

ECONOMIC COMMENTARY

Federal Reserve Bank of Cleveland

The Effect of War Expenditures on U.S. Output

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The war with Iraq has become the most extensive U.S. military involvement since Vietnam. Although the duration and the political ramifications of the operation are still unclear, it is likely that the United States will bear a substantial share of the war's financial cost, placing an additional burden on the federal budget. Aside from the obvious concerns about war's devastation and the tragic cost in human lives, policymakers have also expressed concern about the impact that the war will have on the U.S. economy.

Many analysts believe that the economy will be adversely affected because the cost of the war will reduce consumption either by raising taxes or by increasing the federal budget deficit. Some cite the oil price shock that followed Iraq's invasion of Kuwait and the subsequent drop in consumer spending as additional factors working against the economy. However, others insist that the stimulative effect of increased military expenditures could help to pull the economy out of its current downturn, noting that wars have typically been associated with high output.

This *Economic Commentary* examines the effects of temporary war-related increases in government spending on output and real interest rates in the United States. The model that we use differs significantly in its approach and structure from more frequently used large-scale econometric models. Our simula-

tions indicate that the war with Iraq will have only a minimal impact on the economy.

■ Costs of the Current Military Buildup

In assessing how the cost of Operation Desert Storm will affect the U.S. economy, it is necessary to separate the additional cost of war from the cost of ongoing military operations that the United States would have incurred even if troops had not been called to the Persian Gulf. Because the length of the war is uncertain and the financial support of our allies is unclear, current cost estimates are tenuous at best.

The cost of the war can be broken down into two components: baseline costs and incremental costs. Baseline costs are mainly those that would be incurred regardless of where our troops are stationed. For the U.S. military units deployed under Operation Desert Storm, this amount has been estimated at \$105 billion for 1991.¹ Because these costs would have been realized even in the absence of the Persian Gulf crisis, they are not fully attributable to Operation Desert Storm and therefore are not included in our estimates of the total cost of the war. However, given the political developments in Eastern Europe and the pressures to reduce the federal budget deficit, defense allocations

Will Persian Gulf War expenditures stimulate the U.S. economy? This *Economic Commentary* looks at how war-related temporary increases in government spending affect real interest rates and output. The authors find that even under the most pessimistic scenario, the Persian Gulf War's impact on the economy should be minimal.

for fiscal year 1991 might have been cut in the absence of the crisis.

Under Operation Desert Shield (the first phase of the military buildup), incremental costs included those associated with transporting troops and equipment, maintaining equipment in the desert environment, replacing spare parts, and providing additional training for combat under foreign conditions. The Comptroller General of the United States recently placed the incremental cost of maintaining 450,000 troops in a combat-ready position at \$34 billion per year.

Now that hostilities have started, the incremental costs related to actual combat are undoubtedly higher, but also more difficult to estimate. Additional costs stem from increased medical and logistical support services and from the replacement of destroyed ammunition and equipment. The incremental costs of

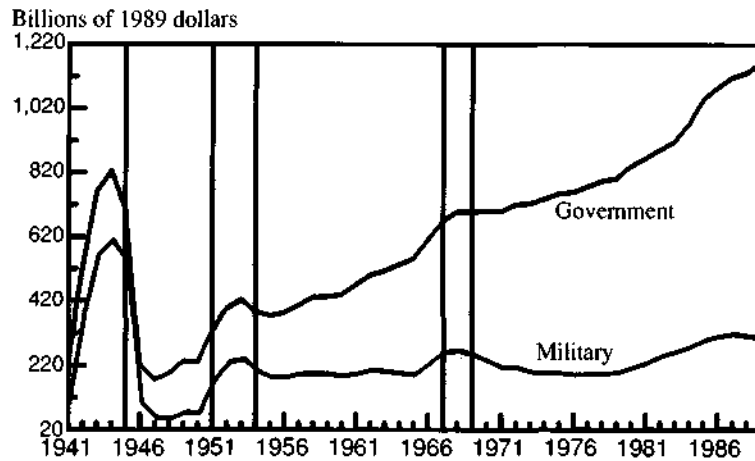
active war could be six times the cost of simply maintaining combat-ready troops. This figure is consistent with daily cost estimates of between \$500 million and \$1 billion provided in Congressional testimony.² If the war is over within a year, the cost of replacing equipment can be extended well into the future. However, if the war lasts significantly longer, equipment will have to be replaced much sooner and at a higher unit cost.

Assuming that Operation Desert Storm lasts one year, we estimate a total cost of \$238 billion, which includes \$34 billion of incremental costs for troop maintenance plus six times that amount for combat-related costs. These estimates do not include the cost to the United States of maintaining a military force in the region for an indefinite period once a cease-fire occurs. Should this be necessary, we assume that maintaining a military presence for 10 years will cost about \$12 billion per year.

For simulation purposes, we assume that half the incremental cost of the Persian Gulf War (\$119 billion) will be spent in the current year, which translates into a 9.8 percent increase in total government expenditures in the first year.³ The other half, which primarily represents the cost of replacing destroyed equipment, is assumed to be amortized over the subsequent 10 years at an annual rate of \$14.6 billion. This amount, combined with the additional cost of maintaining a military presence once the war ends, yields a 2.5 percent annual increase in government spending for the next 10 years. We acknowledge that these figures are likely to be overestimates of the war's actual cost, because 1) we have not taken into account foreign contributions, 2) we assume that all equipment lost will be replaced, and 3) we believe that the duration of the war will be considerably less than one year.

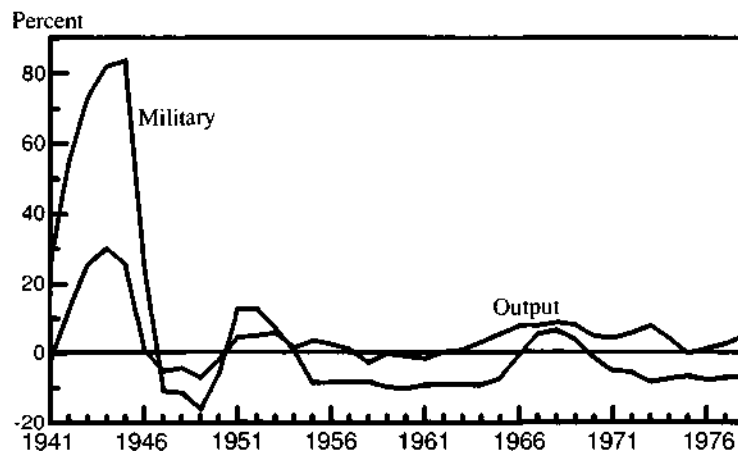
To compare the costs of the current conflict with those of past wars, it is useful to examine U.S. government and military expenditures since 1941 (see figure 1). One study estimates that temporary increases in government spending during the four years of the Korean War (1951-

FIGURE 1 REAL GOVERNMENT AND MILITARY EXPENDITURES, 1941-1989



NOTE: Shaded areas represent war years in which government expenditures temporarily increased.
SOURCES: *Economic Report of the President*, February 1990, and Data Resources, Inc.

FIGURE 2 TEMPORARY CHANGES IN MILITARY EXPENDITURES AND DEVIATIONS OF OUTPUT FROM TREND, 1941-1978



NOTE: Temporary changes in military expenditures are calculated as a percentage of government expenditures.
SOURCES: Authors' calculations and Robert J. Barro, "Output Effects of Government Purchases" (footnote 4).

1954) were 12.9, 12.7, 6.8, and 4.6 percent of total government expenditures, respectively. During the three middle years of the Vietnam War (1967-1969), the respective increases were 5.1, 6.4, and 3.5 percent.⁴ As seen in figure 1, these increases are several orders of magnitude smaller than those associated with World War II.

■ War and Output

Historically, temporary increases in government expenditures (most often precipitated by wars) have been accompanied by higher output. As figure 2 shows, World War II provides the most

graphic example of this phenomenon. In this section, we explain why temporary increases in government spending should lead to higher output in the short run.

A war-induced temporary increase in government expenditures can be financed either by a simultaneous increase in taxes or by an expansion of the federal budget deficit. Both methods of financing should result in higher interest rates and output. However, the magnitude of these increases may differ.

First, suppose that the temporary increase in government spending is

TABLE 1 THE EFFECTS OF WAR ON REAL INTEREST RATES AND OUTPUT

| War | Change in: | | | |
|---------------------|-------------------------------|----------|---|----------|
| | Output (percentage points) | | Real interest rate ^a (basis points) | |
| | First Year | Long Run | First Year | Long Run |
| Korean (1951-1954) | 0.29 | -0.67 | 2 | 11 |
| Vietnam (1967-1969) | 0.13 | -0.29 | 1 | 5 |
| Persian Gulf | 0.10 | -0.17 | 1 | 3 |

a. The real interest rate equals the model's predicted, marginal product of capital and should not be viewed as a riskless rate. Its baseline value for the no-war scenario is 7.1 percent.

SOURCE: Simulations based on Auerbach and Kotlikoff's overlapping generations model (footnote 8).

financed by a concurrent increase in taxes.⁵ Higher taxes during war years (as compared to non-war years) lower current after-tax income. Because individuals desire to smooth consumption over time, they opt to increase borrowing in order to finance current consumption. As borrowing increases relative to saving, the real interest rate rises, causing individuals to increasingly smooth consumption by working longer hours. It is this increase in hours worked that causes output to rise. One study shows that a temporary increase in government expenditures equal to 1 percent of GNP yields a 0.6 percent temporary increase in output.⁶ As these numbers suggest, when government expenditures rise, private consumption and investment fall.

So far our analysis has assumed that wars are financed by higher taxes. However, war efforts are typically financed by higher government deficits. Whether the use of deficit rather than tax finance will have different effects on interest rates and output depends on the response of private saving to higher government deficits.

Individuals tend to compensate for the higher future taxes that will be needed to pay for war-induced deficits by increasing their saving rate. However, the extent of this increase is unclear. One theory, known as the Ricardian Equivalence Theorem (RET), holds that the increase in personal saving will equal the increase in government borrowing. If this is true, the effect of a temporary increase in government spending on output and real interest rates will be iden-

tical under either arrangement. If RET does not hold, however, the increase in saving will fall short of the increase in government borrowing. Consequently, the effect of a temporary upturn in government expenditures on interest rates and output would be somewhat larger under deficit financing than under tax financing.

Interest rates are also affected by international investment. The cost of the Gulf War expected to be borne by many U.S. trading partners is small relative to the size of their economies. Therefore, these countries will not experience the same upward pressure on interest rates faced by the United States. Higher U.S. interest rates relative to those abroad will attract international investment, which will relieve the upward pressure on interest rates and mitigate increases in output.

■ Estimates of Output and Interest-Rate Effects

Many models have been developed to study the output effects induced by increases in government expenditures. These models may generate varying results because of the different assumptions that they embody. For example, large-scale macroeconomic models, which are frequently used for policy analysis purposes, generally yield larger output effects than models that assume flexible prices. The larger results generated by such models stem from assumptions about "sticky" prices.⁷ Because the United States has been involved in only a few wars over the last 40 years, it is difficult to test which type of model yields the most reliable predictions.

We have chosen to generate the output and interest-rate effects of deficit-financed war expenditures through a dynamic, flexible-price model developed by Auerbach and Kotlikoff, because a previous study based on a flexible-price model was able to successfully mimic the output effects of World War II.⁸ In our simulations, the war-related debt is serviced by higher taxes on current and future generations. Individuals increase their saving in response to higher government deficits in order to compensate for their own higher future tax burdens. They do not, however, increase their saving to compensate for the higher taxes faced by their offspring. As a result of this financing arrangement, higher taxes for the indefinite future decrease labor supply and saving, the latter of which eventually leads to a reduced capital stock. Decreases in labor supply and capital stock both reduce future output.

We use this model to highlight the qualitative importance of consumption and savings decisions, labor supply, and fiscal constraints. We do not expect our simulations to capture the precise historical values of interest rates and output, because the model does not account for many real-world factors (the mitigating effects of international capital flows, for example).

To gain perspective on how the Persian Gulf War will affect interest rates and output, we analyze the economic impact of the Korean and Vietnam Wars as well. Table 1 gives the simulated values of output and real interest rates for all three wars.⁹ Note that the model predicts a negligible change in the interest rate during the first year of both the Korean and Vietnam Wars. For the current war, the predicted first-year rise in the real rate of interest is also negligible, so it is not surprising that our model predicts an increase in output of only 0.10 percent. Due to higher future taxes, output begins to decline within five years, eventually reaching a long-run value that is roughly 0.20 percent lower than it would have been in the no-war scenario. Because future taxes are higher, interest rates

must rise to maintain the same after-tax rate of return on savings. For the Gulf War, this increase is less than five basis points.¹⁰

The model shows that temporary increases in government expenditures initially lead to higher output. Our predictions are qualitatively consistent with the increase in output that occurred during past wars, as shown in figure 2; however, the actual increases appear to be larger than expected. These differences result from factors not accounted for in the model. Actual output may rise above or fall below trend because of business-cycle dynamics unrelated to war finance. This appears to have happened during the Vietnam years, when an economic expansion that began prior to the 1967 escalation of the war continued throughout the war years.

■ Conclusion

According to our analysis, the fiscal effects of the Persian Gulf War on the U.S. economy will be minimal. The projected short-run increase in output is not expected to be large enough to pull the economy out of a recession, and over time, output should be somewhat lower as a result of the higher future taxes needed to pay for the war. We recognize, of course, that aspects of the war not covered in our analysis, such as oil price shocks and other business-cycle factors, will also influence the economy.

Nonetheless, it appears that the impact of a temporary increase in government spending of the size expected to result from the Persian Gulf War will not be sufficient to cause the economy to deviate significantly from its present course.

■ Footnotes

1. The estimates used in this analysis are taken from testimony given before the House Budget Committee by Charles A. Bowsher, Comptroller General of the United States, Report No. T-NSIAD-91-03 of the General Accounting Office, January 4, 1991.

2. Briefing by Federal Reserve Board Chairman Alan Greenspan before the U.S. House of Representatives, Committee on the Budget, January 22, 1991. The estimate was provided by Committee Chairman Leon E. Panetta.

3. Total government expenditures include federal, state, and local government spending, but exclude transfer payments, since they do not affect government absorption of resources.

4. These percentage increases were derived using results from Robert J. Barro, "Output Effects of Government Purchases," *Journal of Political Economy*, vol. 89, no. 6 (December 1981), pp. 1086-1121.

5. We assume here that taxes are lump sum, whereas simulations presented later in this paper incorporate income taxes. Both forms of taxation yield the same qualitative effects in the short run.

6. See Marianne Baxter and Robert G. King, "Fiscal Policy in General Equilibrium," University of Rochester Working Paper No. 244, September 1990.

7. Prices are said to be sticky if they respond sluggishly to changes in market demand/supply conditions.

8. See Alan J. Auerbach and Laurence J. Kotlikoff, *Dynamic Fiscal Policy*. Cambridge, England: Cambridge University Press, 1987; and Mark A. Wynne, "The Aggregate Effects of Temporary Government Purchases," Research Paper No. 9007, Federal Reserve Bank of Dallas, April 1990.

9. Details regarding the simulations are available from the authors upon request.

10. The long-run output and interest-rate effects depend entirely on the financing arrangement assumed in the simulations. If the debt due to war expenditures were paid off after a finite period of time, the output and interest-rate effects would be larger until the debt was retired. However, interest rates and output would eventually return to the same levels as would have been realized in the absence of the war.

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