Federal Debt and Macroeconomic Activity*

JAMES S. FACKLER
University of Kentucky
Lexington, Kentucky

W. DOUGLAS McMILLIN
Louisiana State University
Baton Rouge, Louisiana

I. Introduction

The primary motivation for a wide variety of studies over the past decade on the macroeconomic effects of government debt is the Ricardian equivalence hypothesis, popularized by Barro [2]. The Ricardian view holds that government debt is not net wealth. As a consequence, a shift from a lump-sum tax to bond finance of government purchases has no effect on macro variables such as output, prices or interest rates. In contrast, the conventional argument holds that government debt is wealth and hence that shifting from lump-sum taxation to bond finance of government purchases will have first-order macroeconomic effects.

Controversy over the Ricardian equivalence hypothesis has occurred at both theoretical and empirical levels. For example, the theoretical underpinnings of the Ricardian equivalence hypothesis have been disputed by Tobin and Buiter [38] and Brunner [6]. Recent empirical work has not resolved the controversy. For instance, Yawitz and Meyer [40], Feldstein [18], Makin [28], Eisner and Pieper [17], deLeeuw and Holloway [13], and Hoelscher [21] find evidence that debt affects output, consumption or interest rates. However, other studies find the opposite; see, e.g., Kochin [24], Tanner [37], Plosser [32], Dwyer [14], Kormendi [25], Hoelscher [22], Evans [15; 16], Seater and Mariano [33], Aschauer [1] and McMillin [29].[1]

The objective of this study is to analyze empirically the effects of federal government debt on the macroeconomy for the period 1963:2–1984:4. An important distinction between this and most earlier analyses is that the effects of debt on key macro variables (output, prices and a long-term interest rate) are analyzed here within the context of a small empirical macro model.[2] A

*The authors wish to thank Thomas Beard, Faik Koray, William Lastrapes, and G S Laumas for helpful comments and suggestions.

1. Hoelscher's 1983 study focused on the short-term interest rate while his 1986 study examined the long-term interest rate Concise summaries of previous deficit/debt interest rate studies are included in U S Treasury [39] and Congressional Budget Office [10]

2 In the literature of which we are aware, most studies analyze the effects of debt on selected macro variables in the context of single equation models The notable exceptions to this statement include Plosser [32] and Dwyer [14], each of whom evaluate the effects of debt within vector autoregressive models Unlike Plosser and Dwyer, however, the present analysis employs data until the mid-1980s Since the current decade is a period of record federal budget deficits, inclusion of data from this decade is presumably important in determining the effects of debt on the economy

second distinction is the separation of the market values of privately held federal debt into two components: domestically-held debt and foreign-held debt. This distinction is important both conceptually and econometrically. The results are obtained by using vector autoregressions (VARs). In view of impressionistic evidence that the results of some types of analyses are sensitive to the particular type of VAR that is estimated, the robustness of the results is checked by employing three different variants of the VAR methodology.

The remainder of the paper is organized as follows. A variety of methodological issues are considered in the next section. The data used in the analysis are discussed in section III. The empirical results are presented in section IV, and concluding comments are in section V.

II. Methodological Issues

It seems most appropriate to examine empirically the effects of government debt within the context of a small macroeconometric model. The results presented below were derived using vector autoregressions, a reduced-form approach. VAR techniques were chosen for two reasons. First, these techniques avoid the imposition of potentially spurious a priori constraints (such as, for example, econometric exogeneity of debt in the interest rate equation or exclusion of debt from the equations for other system variables). Second, as noted by Fischer [19] and Genberg, Salemi and Swoboda [20], VARs are well-suited to an examination of the channels through which a variable operates since few restrictions are imposed on the way the variables interact. However, as is widely known, it is difficult to distinguish sharply among structural hypotheses with VAR techniques since it is a reduced-form approach. Other limitations have been discussed by Cooley and LeRoy [11]. Since our purpose is to gain insight into the channels through which debt operates, however, VAR techniques seem appropriate for our purposes.

The model estimated and presented below allows analysis of the effects of federal government debt within a seven-variable macro model. The model variables are: output, the price level, a long-term interest rate, the money stock, federal government purchases of goods and services, the market value of domestic holdings of federal debt, and the market value of foreign holdings of federal debt. While detailed discussion of the data is given below, several comments about the choice of variables are in order. First, the non-debt variables in the model are those typically included in small macro models. Although inclusion of an interest rate is standard, it should be noted that the present model uses a long-term rate rather than a short-term rate. The presumption is that investment decisions depend more closely on long rates. Second, government purchases are included since, unless government purchases are perfect substitutes for private expenditures, variations in purchases will have macro effects even if debt is not wealth. If government purchases were excluded, macro effects due to variations in government purchases might be attributed incorrectly to the debt variables since government purchases and debt are correlated. Third, the market value of debt holdings by both domestic and foreign agents is used rather than the par values since it is the market values which are relevant for the operation of wealth effects of debt.

There now exist a variety of ways to estimate VARs. One VAR technique, originally proposed by Sims [34; 35], includes all variables in each equation with a common lag length. A sufficiently generous lag specification will avoid bias associated with exclusion of important lags. A system of this type is arguably over-parameterized, however. A second technique, designed to overcome the problem of inefficient estimates in a Sims-type system while avoiding bias due to exclusion of important lags, has been proposed by Caines, Keng and Sethi [9] and Hsiao [23].

Since this technique depends on the final prediction error (FPE) criterion to specify the lag length, we refer to this model as the FPE model. Third, there also exists a "Bayesian" technique for estimating VARs due to Litterman [26; 27]. There is no guarantee that modeling a set of data with each of these techniques will produce consistent results. In order to check the robustness of the results, the data is modeled using the Sims and Caines *et al.* techniques and a variant of the Litterman technique.[3] Details of the specification of each type of model are provided in an appendix that is available on request.

The effects of federal debt on the macroeconomy are investigated by examining impulse response functions, variance decompositions and historical decompositions.[4] Impulse response functions (IRFs) show the predictable response of each variable in the system to a one standard deviation movement in one of the system's variables. IRFs, which are analogous to dynamic multipliers, thus represent the predicted paths of the system's variables when one particular variable changes. For example, IRFs show the expected paths of real GNP, prices and interest rates in response a change in domestically-held debt.

Variance decompositions (VDCs) show the proportion of forecast error variance for each variable that is attributable to its own innovations and to shocks to other system variables. For example, in a VAR, errors in twenty-quarter ahead forecasts of real GNP are partly due to errors in forecasting money as well as errors in forecasting GNP over the preceding 19 quarters. A VDC for GNP would show the percentages of the forecast error variance of GNP due to shocks to GNP, money, and each of the other variables in the system.[5]

Historical decompositions (HDs) show the importance of "surprise" influences on the movement of a variable relative to the predicted path of the variable over a particular time period that is a subset of the sample. As noted by Burbidge and Harrison [8], the HD assigns credit to shocks to the system's variables for differences between a base projection and the realization of a series, where the base projection is the predicted path of the variable conditional on information available at a particular point in time. The extent to which a variable or set of variables accounts for this difference is a measure of the importance of that variable or set of variables over the time period under investigation.[6] For our purposes, we are interested in the role of unanticipated debt shocks for the evolution of output, prices, and interest rates during the 1980s.[7]

3 In the variant of the Bayesian VAR estimated here, we assume that the priors on the coefficients follow a "Pascal" distribution rather than the usual random walk prior With the random walk prior, the own first lag has prior value of unity and all other lags on both own and other variables have priors on their coefficients of zero With the Pascal distribution, lags further back in the distribution have non-zero priors, although these priors gradually decline to zero

4. Details on the computations of the impulse response functions, the variance decompositions, and the historical decompositions can be found in the RATS manual

5 Since VDCs capture both direct and indirect effects, Sims [36] has argued that the strength of Granger-causal relations can be measured by VDCs. He pointed out that "A variable that is optimally forecast from its own lagged values will have all its forecast error variance accounted for by its own disturbances " A corollary is that other variables will explain little of the forecast error variance if there are only weak (or non-existent) Granger-causality effects. For example, if variable x explains only a small portion of the forecast error variance of variable y, this could be interpreted as a weak Granger-causal relation

6 More precisely, the value of variable $x(T + j)$ can be viewed as the sum of the expected value of $x(T + j)$ conditional on information available at time t and the values of the various shocks affecting x over the time period between T and $T + j$. Thus, the historical path of variable x is decomposed into anticipated and unanticipated components

7. It should be noted that in calculating both VDCs and HDs, the order in which the variables are included matters This is so since no contemporaneous terms enter the equations of the VAR; contemporaneous relations among the variables are reflected in the correlation of residuals across equations. In the results presented below, the variance-covariance matrix is orthogonalized by the Choleski decomposition. Because of the cross-equation residual correlation, this decomposition implies that when a variable higher in the order changes, variables lower in the order are assumed to change as well The

In estimating the VAR, it is assumed that the macroeconomy may be treated as stable over the period of estimation and that the behavior of policymakers in relation to the other variables in the macro model was consistent over this period. Sims [36] has argued that, for the U.S. economy, evidence suggests that the structure of the economy changes slowly over time so that one can estimate a model for the postwar period as a whole without undue concern for bias due to changes in parameters.

The other important methodological issue is the separation of the market value of privately-held federal debt into domestic and foreign holdings.[8] This is done for both economic and econometric reasons. To understand the economic rationale, assume for the moment that bonds are wealth. In a loanable funds context, the sale of bonds to finance a deficit raises the demand for loanable funds. For a given supply of such funds, this increased demand tends to drive up interest rates. Other things equal, this rise in domestic interest rates makes domestic assets attractive relative to foreign-issued assets. The purchase of domestic bonds by foreigners rises as a result. This inflow of capital mitigates, at least to some degree, the effect of the sale of bonds on interest rates. Combining domestic and foreign holdings into one series, as is commonly done, consolidates two series with opposite effects on interest rates. The econometric rationale for separating debt into its domestic and foreign components now follows: such consolidation makes it more difficult to detect econometrically any effect of debt on interest rates than if both series are included separately.[9]

III. Data Description

Quarterly data for the period 1961:1–1984:4 are used in the analysis. The start of the sample period coincides with the beginning of the "Keynesian" period in macrostabilization policy as defined by Buchanan and Wagner [7]. The period ends in 1984:4 since the price index for marketable Treasury securities constructed by Cox [12] and used in the construction of our domestic and foreign debt series ends at this point. Data from 1961:1–1963:1 are used as presample data. Estimation is carried out over 1963:2–1984:4.

The seven variables in the model are: real GNP (y), the GNP deflator with 1982 = 100 (P), the narrowly defined money stock ($M1$), Moody's AAA corporate bond rate (AAA), real federal government purchases of goods and services (g), the market value of domestically-held government debt (DD), and the market value of foreign holdings of federal debt (FD). Based on the evidence of Nelson and Plosser [31], prior to specification and estimation of the VARs, each variable except AAA was transformed by taking the first difference of logs. The first difference of the level of AAA was used rather than the first difference of logs since it is assumed that firms are more interested in the basis point change in interest rates than the percentage change in interest rates. All data are seasonally adjusted except for AAA. Although we recognize that seasonally unadjusted data are often preferable for this type of study, the use of adjusted data

extent of the change depends upon the covariance of the variables higher in the order with those lower in the order The particular ordering analyzed here, along with a rationale for our particular choice, is detailed below

8 It is of interest to note that the ratio of foreign holdings of debt to domestic holdings rose from around 7% in 1961 to about 34% in 1978 Since then, it has declined to about 20% in 1983 and 1984

9 Econometric results of Barth, Iden and Russek [3] suggest that the distinction between domestic and foreign holdings of debt may be important In an examination of a previous single-equation interest rate study, they find that when debt is broken down into domestic and foreign components, debt held domestically has a positive and significant effect on interest rates even though domestic plus foreign holdings do not

was necessitated by the desire to use real GNP and the GNP deflator (which are not available in unadjusted form) as measures of output and price. All data with the exceptions of *DD* and *FD* are from Citibase.

DD excludes Federal Reserve and agency holdings, and *DD* and *FD* were constructed in the following way. The par values of seasonally unadjusted domestically-held and foreign-held debt, obtained from the Federal Reserve Bank of St. Louis, were multiplied by the price index for marketable Treasury securities for the last month of the quarter from Table 3 of Cox [12]. The resulting series constitute measures of the market values of domestically-held and foreign-held debt since Cox's price index is the ratio of market to par value for these Treasury securities. This method was employed since Cox does not provide separate series on the market values of domestic and foreign holdings of debt. However, the sum of the debt series generated is essentially identical to the figures in Cox's Table 2 for the market value of privately-held federal debt. The X-11 routine of SAS was used to seasonally adjust *DD* and *FD*.

IV. Empirical Results

Presented in this section are estimates of the effects of debt changes on key variables in the economy. The various effects of debt are evaluated using the IRFs, VDCs and HDs discussed earlier.

The particular ordering of the variables used to compute the VDCs and HDs is: *M1*, *g*, *DD*, *FD*, *AAA*, *y*, and *P*. Presented in the appendix are the results of a second ordering: *g*, *DD*, *FD*, *M1*, *AAA*, *y*, and *P*; these results are essentially the same as those of the first ordering. Note, however, that the policy variables are placed first in each ordering. This means that any contemporaneous correlation between these policy variables and the macro variables of interest, *y*, *P*, and *AAA*, is assigned to the policy variables. We thus assume that the information set that conditions the settings of the policy variables contains only lagged values of *y*, *P*, and *AAA*. This type of feedback relationship has been widely employed in the macro literature in recent years; for an example, see [30]. This ordering thus allows shocks to the policy variables to contemporaneously alter *AAA*; in turn, shocks to the policy variables and *AAA* contemporaneously alter the goods market variables *y* and *P*. In our ordering, *M1* is prior to the fiscal variables so that government spending, for example, can respond to monetary shocks. In the alternative ordering included in the appendix, the fiscal variables precede *M1*. This allows the monetary authority to be affected by or respond to fiscal developments, which does not seem unreasonable in light of the relative flexibility of implementation of monetary policy as opposed to fiscal policy. More generally, theoretical and institutional considerations should guide the determination of the orderings.[10]

The VDCs are presented in Table I. In order to conserve space and to focus upon the effect of debt on interest rates, output and prices, Table I presents only the results for *AAA*, *y* and *P*. The separate effects of *DD* and *FD* are presented, as is the sum of their effects. The VDC results at horizons of 4, 8, 12, and 20 quarters are presented in order to convey a sense of the dynamics of the system.

10 Blanchard and Watson [5] and Bernanke [4] have also argued that theoretical considerations should be employed in computing VDCs, for example However, they have proposed alternatives to the Choleski decomposition for orthogonalizing the residuals

Table I. Variance Decompositions (Ordering: *M1*, *g*, *DD*, *FD*, *AAA*, *y*, *P*)

Variable	Horizon (Quarter)	FPE System			Sims System			Bayesian System		
		DD	*FD*	*DD+FD*	*DD*	*FD*	*DD+FD*	*DD*	*FD*	*DD+FD*
AAA	4	13.2	7.5	20.7	19.1	2.1	21.2	14.8	5.2	20.0
	8	13.5	14.1	27.6	23.3	4.2	27.5	14.1	5.7	19.8
	12	12.9	15.8	28.6	22.7	4.7	27.4	14.1	6.2	20.3
	20	12.9	16.7	29.6	25.7	4.7	30.4	14.0	6.4	20.4
y	4	11.9	15.2	27.1	13.2	13.4	26.6	9.7	6.1	15.8
	8	9.6	20.9	30.5	12.4	8.2	20.6	8.2	7.6	15.8
	12	9.1	19.1	28.2	12.6	6.8	19.4	7.7	7.4	15.1
	20	10.2	20.8	31.1	13.4	6.5	19.9	7.9	8.3	16.2
P	4	4.9	0.6	5.5	3.8	2.8	6.6	2.1	0.2	2.3
	8	5.5	2.2	7.7	4.2	2.0	6.2	1.7	0.6	2.3
	12	5.4	3.8	9.2	6.0	1.5	7.5	2.1	1.3	3.4
	20	5.4	5.7	11.1	8.3	1.4	9.7	3.4	2.6	6.0

If we look first at the combined effects of *DD* and *FD*, we see that the results for the FPE and Sims systems are quite similar at all horizons for *AAA*. The effects are somewhat weaker in the Bayesian system. At the 20 quarter horizon, the effects for the sum of *DD* and *FD* across the three systems range between 20% and 30%, apparently non-trivial fractions of the forecast error variance of *AAA*. For *y*, the effects at quarter 4 are quite similar for the FPE and Sims systems, although for subsequent quarters the effects of the sum of *DD* and *FD* on *y* are stronger in the FPE than the Sims system. Again, the effects in the Bayesian system are weaker than in the other two systems. At a 20 quarter horizon, the sum of *DD* and *FD* explains 16%–31% of the variation in *y*. Thus, as in the case of *AAA*, debt appears to have economically important effects on *y*. For *P*, the story appears different. The effects of debt are relatively weak in all three systems. At the 20 quarter horizon, 6%–11% of the variation in *P* is explained by the sum of domestic and foreign debt holdings. The longer-run effect of debt on *P* is about one and one-half times the quarter 4 effect in the Sims system, about twice the initial effect in the FPE system, and about two and a half times the initial effect in the Bayesian system. The larger impact of debt on *y* than *P* may reflect rigidities in prices.

For the Sims and Bayesian systems, the effects of *DD* outweigh the effects of *FD* for all three macro variables. For the FPE system, the results are different. The effects of *DD* outweigh those of *FD* only for *P*. For *AAA*, *DD*'s effects outweigh those of *FD* at quarter 4, but the reverse is true at the other horizons. For *y*, at every horizon *FD*'s effects outweigh those of *DD*. It is not clear why these differences between the FPE and the other systems arise. It appears that the method of specifying and estimating the VAR makes more difference in the estimation of the separate effects of *DD* and *FD* than it does for the estimation of the combined effects.

Although the VDC results suggest important macroeconomic effects of debt, they provide no indication of the *direction* of effect of debt. Such an indication about the direction of effects of shocks to *DD* and *FD* is provided by the IRFs. The responses of *AAA*, *y* and *P* for all three systems to a one standard deviation shock to *DD* are presented in part A of Figure 1. The responses for the FPE and Bayesian systems are quite similar while the responses for the Sims system display somewhat wider swings. Interestingly, the initial effects of a shock to *DD* on *AAA* are *negative,* not positive as predicted by the conventional view of debt. After about seven quarters, the effects fluctuate closely around zero for the FPE and Bayesian systems while the

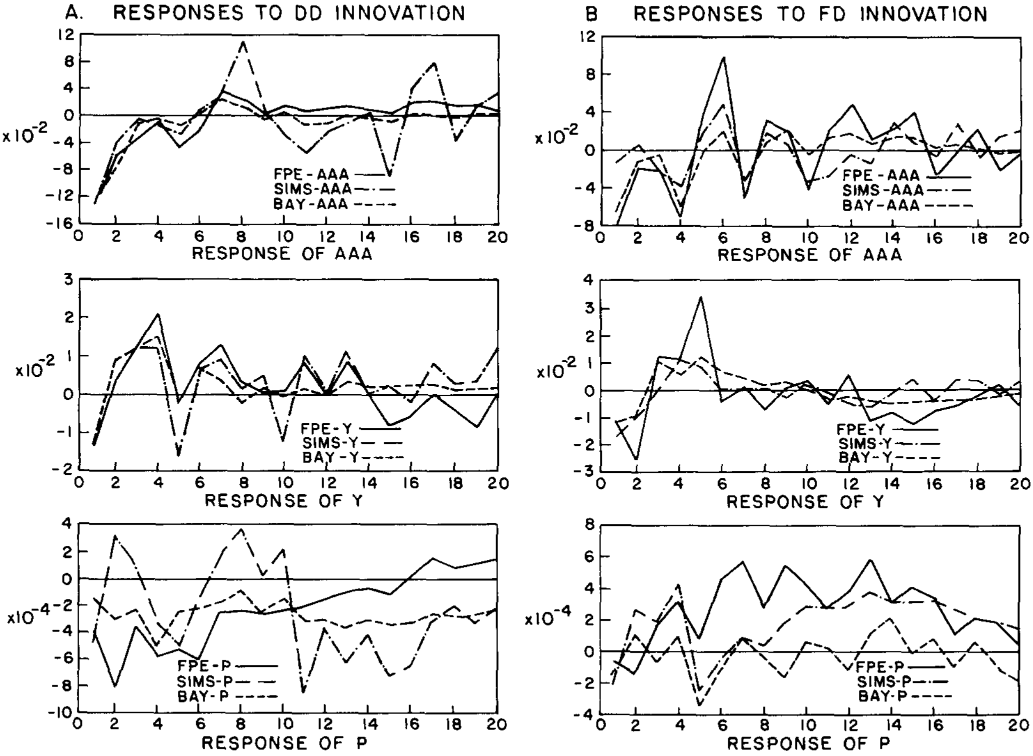

Figure 1.

swings around zero are wider for the Sims system. The initial effects on y and P are also negative for all three systems. For y, the effects quickly become positive, but then fluctuate around zero. For P, the effects in the FPE and Bayesian systems remain negative for an extended period. As with the interest rate, the effects in the Sims system exhibit wider swings for both income and prices.

The initial negative effects on y, P, and AAA are consistent with the evidence of Kormendi [25] and Evans [15]. Kormendi finds some evidence of a significant, negative effect of government debt on consumption while Evans finds evidence of a significant negative effect of deficits on interest rates. The negative effects are not consistent with the conventional view that debt is wealth. They also appear at odds with the Ricardian view. However, Kormendi, based upon a prior argument by Barro [2], suggests that because of uncertainty about the individual's share of future taxes and the timing of these taxes, individuals may save more than the present value of the income streams associated with bonds issued to finance a deficit. In this view, wealth falls as deficits rise, so one would expect declines in interest rates, output, and prices.

The responses of AAA, y, and P for all three systems to a one standard deviation shock to FD are presented in part B of Figure 1. For AAA, the initial effects are negative in all systems. After about seven quarters, the effects fluctuate around zero. The widest swings are now found for the FPE system. For both y and P, the initial effects are also negative. For y, the effects settle down to approximately zero after six quarters. For P, the effects for the FPE and Bayesian systems are positive after quarter six while the effects for the Sims system fluctuate around zero. The initial negative effects on AAA seem consistent with the standard view that a foreign capital inflow

Table II. Summary of Historical Decomposition Results (Ordering: *M1*, *g*, *DD*, *FD*, *AAA*, *y*, *P*)

Variable	*BP*[a] RMSE[c]	*BP+DD+FD*[b] RMSE	RATIO[d]
AAA			
FPE System	.716	.566	(.79)
Sims System	.591	.373	(.63)
Bayesian System	.786	.678	(.86)
y			
FPE System	.010	.008	(.80)
Sims System	.010	.007	(.70)
Bayesian System	.012	.009	(.75)
P			
FPE System	.005	.004	(.80)
Sims System	.003	.003	(1.00)
Bayesian System	.004	.004	(1.00)

a. *BP* = base projection.
b. *BP* + *DD* + *FD* = base projection plus influence of *DD* and *FD*.
c. RMSE = root-mean-square error.
d Ratio of RMSE of *BP* + *DD* + *FD* to RMSE of *BP*.

puts downward pressure on interest rates. However, there seems to be no obvious explanation for the patterns of effects for *y* and *P*. We note that the effects on *y* quickly go to zero, while the long-run effects on *P* also appear to be zero.

The results from the HDs for the period 1980:1–1984:4, when outstanding debt grew rapidly, show that debt shocks were important in explaining the behavior of *AAA* and *y*, but not of *P*; see Table II. To conserve space, only the combined effects of *DD* and *FD* are reported. As noted earlier, if debt is important in explaining the behavior of *AAA*, for example, the base projection for *AAA* plus the contribution of *DD* and *FD*(*BP* + *DD* + *FD*) should be closer to the actual series than the base projection alone (*BP*). In order to more precisely determine how *DD* and *FD* contribute to closing the gap between the base projection and the actual series, the root-mean-square error (RMSE) was computed for *BP* and *BP* + *DD* + *FD*. The numbers in parentheses in Table II are the ratios of the RMSEs for *BP* + *DD* + *FD* to those of *BP*. For *AAA*, we observe a reduction of 37% (=1.0 − .63) in the RMSE for the Sims system, and reductions of 21% and 14% for the FPE and Bayesian systems, respectively. For *y*, the addition of *DD* and *FD* to the base projection reduces the RMSE by 30% for the Sims system, by 20% for the FPE system, and by 25% for the Bayesian system. The addition of *DD* and *FD* does not reduce the RMSE for *P* for the Sims and Bayesian systems, but for the FPE system the RMSE of the base projection is reduced by 20%. Thus, the HD results are broadly consistent with the VDC results, which indicated substantially larger effects of debt shocks on *AAA* and *y* than on *P*.

V. Conclusion

This paper has considered the effects of federal government debt on the macroeconomy for the period 1963:2–1984:4. The study differs from previous analyses in several ways. First, the effects of debt are analyzed in the context of a system of equations. Second, the market value of debt, rather than the par value, is used in the analysis. Third, the distinction between domestically-held and foreign-held debt is considered. Finally, the robustness of the results with regard to the type of VAR methodology is checked.

The effects of debt were evaluated by computing impulse response functions, variance decompositions, and historical decompositions. The results indicated that the sum of domestically-held and foreign-held debt had non-trivial effects on the long-term interest rate and output. The effects on prices are much weaker.

As has been widely noted, it is difficult to distinguish sharply among structural hypotheses using the techniques in this paper. Based on the variance decompositions and historical decompositions, it might be tempting to conclude that the results suggest that federal debt is wealth. However, the impulse response function results do not appear consistent with the conventional view that of the macroeconomic role of government debt. In particular, the IRFs indicated that shocks to holdings of domestic debt initially *reduce* the interest rate, output, and prices. An explanation of this type of result that is consistent with the Ricardian equivalence hypothesis has been offered by Kormendi [25]. He argues that due to uncertainty about the individual's share of future taxes and the timing of these taxes, individuals may save more than the present value of the income streams associated with bonds issued to finance a government deficit. Wealth is thus reduced, implying the expected negative effects on interest rates, output, and price. While there may be other explanations, our findings do not appear consistent with the conventional view that debt is wealth and that increases in government debt raise aggregate demand.

References

1. Aschauer, David A , "Fiscal Policy and Aggregate Demand " *American Economic Review*, March 1985, 117–27.

2. Barro, Robert J., "Are Government Bonds Net Wealth?" *Journal of Political Economy*, November/December 1974, 1095–117.

3. Barth, James R., George Iden, and Frank S Russek, "Do Federal Deficits Really Matter?" *Contemporary Policy Issues*, Fall 1984–85, 79–95.

4. Bernanke, Ben S , "Alternative Explanations of the Money-Income Correlation." *Carnegie Rochester Conference Series on Public Policy*, Autumn 1986, 49–99

5. Blanchard, Olivier J., and Mark W Watson "Are Business Cycles All Alike?" in *The American Business Cycle*, edited by Robert J Gordon. Chicago: University of Chicago Press, 1986, pp 123–82

6 Brunner, Karl. "Fiscal Policy in Macro Theory A Survey and Evaluation," in *The Monetary versus Fiscal Policy Debate: Lessons from Two Decades*, edited by R W. Hafer. Totowa, New Jersey: Rowman and Allanheld, 1986, pp 33–116.

7. Buchanan, James A., and Richard E Wagner, *Democracy in Deficit The Political Legacy of Lord Keynes* Academic Press, New York, 1977.

8. Burbidge, John, and Alan Harrison, "An Historical Decomposition of the Great Depression to Determine the Role of Money." *Journal of Monetary Economics*, July 1985, 45–54

9 Caines, P E , C. W Keng, and S. P Sethi, "Causality Analysis and Multivariate Autoregressive Modelling with an Application to Supermarket Sales Analysis " *Journal of Economic Dynamics and Control*, August 1981, 267–98

10 Congressional Budget Office *The Economic Outlook*, February 1984, Appendix A (Deficits and Interest Rates Empirical Findings and Selected Bibliography), 99–102

11 Cooley, Thomas F., and Stephen F. LeRoy, "Atheoretical Macroeconomics. A Critique." *Journal of Monetary Economics*, November 1985, 283–308

12. Cox, W Michael, "The Behavior of Treasury Securities: Monthly, 1942–1984 " *Journal of Monetary Economics*, September 1985, 227–40

13. de Leeuw, Frank, and Thomas M Holloway, "The Measurement and Significance of the Cyclically Adjusted Federal Budget and Debt " *Journal of Money, Credit, and Banking*, May 1985, 232–42

14 Dwyer, Gerald P , Jr , "Inflation and Government Deficits." *Economic Inquiry*, July 1982, 315–29.

15. Evans, Paul, "Do Large Deficits Produce High Interest Rates?" *American Economic Review*, March 1985, 68–87.

16. ———, "Interest Rates and Expected Future Budget Deficits in the United States." *Journal of Political Economy*, February 1987, 34–58.

17. Eisner, Robert, and Paul J. Pieper, "A New View of Federal Debt and Budget Deficits" *American Economic Review*, March 1984, 11–29.

18. Feldstein, Martin, "Government Deficits and Aggregate Demand" *Journal of Monetary Economics*, January 1982, 1–20.

19. Fischer, Stanley, "Relative Shocks, Relative Price Variability, and Inflation." *Brookings Papers on Economic Activity*, 2 1981, 381–431.

20 Genberg, Hans, Michael K. Salemi, and Alexander Swoboda, "The Relative Importance of Foreign and Domestic Disturbances for Aggregate Fluctuations in the Open Economy Switzerland, 1964–1981" *Journal of Monetary Economics*, January 1987, 45–67.

21 Hoelscher, Gregory, "New Evidence on Deficits and Interest Rates" *Journal of Money, Credit, and Banking*, February 1986, 1–17.

22 ———, "Federal Borrowing and Short-term Interest Rates" *Southern Economic Journal*, October 1983, 319–33.

23. Hsiao, Cheng, "Autoregressive Modelling and Money Income Causality Detection" *Journal of Monetary Economics*, January 1981, 85–106.

24. Kochin, Levis, "Are Future Taxes Anticipated by Consumers?" *Journal of Money, Credit, and Banking*, August 1974, 385–94

25. Kormendi, Roger C., "Government Debt, Government Spending, and Private Sector Behavior." *American Economic Review*, December 1983, 994–1010

26. Litterman, Robert B., "Techniques of Forecasting Using Vector Autoregressions," Working Paper 115, Federal Reserve Bank of Minneapolis, 1979.

27. ———, "Specifying Vector Autoregressions for Macroeconomic Forecasting," Staff Report 92, Federal Reserve Bank of Minneapolis, 1980

28. Makin, John H., "Real Interest, Money Surprises, Anticipated Inflation and Fiscal Deficits." *Review of Economics and Statistics*, August 1983, 374–84.

29 McMillin, W. Douglas, "Federal Deficits and Short-Term Interest Rates" *Journal of Macroeconomics*, Fall 1987, 403–22

30. Mishkin, Frederic S., "Does Anticipated Monetary Policy Matter? An Empirical Investigation" *Journal of Political Economy*, February 1982, 22–51.

31. Nelson, Charles R., and Charles I Plosser, "Trends and Random Walks in Macroeconomic Time Series Some Evidence and Implications." *Journal of Monetary Economics*, September 1982, 139–62

32 Plosser, Charles I, "Government Financing Decisions and Asset Returns." *Journal of Monetary Economics*, May 1982, 325–52

33 Seater, John J., and Roberto S Mariano, "New Tests of the Life Cycle and Tax Discounting Hypothesis" *Journal of Monetary Economics*, March 1985, 195–215.

34. Sims, Christopher A., "Macroeconomics and Reality" *Econometrica*, January 1980, 1–48

35. ———, "Comparison of Interwar and Postwar Business Cycles. Monetarism Reconsidered" *American Economic Review*, May 1980, 250–57.

36. ———, "Policy Analysis with Econometric Models" *Brookings Papers on Economic Activity*, 1 1982, 107–52

37. Tanner, J Ernest, "An Empirical investigation of Tax Discounting" *Journal of Money, Credit, and Banking*, May 1979, 214–18

38. Tobin, James, and Willem Buiter. "Fiscal and Monetary Policies, Capital Formation, and Economic Activity," in *The Government and Capital Formation*, edited by George von Furstenberg Cambridge. Ballinger, 1980, pp 73–151

39. U. S. Treasury Department, Office of the Assistant Secretary for Economic Policy. "The Effects of Deficits on Prices of Financial Assets: Theory and Evidence" March 1984.

40. Yawitz, Jess B, and Laurence H. Meyer, "An Empirical Test of the Extent of Tax Discounting" *Journal of Money, Credit, and Banking*, May 1976, 247–54