THE RELATIONSHIP BETWEEN FEDERAL TAXES AND SPENDING: AN EXAMINATION OF RECENT RESEARCH

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This study was prepared at the request of Congressman William H. Gray, III, Chairman, Budget Committee, United States House of Representatives. It was written by Jon Hakken and Rosemarie Nielsen of the Tax Analysis Division, under the supervision of Rosemary D. Marcuss and Eric J. Toder. Maureen Griffin provided research support. Questions regarding this analysis may be addressed to Jon Hakken (226-2680) or Rosemarie Nielsen (226-2690).

OVERVIEW AND PURPOSE OF THE PAPER

The Congress continues to debate the proper mix of tax increases and spending cuts, the two available tools for reducing the deficit. Recently some commentators have argued that historical evidence indicates that, contrary to the above presumption, federal tax increases cause federal spending increases. An even stronger position holds that these spending increases may be larger than the tax increases that cause them. This position implies that tax increases are ineffective at best, and may even be counterproductive in reducing the federal deficit.

This paper examines the hypothesis that tax increases cannot reduce deficits (hereafter referred to as the "tax-and-spend" hypothesis). First, it presents historical tax and spending data and observes some trends. Next, it shows that the statistical results in one recent study, by Vedder, Gallaway, and Frenze, are extremely sensitive to the sample period, and are also highly dependent on assumptions about the structure of the error term in the basic regression. 1/ It concludes that the Vedder *et al.* analysis provides no persuasive evidence in favor of the tax-and-spend hypothesis.

Next, the paper discusses another recent study by von Furstenberg, Green, and Jeong that attempts to test the tax-and-spend hypothesis using a much different econometric technique: by observing the order of precedence between federal tax increases and federal spending increases. 2/ Again, the evidence does not support the tax-and-spend hypothesis.

Several other studies of the tax-and-spend hypothesis focus on the taxing and spending behavior of state and local governments. These have not been reviewed since the widespread use of constitutional restrictions against deficit spending at the state and local level makes the tax-spending link much tighter than at the federal level.

THE HISTORICAL RELATIONSHIP BETWEEN TAXES AND SPENDING

This section presents data on taxes and spending during the post-World War II period are presented for the purpose of examining the past relationship between federal tax collections and expenditures. Taxes and spending are unquestionably related because taxes are raised either to pay

1. Richard Vedder, Lowell Gallaway, and Christopher Frenze, "Federal Tax Increases and the Budget Deficit, 1947-1986," paper released by minority staff, Joint Economic Committee (1987).

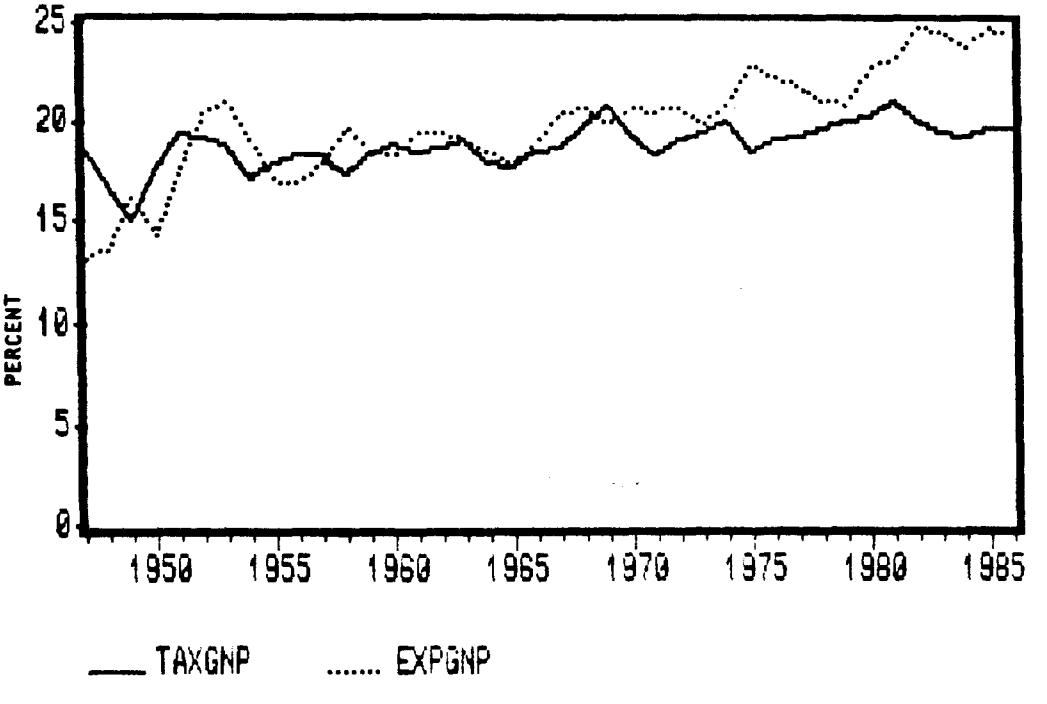
2. George von Furstenberg, R. Jeffery Green, and Jin-Ho Jeong, "Tax and Spend, or Spend and Tax," Review of Economics and Statistics (May 1986).

for current spending or to pay for debt-financed spending from prior years. The relationship, however, is not exact. For example, taxes and spending may diverge because they change in opposite directions over the business cycle in response to automatic and discretionary stabilization policies, or because extraordinary spending during wars is not fully tax financed.

In the postwar period, most of the spending in any year has been financed by tax collections in that year. However, both spending and taxes have grown to become increasing shares of gross national product (GNP), as shown in Figure 1. In 1947, government spending was only 13 percent of GNP; during the 1980s, spending rose from 22 percent to over 24 percent of GNP. Similarly, taxes were less than 18 percent of GNP in 1948-1950, but rose to about 20 percent of GNP in the late 1970s and have remained at about that level.

The figure shows that the share of spending that is deficit financed has generally been quite small. In some years, the government ran small budgetary surpluses. Even in many of the deficit years, the deficit was less than 1 percent of GNP. With the exception of high deficits in 1975 and 1976, the deficit exceeded 2 percent of GNP only in the 1980s, reaching historically high levels of about 5 percent of GNP from 1982 to the present.

FIGURE 1. FEDERAL TAXES AND EXPENDITURES AS A SHARE OF GNP (1947-1986)



SOURCE: Economic Report of the President (1987).

THE TAX-AND-SPEND HYPOTHESIS

Even though annual federal tax receipts have nearly equaled annual spending during most of the postwar period, the recent divergence of one from the other has stimulated academic interest and political controversy over whether there is a direct causal relationship between tax and spending changes.

Some critics of tax increases argue that tax increases cause spending increases and that, as a result, tax increases are not very effective in reducing the deficit. The logical extreme of this argument is that tax increases cause spending increases of an equal or greater magnitude so that tax increases cannot reduce deficits.

It is worth noting that even skeptics of the tax-and-spend hypothesis admit that taxes and spending are related in the sense that taxes always pay for past or present spending. The controversy is over whether, at the margin, additional taxes actually reduce the deficit, or whether the political process inevitably results in the Congress using these additional taxes for higher spending levels.

The study by Vedder *et al.* claims that historical evidence supports what might be called an extreme view of the tax-and-spend hypothesis--namely, that tax increases cause even larger spending increases in the same year. Specifically, the authors estimate that over the postwar period every dollar increase in taxes led to a $0.58 increase in the deficit, other factors held constant. This implies a $1.58 increase in spending for every dollar increase in taxes.

The empirical analysis done by Vedder *et al.* does not actually test for a causal relationship between taxes and spending. It assumes that tax increases cause spending increases as the basis for specifying the statistical model. The statistical model then determines how responsive spending is to a tax increase, assuming that taxes affect spending.

The estimated $1.58 spending response to a dollar increase in taxes is highly sensitive to the time period selected and to the statistical formulation, in particular to the specification of the error term. The first column in Table 1 shows the regression results reported by Vedder *et al.* The dependent variable is the actual budget deficit as a percentage of GNP. The independent variables include actual tax receipts as a percentage of GNP, a dummy variable for the Korean and Vietnam wars, and macroeconomic variables that affect the deficit. Estimated t-statistics are shown below their estimated coefficients. The regression is corrected for autoregressive errors using a "moving average" technique. The second column shows CBO's replication of the Vedder *et al.* results. While the replication is not exact, it is very close. The key result is shown in the row labeled "taxes/GNP." The coefficient of 0.58 for the Vedder specifi-

cation implies that the deficit increases by $0.58 for each additional dollar of tax receipts, holding other factors constant. The CBO replication shows a slightly smaller deficit response of $0.55 for each additional dollar of taxes. Both estimates of the coefficient are significantly greater than zero at a 99 percent level of confidence.

The third column in Table 1 reports the regression coefficients for a slightly different specification of the error term. The regression uses the Cochran-Orcutt method of correcting for serial correlation instead of the "moving average" method used by Vedder *et al.* Under this specification, an additional dollar of taxes is estimated to reduce the deficit by $0.17 instead of increasing it by $0.58 as reported by Vedder *et al.* The estimated coefficient is not significantly different from zero, meaning that the hypothesis that additional taxes have no effect on the current deficit cannot be rejected as Vedder *et al.* claimed in the case of their specification.

The fourth and fifth columns repeat the specifications in the second and third columns using data for only the past three decades (1956-1986) instead of for the entire postwar period (1949-1986). Using Vedder's specification, an additional tax dollar is estimated to increase the deficit by only $0.05. Using Vedder's specification with a Cochran-Orcutt adjustment for serial correlation, an additional tax dollar is estimated to reduce the deficit by $0.92. Given that the $0.92 reduction is significantly different from zero, the hypothesis that additional taxes do not reduce the deficit can be rejected. Moreover, given that the coefficient is not significantly different from -1.0, the hypothesis that additional taxes have no effect on current spending cannot be rejected. Therefore, a tax increase may reduce the deficit by nearly the same amount.

The fact that slight variations in the error term specification and the sample period lead to opposite results casts doubt on the credibility of the basic empirical finding of Vedder *et al.* that additional taxes do not reduce the deficit. 3/

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3. Another problem with the specification used by Vedder et al. is that the macroeconomic variables only control for the effects of these variables on spending, not on taxes. This is because actual tax receipts are included, in a linear fashion, in the dependent variable as well as being included as an independent variable. In order to correct this problem, the regression that is shown in the sixth column of Table 1 repeats Vedder's specification but substitutes "full employment" tax receipts as an independent variable instead of actual receipts. The sample period is limited to the last 30 years, because estimates of "full employment" tax receipts were not readily available for earlier years. The regression shown in the seventh column repeats the specification in the sixth column with a Cochran-Orcutt adjustment instead of the "moving average" adjustment. While the use of the "full employment" tax receipt variable clearly affects the coefficients for the macroeconomic variables, it has little effect on the coefficient for the tax variable.

TABLE 1. REGRESSION RESULTS

Dependent Variable: Deficit/GNP	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Specification:	Vedder et al.[1]	CBO Replication	Same As (2), Except Error Term	Same As (2), Different Period	Same As (4), Except Error Term	Discretionary Tax Specification	Same As (6), Except Error Term
Time Period:[2]	1949?-1986	1949-1986	1949-1986	1956-1986	1956-1986	1956-1986	1956-1988
Adjustment for Serial Correlation:[3]	MA(1)	MA(1)	AR(1)	MA(1)	AR(1)	MA(1)	AR(1)
Constant	-15.14	-12.60	4.00	-7.11	21.60	-5.01	18.09
	-3.61	-3.83	1.74	-1.86	1.97	-1.28	2.58
Taxes/GNP	0.58	0.55	-0.17	0.05	-0.92	---	---
	2.39	2.93	-1.69	0.22	-4.79	---	---
Full Employment	---	---	---	---	---	-0.08	-0.88
Taxes/GNP	---	---	---	---	---	-0.36	-4.81
Civilian Unemployment Rate	0.85	0.64	0.25	1.22	0.44	1.28	0.76
	4.67	4.02	1.46	5.84	2.25	5.50	4.43
Real GNP Growth	0.04	-0.10	-0.12	0.06	-0.08	0.06	-0.13
	0.47	-1.49	-2.30	0.82	-1.72	0.81	-2.65
War Dummy Variable	0.77	0.40	0.13	1.28	-0.13	1.31	-0.18
	1.29	0.82	0.24	2.42	-0.29	2.57	-0.40
Unanticipated Inflation	-0.19	-0.19	-0.23	0.04	-0.06	0.05	-0.08
	-2.48	-2.94	-4.47	0.43	-1.11	0.63	-1.34
MA(1)	not reported	0.64	---	0.55	---	0.58	---
		3.49	---	2.43	---	2.55	---
AR(1)	---	---	0.74	---	0.96	---	0.95
	---	---	7.18	---	13.89	---	12.59
R^{-2}	0.68	0.77	0.83	0.81	0.92	0.82	0.93
Durbin Watson	1.93	1.85	1.65	1.71	1.58	1.72	1.70

1. Richard Vedder, Lowell Gallaway, and Christopher Frenze, "Federal Tax Increases and the Budget Deficit, 1947-1986," paper released by minority staff, Joint Economic Committee (1987).
2. Data for 1947-1986 were used, but no value is available for the civilian unemployment rate for 1947. Because a lag term is included in the specification, the sample would be restricted to 1949-1986 unless a value were imputed for the missing value.
3. MA(1) is the "moving average" adjustment and AR(1) is the Cochran-Orcutt adjustment.

OTHER INFERENCES ABOUT THE CAUSAL RELATIONSHIP BETWEEN TAXES AND SPENDING

As mentioned before, causality cannot be directly tested statistically. Statistical models always assume that some variables are endogenous (dependent) and others are exogenous (independent). Changes in the exogenous variables are assumed to cause changes in the endogenous variables, while changes in the endogenous variables are assumed not to affect exogenous variables.

In the case of the relationship between taxes and spending, there is no commonly accepted theory about which variables are exogenous and which are endogenous. The relationship is usually seen as being very complex. Taxes may be raised to finance a given level of spending; spending may be raised because tax revenues are available, or taxes and spending may be determined simultaneously.

One way of testing evidence on potential causality is to examine the order of events. While Vedder *et al.* did not attempt to use this method of inference for their analysis, it has been used by von Furstenberg and his colleagues to examine federal taxes and spending.

Von Furstenberg, Green, and Jeong investigated the dynamic relationship between federal tax receipts and expenditures during the 1954-1982 period. They used data on aggregate taxes and expenditures that were adjusted to exclude the automatic effects of the business cycle and inflation in order to isolate the effects of "discretionary" or "legislated" changes in taxes and spending on each other. They looked for a systematic relationship between discretionary changes in aggregate spending and discretionary changes in aggregate taxes during the preceding 16 quarters, suggesting that tax changes have led historically to spending changes. They also looked for a systematic relationship suggesting the opposite--that spending changes have led to tax changes. 4/

Von Furstenberg *et al.* did not find a statistically significant relationship in either direction. Discretionary changes in taxes did not systematically precede discretionary changes in aggregate spending nor did discretionary changes in aggregate spending systematically precede discretionary changes in taxes. While the results came close to suggesting that spending preceded taxes, they provided no evidence that taxes preceded

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4. One problem with this approach is that "discretionary" tax and spending changes may follow legislative actions in an unsystematic manner. Thus, for example, legislative action on spending could precede legislative action on taxes, but the resulting changes in discretionary tax receipts could precede the resulting changes in discretionary outlays. These time lags between legislative action and fiscal effect confound the problem of inferring precedence.

spending. Changes in the mix of spending, however, did precede tax changes in a statistically significant way.

Conclusion

Given the difficulties of inferring causality from tax and spending data, it is hard to reach a definite conclusion about whether taxes cause spending, spending causes taxes, or something else causes both. What does seem clear, both from CBO's reestimates of the Vedder specification and from the von Furstenberg study, is that there is no persuasive evidence that taxes cause spending at the federal level.