Forecasting the Effects of Reduced Defense Spending

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I. INTRODUCTION

The end of the Cold War provides the United States with an opportunity to cut its defense spending significantly. Indeed, the Bush Administration's 1992-1997 Future Years Defense Program (presented in 1991 and therefore referred to as the "1991 plan") calls for a 20 percent reduction in real defense spending by 1997. Although expenditures related to Operation Desert Storm have delayed the implementation of the 1991 plan, policymakers continue to call for defense cutbacks. In fact, since Bush's plan was drafted prior to the collapse of the Soviet Union, it seems likely that the Clinton Administration will propose cuts in defense spending that are even deeper than those specified by the 1991 plan. This paper draws on both theoretical and empirical economic models to forecast the effects that these cuts will have on the U.S. economy.

A. Economic Theory

Economic theory suggests that in the short run, cuts in defense spending are likely to have disruptive effects on the U.S. economy. Productive resources—both labor and capital—must shift out of defense-related industries and into nondefense industries. The adjustment costs that this shift entails are likely to restrain economic growth as the defense cuts are implemented.

Economic theory is less clear, however, about the likely long-run consequences of reduced defense spending. The neoclassical macroeconomic model (a simple version of which is presented by Barro, 1984) assumes that all goods and services are produced by the private sector. Rather than hiring labor, accumulating capital, and producing defense services itself, the government simply purchases these services from the private sector. Thus, according to the neoclassical model, the direct effect of a permanent $1 cut in defense spending acts to decrease the total demand for goods and services in each period by $1. Of course, so long as the government has access to the same production technologies that are available to the private sector, this prediction of the neoclassical model does not change if instead the government produces the defense services itself.[1]

A permanent $1 cut in defense spending also reduces the government's need for tax revenue; it implies that taxes can be cut by $1 in each period. Households, therefore, are wealthier following the cut in defense spending; their permanent income increases by $1. According to the permanent income hypothesis, this $1 increase in permanent income induces households to increase their consumption by $1 in every period, provided that their labor supply does not change.

However, the wealth effect of reduced defense spending may also induce households to increase the amount of leisure that they choose to enjoy. If households respond to the increase in wealth by taking more leisure, then the increase in consumption from the wealth effect only amounts to $\$(1-\alpha)$ per period, where α is a number between zero and one. That is, the increase in wealth is split between an increase in consumption and an increase in leisure. In general, therefore, the wealth effect of a cut in defense spending acts to increase private consumption, and hence total demand, by $\$(1-\alpha)$ per period.

The increase in leisure from the wealth effect, meanwhile, translates into a decrease in labor supply. This decrease in labor supply, in turn, translates into a decrease in the total supply of goods and services. In fact, the increase in leisure acts to decrease the total supply of goods by $\$\alpha$ per period (Barro, 1984, Ch. 13). Thus, the number α measures

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[1] See Wynne (1992), however, for a more general version of the neoclassical model in which the government may have access to different technologies from those used by the private sector. Wynne's model also distinguishes between the goods and services that the government produces itself and those that it purchases from the private sector.

the magnitude of the wealth effect's impact on leisure and the supply of goods relative to its impact on consumption and the demand for goods. The higher α is, the larger the decrease in supply and the smaller the increase in demand.

Combining the direct effect of the permanent $1 cut in defense spending, which decreases total demand by $1 per period, with the wealth effect, which increases total demand by $\$(1-\alpha)$ per period, shows the permanent cut in defense spending decreases the total demand for goods by $\$\alpha$ per period. Likewise, the direct effect implies no change in supply, while the wealth effect implies a decrease in supply of $\$\alpha$ per period; when combined, the two effects imply a decrease in supply of $\$\alpha$ per period. Altogether, both total demand and total supply decrease by $\$\alpha$ in each period, so that the permanent cut in defense spending reduces real output by $\$\alpha$ in each period.

Before moving on, it is important to emphasize that although the neoclassical model predicts that total output (GNP) will fall in response to a permanent cut in defense spending, this result does not imply that households would be better off without the spending cut. While the permanent $1 cut in defense spending reduces total GNP by $\$\alpha$ per period, it also makes available to households $1 per period that would otherwise be allocated to defense. Private GNP, defined as total GNP less all government spending, therefore increases by $\$(1-\alpha)$ per period. Since private GNP accounts for the goods and services that are available to the private sector, it is a better measure of welfare than total GNP; the rise in private GNP indicates that households are better off after the defense cuts, even though total GNP is lower. In fact, the increase in private GNP underestimates the welfare gain from reduced defense spending since it does not take into account the increase in leisure resulting from the wealth effect of the spending cut.

So far, the analysis has assumed that the cut in defense spending will be used to reduce taxes. Provided that the Ricardian equivalence theorem applies, however, the results do not change if instead the cuts are used to reduce the government debt. Suppose that, in fact, the permanent $1 cut in defense spending is initially used to reduce the government debt. According to the Ricardian equivalence theorem, households recognize that by reducing its debt, the government is reducing its need for future tax revenues by an equal amount. Thus, using the cut in defense spending to reduce the government debt today simply means that tax cuts of more than $1 per period will come in the future. Under Ricardian equivalence, household wealth does not depend on the precise timing of the tax cuts. The magnitude of the wealth effect, and hence the changes in aggregate supply and demand, are the same whether the cut in defense spending is used to reduce the federal debt or to reduce taxes.

Central to the Ricardian equivalence theorem is the assumption that households experience the same change in wealth from a reduction in government debt as they do from a cut in taxes. If this assumption is incorrect, then a cut in defense spending can have very different long-run effects from those predicted by the neoclassical model under Ricardian equivalence.

Most frequently, the relevance of the Ricardian equivalence theorem is questioned based upon the observation that households have lifetimes of finite length (Bernheim, 1987). Suppose, for instance, that while individuals recognize that a reduction in government debt today implies that taxes will be lower in the future, they also expect that the future tax cuts will occur after they have died. In this extreme case, individuals who are alive today experience no change in wealth if the cuts in defense spending are used to reduce the government debt. Only the direct effect of the defense cut is present; the wealth effect is missing. Since households do not experience an increase in permanent income, neither their consumption nor their labor supply changes. The decrease in total demand resulting from the direct effect of the spending cut leads to a condition of excess supply.

In response to excess supply, output falls in the short run, and the real interest rate falls as well. In the long run, however, the lower real interest rate leads to increases in both investment and output. Thus, a departure from Ricardian equivalence can explain why cuts in defense spending might increase, rather than decrease, total GNP in the long run, provided that the cuts are used to reduce the government debt.

Whether or not the Ricardian equivalence theorem applies to the U.S. economy is a controversial issue. There are many theoretical models in which household wealth is affected by a decrease in government debt in exactly the same way that wealth is affected by a decrease in taxes, so that Ricardian equivalence applies (see Barro, 1989, for a survey of these models). On the other hand, there are many other models in which the wealth effect from a cut in government debt differs from the wealth effect from a cut in taxes, so that Ricardian equivalence does not hold (see Bernheim, 1987, for a survey of these models). Overall, economic theory provides no clear answer as to the relevance of the Ricardian equivalence theorem. Consequently, economic theory does not provide a clear answer as to the long-run effects of cuts in defense spending either. Instead, empirical models must be used to forecast the effects of reduced defense spending.

B. Previous Empirical Estimates

A detailed study by the Congressional Budget Office (CBO, 1992) forecasts the effects of the 1991 plan for the U.S. economy. The CBO's conclusions are based on results from two large-scale macroeconomic forecasting models: the Data Resources, Inc. (DRI) Quarterly Macroeconomic Model and the McKibbin-Sachs Global (MSG) Model. Both of these econometric models incorporate short-run adjustment costs of changes in defense spending and long-run non-Ricardian effects of changes in the government debt into their forecasts for real economic activity. The models predict, therefore, that the cuts proposed by the 1991 plan will reduce growth in the U.S. economy in the short run. The models also predict that if the cuts in defense spending are used to reduce the federal debt, then the real interest rate will fall and investment and output will increase in the long run as the non-Ricardian effects kick in. Thus, while the CBO predicts that the 1991 plan will reduce total GNP by approximately 0.6 percent throughout the mid-1990s, their forecasts also show positive effects on total GNP by the end of the decade, leading to a long-run increase in total GNP of almost 1 percent.

The Congressional Budget Office's econometric models draw heavily on economic theory to obtain their conclusions. As noted above, however, there is considerable debate in the theoretical literature concerning the possible channels through which defense spending influences aggregate activity in the long run. Models that assume that the Ricardian equivalence theorem holds indicate that cuts in defense spending will reduce output in the long run. On the other hand, models in which Ricardian equivalence does not apply predict that defense cuts may increase output in the long run, provided that the proceeds from the cuts are used to reduce the government debt. The CBO's models both assume that Ricardian equivalence does not hold in the U.S. economy. Hence, their forecasts show significant long-run gains in total GNP from the 1991 plan. But these forecasts will be on target only to the extent that their underlying—and controversial—assumption about Ricardian equivalence is correct.

C. An Alternative Forecasting Strategy

This paper takes an approach to forecasting the effects of reduced defense spending that differs significantly from the approach taken by the CBO. Rather than using a large-scale econometric model, it uses a much smaller vector autoregressive (VAR) model like those developed by Sims (Jan. 1980, May 1980). As emphasized by Sims (Jan. 1980), VAR models require none of the strong theoretical assumptions that the DRI and MSG models rely on so heavily. The approach taken here, therefore, recognizes that economic theory provides no clear answer as to the likely long-run effects of reduced defense spending. Moreover, as documented by Lupoletti and Webb (1986), VAR models typically perform as well as the larger models when used as forecasting tools, especially over long horizons. Thus, there are both theoretical and practical reasons to prefer the VAR approach to the CBO's.

Forecasts from the VAR model, like those from the CBO's models, show that the 1991 plan will lead to weakness in aggregate output in the short run. Unlike the CBO's models, however, the VAR does not predict that there will be a long-run increase in total GNP resulting from the cuts in defense spending, even if the cuts are used to reduce the federal debt. This result, which is consistent with the neoclassical model under Ricardian equivalence, suggests that the larger models rely on the incorrect assumption that there are strong non-Ricardian effects of changes in the government debt in the U.S. economy.

Although the VAR forecasts for total GNP are considerably more pessimistic than the CBO's forecasts, they do not imply that the defense cuts called for by the 1991 plan are undesirable. Private GNP, in contrast to total GNP, is forecast by the VAR to increase in the long run as a result of the 1991 plan. This result, which is again consistent with the neoclassical model under Ricardian equivalence, indicates that the 1991 plan will make more resources available to the private sector in the long run. As noted by Garfinkel (1990) and Wynne (1991), this gain in resources can be used to increase private consumption and investment, making American households better off in the long run.

The VAR is introduced in the next section. Section III presents the forecasts generated by the VAR and compares them to the forecasts given by the CBO. Section IV summarizes and concludes.

II. DESCRIPTION OF THE MODEL

The basic model is an extension of the four-variable VAR developed by Sims (May 1980) and is designed specifically to capture the effects of defense spending on aggregate economic activity. There are six variables in the model: the growth rate of real defense spending (RDEF), the growth rate of real U.S. government debt (RDEBT), the nominal six-month commercial paper rate (R), the growth rate of the broad monetary aggregate (M2), the growth rate of the implicit price deflator for total GNP (P), and the growth rate of real total GNP (Y). All of the variables except for the interest rate are expressed as growth rates so that all may be represented as stationary stochastic processes. Using growth rates for these variables avoids the problems, discussed by Stock and Watson (1989), associated with including nonstationary variables in the VAR.

Using vector notation, the model can be written as

$$X_t = \sum_{s=1}^{k} B_s X_{t-s} + u_t, \qquad (1)$$

where the 6x1 vector X_t is given by

$$X_t = [RDEF_t, RDEBT_t, R_t, M2_t, P_t, Y_t]' \qquad (2)$$

and where the B_s are each 6x6 matrices of regression coefficients. In order to obtain information about the long-run effects of changes in defense spending, the system (1) is estimated using a long data set that extends from 1931 through 1991. All data are annual (quarterly data are unavailable for dates prior to World War II); their sources are given in the appendix. The lag length $k=4$ is chosen on the basis of the specification test recommended by Doan (1989).

Once the system (1) is estimated, impulse response functions can be used to trace out the effects of changes in defense spending and the government debt on total GNP and, in particular, to forecast the effects of the 1991 plan. For the purpose of generating impulse response functions, the ordering of variables shown in equation (2) reflects the assumption that policy decisions that change defense spending are made before the contemporaneous values of the other variables are observed. Monetary policy actions, which are best captured as changes in R_t (McCallum, 1986), are made after decisions that affect defense spending and the government debt, but before money, prices, or output are observed. Money, prices, and output are then determined in succession, given that fiscal policy has determined RDEF and RDEBT and monetary policy has determined R.[2]

III. FORECASTS FROM THE VAR

The VAR results are foreshadowed in Figure 1, which plots the series Y, RDEF, and RDEBT over the 60-year sample period. Panel B reveals that there were significant cuts in defense spending following World War II, the Korean War, and the Vietnam War. In each case, the defense cuts were accompanied by slow growth in total GNP (panel A). In light of this past relationship, it seems likely that the VAR will associate the defense cuts called for by the 1991 plan with slower total GNP growth, at least in the short run.

By comparing the behavior of RDEBT (panel C) to that of Y (panel A), however, it is difficult to see the negative long-run relationship between output and government debt predicted by models in which the Ricardian equivalence theorem does not apply. Growth in the real value of U.S. government debt was negative for much of the 1950s and 1960s and positive for much of the 1970s and all of the 1980s.

[2] More formally, the variables in equation (2) are organized as a Wold causal chain to produce the impulse response functions. See Sims (1986) for a detailed discussion of the Wold causal chain approach as well as other strategies for identifying impulse response functions in VAR models.

Figure 1A

GROWTH RATE OF REAL GNP

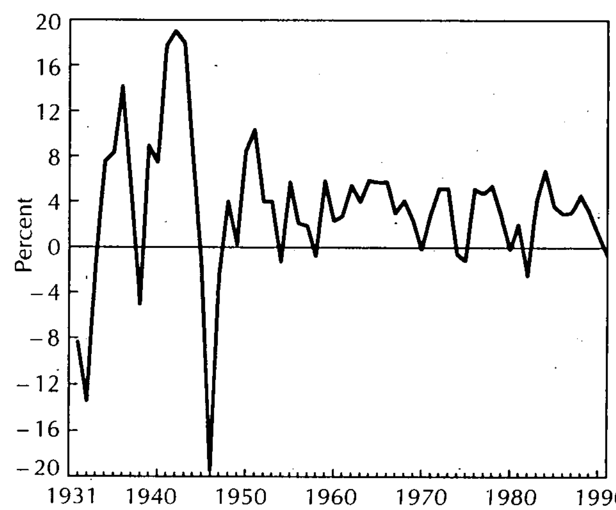


Figure 1B

GROWTH RATE OF REAL DEFENSE SPENDING

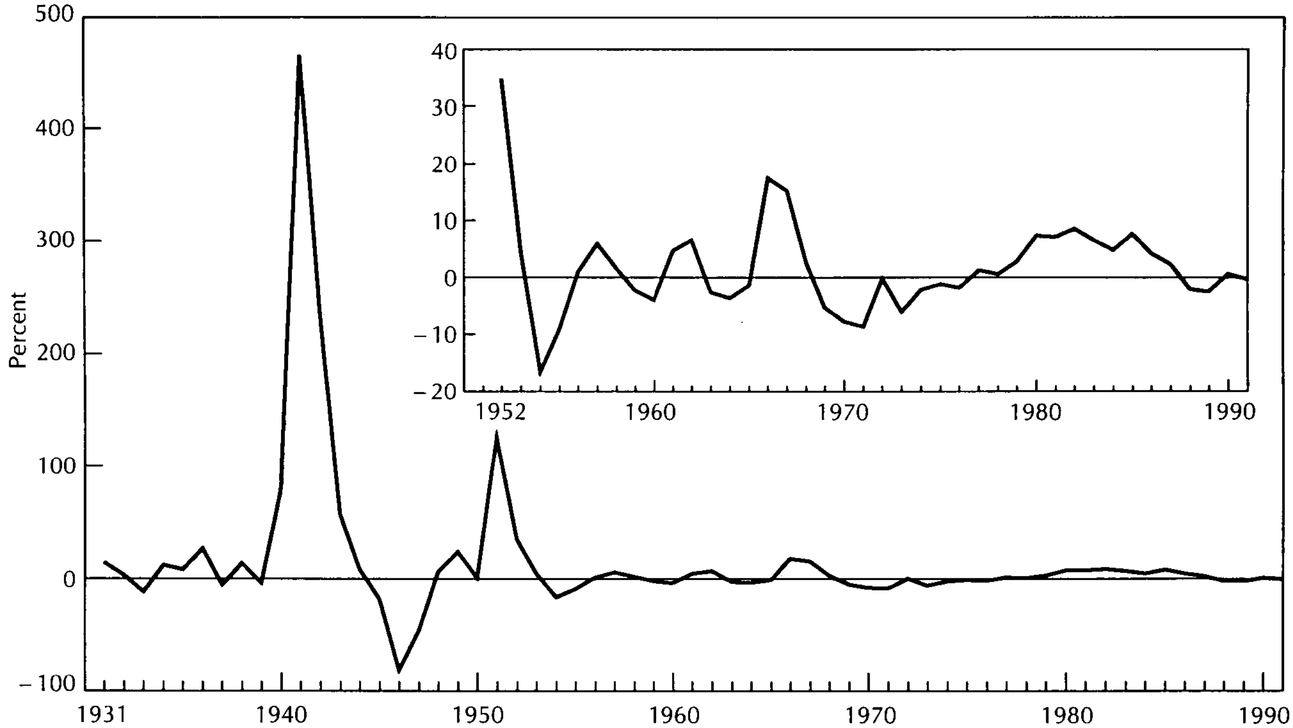
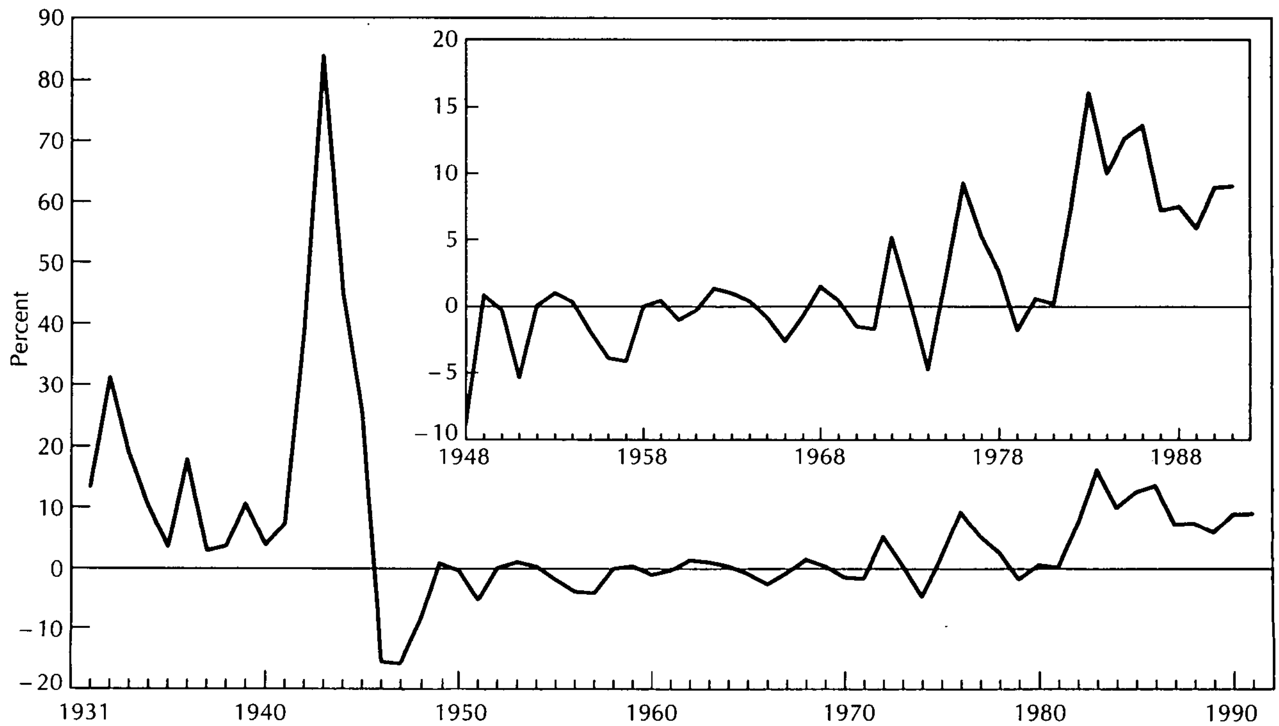


Figure 1C

GROWTH RATE OF REAL GOVERNMENT DEBT



Yet it does not appear that the growth rate of output was substantially different before and after 1970, as these models predict. Thus, it seems likely that the VAR will not find strong non-Ricardian effects of changes in government debt in the U.S. economy.

Figure 2, panel A, shows the cumulative impulse response function of Y to a one-time one-standard deviation (20 percent) decrease in RDEF, computed using the VAR described by equations (1) and (2).[3] The graph shows the cumulative change in the level of total GNP through the end of each year that results from a decrease in RDEF in the first year. It indicates that the decrease in RDEF yields a contemporaneous decrease in total GNP of approximately 1.5 percent. The effect of the shock to RDEF peaks at 5.5 percent after four years before settling down to a long-run decrease of about 2.5 percent. The confidence interval reveals that the initial decrease in total GNP due to the decrease in defense spending is statistically significant. In fact, the hypothesis that changes in RDEF do not influence Y (more formally, the hypothesis that changes in RDEF do not Granger-cause changes in Y) can be rejected at the 99 percent confidence level.[4] Thus, the model indicates that in response to a decrease in defense spending, total GNP will fall in both the short run and the long run.

Figure 2, panel B, plots the cumulative impulse response function of Y to a one-time one-standard deviation (3 percent) decrease in RDEBT. Consistent with the non-Ricardian assumptions that are embedded in the DRI and MSG models, this impulse response function indicates that a decrease in RDEBT will increase total GNP in the long run. In addition, the hypothesis that changes in RDEBT do not influence changes in Y can be rejected at the 98 percent confidence level. However, at no time are the effects of RDEBT on Y very large; except in period 2, the confidence interval always includes zero. Overall, therefore, Figure 2 is consistent with the neoclassical model under Ricardian equivalence, which predicts that a reduction in the size of the federal debt will not have a large effect on output and that a reduction in defense spending will permanently reduce total GNP.

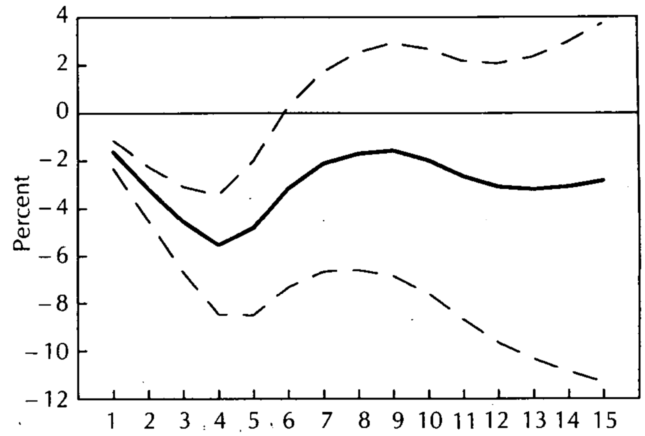
[3] Note that each of the impulse response functions in Figure 2 traces out the effects of a decrease in one of the variables on GNP. Impulse response functions more typically examine the effects of an increase in one of the model's variables. Here, however, it is the effects of decreases in defense spending and government debt that are of interest, so the direction of the shock is reversed.

[4] Here and below, the likelihood ratio test for block exogeneity described by Doan (1989) is used to test for the absence of Granger causality.

Figure 2A

CUMULATIVE RESPONSE OF GROWTH RATE OF REAL GNP TO GROWTH RATE OF REAL DEFENSE SPENDING

(with 95 percent confidence interval)

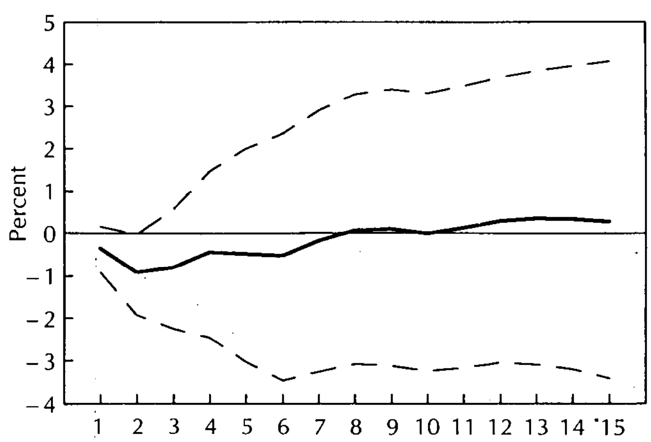


Forecasts from the VAR are generated by constraining future values of RDEF and RDEBT as called for by the 1991 plan. The constrained values of RDEF and RDEBT translate into constrained values of the shocks to these two variables. Hence, the VAR forecasts are essentially linear combinations of the impulse response functions shown in Figure 2. The impulse response functions suggest that the short-run forecasts from the VAR will be similar to those given by the CBO's models, but the long-run forecasts will be quite different. All of the models

Figure 2B

CUMULATIVE RESPONSE OF GROWTH RATE OF REAL GNP TO GROWTH RATE OF REAL GOVERNMENT DEBT

(with 95 percent confidence interval)



predict that cuts in defense spending will reduce total GNP in the short run. But the VAR forecasts none of the long-run gains in total GNP that the large-scale models do.

The table (right) compares the forecasts of the effects of the 1991 plan on total GNP generated by the VAR model to those generated by the DRI and MSG models. All three sets of forecasts compare the predicted behavior of total GNP under a base case, in which real defense spending is essentially held constant as a fraction of total GNP (except for the small decreases called for by the Budget Enforcement Act), to the behavior of total GNP when defense spending is cut as called for by the 1991 plan and the proceeds are used to reduce the federal debt. The figures in the table represent the predicted differences, in percentages, between the level of total GNP under the 1991 plan and the level of total GNP in the base case. Details about these two alternative paths for defense spending are provided in the CBO's report (1992, Table 3, p. 10), as are the forecasts from the DRI and MSG models (Figure 3, p. 14 and Table 4, p. 15).

The table shows that the VAR model is consistently more pessimistic than the CBO's models about both the short-run and long-run effects of the 1991 plan. While the DRI and MSG models predict that the short-run costs of reduced defense spending will be 0.5 to 0.7 percent of total GNP, the VAR estimates these costs at 1 to 1.8 percent of total GNP. While the DRI and MSG models expect long-run benefits from the debt reduction to begin offsetting the short-run costs in the mid-1990s, the VAR predicts that the costs of the 1991 plan will peak at 2.4 percent of total GNP in the late 1990s. Finally, while both the DRI and MSG models predict gains in total GNP by the year 2000, the VAR model predicts that there will be a permanent loss of 1.9 percent of total GNP from the 1991 plan.

In order to check the robustness of the VAR forecasts, several kinds of alternative model specifications can be considered. Although the causal ordering used in equation (2) is to be preferred based on economic theory, it would be troublesome if other orderings yielded vastly different results. Similar forecasts are obtained, however, when RDEF and RDEBT are placed last, rather than first, in the ordering. The model does not include some variables that may nonetheless be useful in forecasting GNP growth. Following the suggestion of Dotsey and Reid (1992), an oil price series can be added to the model, but again the results do not change. Nor do the results change if nondefense government spending or Barro and Sahasakul's (1986) marginal tax rate series is added as a seventh variable. Since Figure 1 reveals that the behavior of the model's variables was most dramatic during and shortly after World War II, it is useful to know the extent to which the results depend on the data from these years. When the six-variable VAR is reestimated with quarterly data from 1947 through 1991, the 1991 plan is predicted to reduce total GNP in the long run by 2.7 percent, a figure that is even larger than that generated by the original model. Finally, the forecasts are insensitive to changes in the lag length from $k=4$ to $k=3$, 5, or 6. The VAR forecasts, therefore, are quite robust to changes in model specification; in all cases, cuts in defense spending are predicted to reduce total GNP substantially in the long run, even when cuts are used to reduce the federal debt.

Forecasts of the Effects of the 1991 Plan on GNP

	Model			
Year	DRI (total GNP)	MSG (total GNP)	VAR (total GNP)	VAR (private GNP)
1992	−0.2	−0.3	−0.4	−0.2
1993	−0.7	−0.6	−1.0	−0.3
1994	−0.6	−0.5	−1.4	−0.5
1995	−0.6	−0.5	−1.8	−0.4
1996	−0.6	−0.3	−2.2	−0.4
1997	−0.6	−0.2	−2.4	−0.3
2000	0.0	0.5	−2.0	−0.1
2010	N/A	0.8	−1.9	0.3
2015	N/A	0.9	−1.9	0.3

Notes: The effects are expressed as percentage differences between GNP under the 1991 plan for reductions in defense spending and GNP under the base case of no change in real defense spending. DRI is the Data Resouces Model, MSG is the McKibbin-Sachs Model, and VAR is the vector autoregressive model. Details about the two alternative paths for defense spending, as well as the forecasts from the DRI and MSG models, are taken from CBO (1992). N/A indicates that the forecast is not available.

To emphasize the point that the VAR forecasts, although considerably more pessimistic than the CBO's forecasts, do not imply that the defense cuts called for by the 1991 plan are undesirable, the table also presents forecasts from a VAR model that is identical to model (1), except that the growth rate of total GNP is replaced by the growth rate of private GNP. Private GNP, like total GNP, is predicted to fall in the short run as the 1991 plan is implemented. In the long run, however, private GNP is expected to increase by 0.3 percent. The 1991 plan reduces total GNP, but it also makes available to the private sector resources that would otherwise be allocated to defense. The VAR forecasts show that on net, private GNP increases, making American households better off from the 1991 plan in the long run.

IV. Summary and Conclusions

The Bush Administration's 1992-1997 Future Years Defense Program (the "1991 plan") calls for the first significant cuts in defense spending in the United States since the end of the Vietnam War. Economic theory indicates that these defense cuts are likely to restrain economic growth in the short run as productive resources shift out of defense-related activities and into nondefense industries. Economic theory is less clear, however, about the long-run consequences of reduced defense spending. Models that assume that the Ricardian equivalence theorem holds find that a permanent decrease in defense spending decreases aggregate output in the long run. On the other hand, models that assume that Ricardian equivalence does not apply predict that a permanent decrease in defense spending increases output in the long run, provided that the proceeds from the spending cut are used to reduce the federal debt.

The large-scale econometric models employed by the Congressional Budget Office (1992) rely on the theoretical assumption that Ricardian equivalence does not hold in the U.S. economy. Thus, the CBO's models predict that while the 1991 plan will reduce total GNP in the short run as the economy adjusts to a lower level of defense spending, they also predict that the non-Ricardian effects of reducing the government debt will generate an increase in total GNP in the long run.

As an alternative to the CBO's large-scale models, this paper uses a much smaller VAR model to forecast the macroeconomic effects of the 1991 plan. Unlike the larger models, the VAR requires no strong theoretical assumption about whether or not Ricardian equivalence holds in the U.S. economy. The VAR, therefore, recognizes that economic theory provides no clear answer as to the likely long-run effects of reduced defense spending.

In fact, results from the VAR suggest that the Ricardian equivalence theorem does apply to the U.S. economy. Changes in government debt are found to have only small effects on aggregate output. Forecasts from the VAR, which show that the 1991 plan is likely to reduce total GNP in both the short run and long run, are more consistent with the neoclassical model presented by Barro (1984), in which Ricardian equivalence holds, than with those of competing models in which Ricardian equivalence does not apply.

Although the VAR forecasts are considerably more pessimistic than the CBO's forecasts, they do not imply that the defense cuts called for by the 1991 plan are undesirable. In fact, both the neoclassical model and the VAR forecasts suggest that as the cuts in defense spending are implemented, growth in total GNP is likely to be a misleading measure of household welfare. Although the 1991 plan reduces total GNP, it also makes available to the private sector resources that would otherwise be allocated to defense. The VAR forecasts show that on net, private GNP increases. As noted by Garfinkel (1990) and Wynne (1991), this net gain can be used to increase private consumption or private investment, making American households better off in the long run.

APPENDIX

DATA SOURCES

Defense Spending: Data for 1930 through 1938 are national security outlays reported in Table A-I of Kendrick (1961). Data for 1939 to 1991 are government purchases of goods and services, national defense, from Table 3.7a of the *Survey of Current Business*, Department of Commerce, Bureau of Economic Analysis. The nominal data are deflated using the implicit price deflator for GNP reported in Table 7.4 of the same publication.

Government Debt: Debt before 1941 is total gross debt at the end of the fiscal year reported in the *Bulletin of the Treasury*. Debt for 1941-1991 is total outstanding debt, also at the end of the fiscal year, reported in the same publication. Nominal debt was deflated to real terms using the implicit price deflator for GNP.

Interest Rate: The six-month commercial paper rate is taken from Table H15 of the *Statistical Release*, Board of Governors of the Federal Reserve System.

Monetary Aggregate: The money supply series before 1959 is the M4 aggregate reported in Table 1 of Friedman and Schwartz (1970). The money series for 1959 to 1991 is the M2 series reported in Table 1.21 of the *Federal Reserve Bulletin*, Board of Governors of the Federal Reserve System.

Price Deflator: The implicit price deflator for GNP is from Table 7.4 of the *Survey of Current Business*, Department of Commerce, Bureau of Economic Analysis.

Gross National Product: Nominal figures for GNP are taken from Table 1.1 of the *Survey of Current Business*, Department of Commerce, Bureau of Economic Analysis. Nominal GNP was deflated to real terms using the implicit price deflator for GNP.

Nondefense Government Spending: Nondefense spending is government purchases of goods and services from Table 1.1 of *The National Income and Product Accounts* (Department of Commerce, Bureau of Economic Analysis), less the defense spending series described above.

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