How Changes in Fiscal Policy Affect The Budget: The Feedback Issue

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HOW CHANGES IN FISCAL POLICY AFFECT THE BUDGET: THE FEEDBACK ISSUE

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PREFACE

A change in federal tax or spending policy may have complex effects. A tax cut, for example, directly decreases revenues. But it may also stimulate economic activity and generate new revenues. Little is known about the size of these "feedback" or "reflow" effects, the extent to which they may differ for different policy changes, or how sensitive they are to underlying conditions, such as the behavior of monetary policy. This paper attempts to meet this need by surveying the issues involved and advancing quantitative estimates from available sources.

How Changes in Fiscal Policy Affect the Budget: The Feedback Issue was prepared in response to a February 9, 1982, request from the House Committee on the Budget. In accordance with the Congressional Budget Office (CBO) mandate to provide nonpartisan analysis, the paper offers no recommendations.

The study was carried out by Frederick Ribe, formerly of CBO's Tax Analysis Division and now in the Fiscal Analysis Division, under the direction of James M. Verdier and William J. Beeman. A number of people within CBO provided valuable assistance, including Christopher Kask, Naif Khouri, Patricia Kinslow, and Kathy Ruffing. Valuable criticism was received from many other persons, especially Frank de Leeuw (Bureau of Economic Analysis), Cornelia Motheral (House Committee on the Budget), and Rosemary Marcuss, Joseph Minarik, Pearl Richardson, Peter Taylor, Paul Van de Water, and Stephen Zeller of CBO. Francis Pierce edited the manuscript, and Shirley Hornbuckle typed the many drafts.

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Director

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SUMMARY

Federal tax cuts or spending cuts are often discussed as though they were simple subtractions from revenues or outlays. Their effects are estimated on the assumption that they make no difference in the performance of the national economy. It is widely recognized, however, that tax and spending changes may cause changes in the economy, which in turn may affect budget revenues and outlays through "feedback effects." Satisfactory estimates of the overall budgetary impacts of tax or spending changes are, however, not always available to the Congress.

This paper develops estimates of feedback rates for different tax and spending changes in order to illustrate their rough magnitudes and the number and importance of the issues that are involved. The estimates are derived with the assistance of several econometric models.[1] Emphasis is given to differences in the estimated feedback rates for four different tax and spending changes: reductions in personal income tax rates, in corporation tax rates, in federal purchases of goods and services, and in federal transfer payments. Two special tax measures are considered separately: provisions governing special-purpose tax-exempt bonds such as industrial revenue bonds, and reductions in the special tax rate on capital gains.

How Feedback Effects Work

When feedback effects are ignored, the impact of a 10 percent cut in tax rates is given by the change in effective tax rates multiplied by the level of taxable income anticipated for that

1. As it turns out, there is significant variation among the results from different models. While this fact itself is evidence that the state of available knowledge about feedback effects is uncertain, it provides little guidance as to their likely magnitudes. Accordingly, the paper develops illustrative "model consensus" estimates for each policy change, and discusses some of the sources of uncertainty.

year. This is called the "static" impact.[2] The change in tax rates may, however, stimulate changes in working and spending by households and in hiring and investing by firms, among other economic effects. These impacts may increase Gross National Product (GNP) and taxable incomes, and therefore tax receipts. The increase in receipts is directly related to the tax cut, and is therefore known as the "revenue feedback effect" or "revenue reflow" of the cut. The feedback effect at least partially offsets the static budget impact, leading to an actual impact on budget revenues that is a combination of the two separate parts.

The change in the behavior of the economy may also cause changes in budget outlays. Changes in unemployment affect unemployment compensation and other categories of transfer payments, while changes in inflation have impacts on programs that are indexed to the price level. Outlays for interest on the federal debt may change because of changes in interest rates and in federal borrowing that may be caused by the policy change. All of these induced responses in outlays together make up the "outlay feedback effect." This effect, together with revenue feedbacks and the static impact, constitutes the overall effect of the policy change on the budget.

When Should Feedback Estimates Be Used?

Static budget impact estimates are valuable for many purposes. Such figures provide useful information on the quantity of resources that the federal government allocates to different uses and on the magnitude of the impulse that the budget gives to overall economic activity. Incorporating feedbacks is important only when interest centers on the overall impact of a given tax or spending proposal on the budget deficit. Even then, however, trouble can sometimes be saved by using static impact estimates during some stages of discussion. Since all budget policy changes may entail feedbacks, and since such changes are usually considered

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2. Both static and feedback estimates are sensitive to the underlying economic forecast. If the particular monetary and fiscal policies that are assumed in making the economic forecast are not actually put in place, then both the forecast and the budget estimates that are based on it can be inaccurate. For this reason, close attention to the assumptions underlying a given set of budget estimates is important.

in groups, it saves time to consider individual proposals in terms of static impact estimates and to incorporate feedbacks only when the outline of an overall package of proposals becomes known. At that point, proposals thought to have similar feedback rates can be combined.

Estimating Feedback Effects

One way to generate budget estimates that include feedbacks is to develop an entirely new economic and budgetary forecast on the basis of each tax or spending proposal that comes under consideration. This procedure is cumbersome, however, given the numbers of budget policy changes that are typically discussed during a legislative session. A more practical alternative that is developed in this paper is to generate simple "feedback rates" expressing the percentage of the static budget impact of a given type of policy change that is offset by feedbacks in a given year. A tax cut with a static revenue loss of $10 billion and a feedback rate of 40 percent, for example, would cause a net increase in the federal deficit of $6 billion; the other $4 billion would be offset by feedback effects. Negative feedbacks, conversely, represent cases in which the feedbacks reinforce the static deficit impact of a policy change, instead of offsetting it.

ECONOMIC IMPACTS OF CHANGES IN FEDERAL FISCAL POLICY

There is considerable controversy and uncertainty regarding the economic impacts of changes in federal fiscal policy. Traditional theories have been severely criticized from a "supply side" point of view for taking insufficient account of the effects of fiscal policy on the available supplies of work and savings, and of possible changes in the structure of the economy in recent decades. Another important line of criticism, the "rational expectations" point of view, holds that traditional analytic approaches pay insufficient attention to the expectations of workers, employers, and other economic agents regarding the future course of the economy.

The estimates presented in this paper are largely based on traditional and, to a lesser extent, "supply side" analysis. Few "rational expectations" approaches to short-term quantitative policy analysis like that discussed in this paper are available, largely because adherents of this point of view are less concerned

with short-term analysis, and because some argue that current techniques for quantitative analysis are highly unreliable.[3] Since alternative points of view to those taken in this paper are possible, however, the estimates presented here are far from definitive.

Outlay and Revenue Feedback Rates

A range of estimated feedback rates is shown in Summary Table 1 for each of four different budget policy changes assumed to have taken effect on October 1, 1981. The changes consist of reductions in individual income tax rates, in corporation income tax rates, in federal purchases of goods and services, and in federal transfer payments to persons. In fiscal 1982, for example, the figures suggest that between 6 and 22 percent of the static revenue cost of a cut in personal tax rates may be offset by induced increases in revenue. Increases in outlays for interest and other programs, however, may amount to as much as 6 percent of the static revenue loss, and like the static loss these outlay changes increase the deficit rather than reduce it. As a net result the revenue and outlay feedbacks taken together may offset between 2 and 23 percent of the static deficit impact in 1982. The estimates assume that the Federal Reserve follows a "partially accommodating" policy of holding the path of nonborrowed reserves unchanged, perhaps allowing both interest rates and the money supply to vary somewhat in response to the budget policy change.

Estimates of each feedback rate vary widely among econometric models, largely reflecting technical differences in the models. Much of the variation is contributed by the estimates of outlay feedback rates, which reflect induced changes in spending for interest, transfer payments, and programs that are "indexed" to the price level. These rates are, however, consistently negative because of the large impact of each policy change on interest payments on the federal debt. Interest outlays change by relatively large amounts because changes in budget policy affect both the

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3. For discussion of these points, see Robert Lucas, "Econometric Policy Evaluation: A Critique," in Karl Brunner and Allan Meltzer, eds., The Phillips Curve and Labor Markets (North Holland, 1977), pp. 19-46, and Stanley Fischer, ed., Rational Expectations and Economic Policy (University of Chicago Press, 1980).

SUMMARY TABLE 1. RANGES OF FEEDBACK RATES FOR FOUR FISCAL POLICY CHANGES ESTIMATED FROM ECONOMETRIC MODELS ASSUMING THAT MONETARY POLICY IS PARTIALLY ACCOMMODATING[a] (By fiscal year)[b]

	1982	1983	1984	1985	1986
Reductions in individual income tax rates					
Total	2 to 23	8 to 31	6 to 35	-5 to 34	-23 to 43
Revenues	6 to 22	20 to 39	28 to 46	31 to 59	31 to 81
Outlays	-6 to 0	-15 to -8	-27 to 12	-42 to -15	-60 to -20
Reductions in corporation income tax rates					
Total	-11 to 13	-6 to 27	-7 to 69	-14 to 113	-26 to 146
Revenues	-9 to 16	2 to 34	10 to 70	13 to 105	12 to 129
Outlays	-6 to -1	-11 to -3	-17 to -1	-28 to 8	-38 to 17
Reductions in federal purchases					
Total	27 to 48	33 to 62	31 to 68	39 to 74	26 to 75
Revenues	26 to 46	37 to 61	54 to 71	60 to 89	59 to 104
Outlays	-3 to 2	-12 to 0	-23 to -3	-29 to -5	-37 to -7
Reductions in federal transfer payments					
Total	2 to 20	3 to 25	8 to 29	-5 to 28	-23 to 39
Revenues	7 to 19	16 to 35	31 to 42	37 to 56	38 to 76
Outlays	-6 to 1	-15 to -9	-23 to -13	-42 to -17	-39 to -21

a. The econometric models that were used to generate these estimates are those of Chase Econometrics, Inc.; Data Resources, Inc. version US81C; Evans Economics, Inc.; and Wharton Econometric Forecasting Associates, Inc. version 6.1.

b. Percentage of static budget impact offset by feedback effects. Negative sign denotes feedbacks that reinforce static impact, rather than offsetting it. Figures for revenues and outlays may not sum to those for total feedback rate because "revenue" and "outlay" figures shown may be drawn from different models, while each "total" figure is based on revenue and outlay estimates from the same model.

amount of federal borrowing and the level of interest rates. A tax cut, for example, may increase both federal borrowing and interest rates, while a spending cut does the reverse. According to the estimates presented in this paper, changes in interest payments almost always reinforce the static impact on the deficit, and they always dominate other outlay feedbacks. These estimates, however, are heavily dependent on the "baseline" levels of interest rates. Should rates fall from the relatively high levels that were assumed in this study, the magnitudes of interest outlay responses to changes in policy could be significantly smaller.

The strongest revenue feedbacks, for economic reasons that are explored in the text, appear to be those from changes in federal purchases, followed by those for changes in personal tax rates and changes in transfer payments to persons, which appear to be approximately the same. Estimates of revenue feedbacks for changes in corporation income tax rates are highly uncertain, but they appear to be the lowest from any of the different policy changes, at least during the first two years after enactment.

In absolute terms the figures for cuts in purchases suggest that revenue feedbacks offset roughly one-quarter to one-half of the static budget saving of a cut during the first year after enactment, an amount which rises above one-half by the third year and even higher in the fifth. The revenue feedbacks for reductions in transfers and in individual income tax rates are slightly below these levels: a third to half of the static revenue loss is recouped in revenue feedbacks by the third year, and perhaps as much as 80 percent by the fifth year. The revenue feedback figures for reductions in corporation income tax rates, finally, are too widely divergent to permit useful inferences to be drawn.

Summary Table 2 shows "model consensus" feedback rate estimates for each different policy change. These figures were developed using CBO's Multipliers Consensus Framework.[4] They largely reflect the quantitative inferences that have just been described. The estimates for a personal tax cut, for example, suggest that 19 percent of the static revenue cost is offset by revenue feedbacks in 1982, and 57 percent in 1986, though negative

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4. The Multipliers Consensus Framework was developed as a means of reconciling varying results from different econometric models by averaging certain "key" parameters of those models. For a detailed description, see Appendix C of this report.

SUMMARY TABLE 2. "MODEL CONSENSUS" FEEDBACK RATE ESTIMATES FOR DIFFERENT FISCAL POLICY CHANGES ASSUMING THAT MONETARY POLICY IS PARTIALLY ACCOMMODATING (By fiscal year)[a]

	1982	1983	1984	1985	1986
Reductions in individual income tax rates					
Total	11	13	12	10	5
Revenues	19	37	45	50	57
Outlays	-8	-24	-33	-40	-52
Reductions in corporation income tax rates					
Total	-2	13	25	28	20
Revenues	8	26	40	48	42
Outlays	-10	-13	-15	-20	-22
Reductions in federal purchases					
Total	25	33	29	21	18
Revenues	30	49	57	61	68
Outlays	-5	-16	-28	-40	-50
Reductions in transfer payments to individuals					
Total	11	13	13	10	9
Revenues	19	37	46	52	59
Outlays	-8	-24	-33	-41	-50

a. Percentage of static budget impact offset by feedbacks; negative sign denotes feedbacks that reinforce static impact, rather than offsetting it. Detail may not sum to totals because of rounding.

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outlay feedbacks reduce the overall feedback rates in each of these years. The revenue feedback rate estimates for cuts in corporation income tax rates are the smallest from any of the policy changes.

The Importance of Monetary Policy

There is some uncertainty about how monetary policy might behave in response to changes in tax or spending policy. The estimates presented above assume that the Federal Reserve would allow both interest rates and the money supply to change somewhat in the face of a fiscal policy change--an assumption called "partial accommodation" that has been satisfactory in the past. The Fed's 1979 announcement that it intends to control the money supply more closely raises the possibility, however, that the money supply might change little or not at all--a "nonaccommodating" monetary policy--while interest rates might be affected more strongly. If this happened, feedback rates for budget policy changes might be significantly reduced from the levels shown above. This is shown in Summary Table 3, which shows feedback rate estimates from simulation of each of the policy changes discussed above on two econometric models, assuming that the Federal Reserve follows a nonaccommodating policy. The revenue feedback rates are reduced and the negative feedbacks from outlays for interest are increased relative to the levels for a "partially accommodating" monetary policy. The figures reflect a stronger likelihood that a tax cut, for example, may increase the deficit by more than the static revenue loss estimate, principally because of the strong increases in interest rates, and therefore in budget outlays for interest, that the tax cut may cause.

Are Strong Feedback Effects Necessarily Good?

It is tempting to conclude that high feedback rates of tax cuts are a positive factor, on the grounds that the static revenue costs of such tax cuts are misleadingly high. A large part of this revenue feedback, however, may result directly from increases in inflation that may be caused by the tax cut. Inflation is especially efficient at producing new federal revenues: increases in wages and profits reflecting inflation swell the tax base and also push individual taxpayers into higher tax brackets. When the revenue feedbacks of cuts in personal tax rates are recomputed on the assumption that the tax cut causes no change in inflation, the estimated revenue feedback rates are reduced substantially.

SUMMARY TABLE 3. RANGES OF FEEDBACK RATES FOR FOUR FISCAL POLICY CHANGES ESTIMATED FROM ECONOMETRIC MODELS[a] ASSUMING THAT MONETARY POLICY IS NONACCOMMODATING (In fiscal years)[b]

	1982	1983	1984	1985	1986
Reductions in individual income tax rates					
Total	-4 to 22	-22 to 14	-36 to 1	-48 to -16	-57 to -43
Revenues	4 to 22	5 to 29	6 to 32	7 to 35	10 to 34
Outlays	-8 to 0	-27 to -14	-41 to 31	-55 to 51	-68 to 77
Reductions in corporation income tax rates					
Total	-1 to -11	0 to -5	-17 to -6	-36 to -14	-43 to -27
Revenues	-9 to 4	2 to 15	10 to 11	5 to 13	8 to 12
Outlays	-5 to -1	-15 to -7	-28 to -16	-41 to -27	-50 to -40
Reductions in federal purchases					
Total	3 to 44	-12 to 47	-24 to 45	-42 to 33	-45 to 14
Revenues	16 to 41	17 to 49	21 to 56	17 to 59	25 to 57
Outlays	-12 to 2	-30 to -2	-45 to -12	-59 to -26	-70 to -43
Reductions in federal transfer payments					
Total	-3 to 20	-23 to 15	-31 to 3	-44 to -16	-52 to -43
Revenues	5 to 19	3 to 26	7 to 30	7 to 34	10 to 35
Outlays	-8 to 1	-26 to -11	-38 to -28	-51 to -50	-61 to -78

a. The econometric models that were used to generate these estimates are those of Data Resources, Inc. version US81C; and Wharton Econometric Forecasting Associates, Inc. version 6.1. Other models were not used because of technical difficulties in analyzing nonaccommodating monetary policy on those models.

b. Percentage of static revenue loss offset by budget feedback; negative sign denotes feedback that reinforces static deficit impact, rather than offsetting it. Conversion of results to Unified Budget accounting basis was done by CBO.

The revenue feedback rates of cuts in federal spending, on the other hand, represent reductions in revenues. These may offset at least some of the static reduction in the deficit brought about through spending cuts. In these cases, however, a large part of the revenue feedback may reflect reductions in inflation, so the revenue feedback effects of reductions in spending are not entirely undesirable. Moreover, since spending cuts may cause significant reductions in outlays for interest, as reflected in their outlay feedback estimates, they may cause a substantial overall reduction in the deficit.

CHAPTER I. INTRODUCTION

What is the overall effect on the federal budget of a given change in tax rates or federal spending? Can tax cuts pay for themselves by stimulating new surges of taxable economic activity? Do matched tax and spending cuts leave the deficit unchanged? These frequent questions concern the "feedback" or "reflow" effects of tax and spending changes.

Federal spending and taxes play such a large role in the economy that changes in them are likely to stimulate significant changes in spending, working, investing, and other kinds of economic behavior. These in turn may affect taxable incomes and tax revenues and change certain budget outlays that are sensitive to fluctuations in the economy--impacts that are known as the budgetary "reflow" or "feedback" effects of a change in fiscal policy. Estimating feedback effects for different types of fiscal policy change makes it possible to convert static impact estimates into estimates of the actual net effect on the budget.

WHEN SHOULD FEEDBACK ESTIMATES BE USED?

Static budget impact estimates are valuable for many purposes. They convey useful information on the quantities of resources that the federal government devotes to different uses, and on the magnitude of the impulse to the economy that the federal budget entails. They also contain incomplete but useful information on both the overall budget impact of a proposal and on its distribution, which is valuable because it is less controversial and uncertain than are net-of-feedback estimates. Finally, since most changes in budget policy entail feedbacks, and since such changes are normally considered in groups, use of static instead of net-of-feedback estimates can often save trouble. In many cases the feedbacks of one program change will be offset by those of others, implying that efforts spent on computing feedbacks for each separate proposal will have been wasted.

When interest centers on the overall deficit impact of a change in tax or spending policy, however, feedback effects must be considered. One way to incorporate feedbacks in budget estimates

is to make an entirely new economic forecast on the basis of each budget policy proposal, together with forecasts of the resulting levels of federal revenues and outlays. This procedure may often be cumbersome, however, given the number of policy proposals that typically come under consideration during a legislative session. A more practical alternative is to develop simple rules for converting static impact estimates into net impacts. Different policy changes with similar feedback rates per dollar of static budget impact can be grouped together before the rules are applied, permitting the net budgetary impact of a program to be estimated relatively easily.

This paper sets forth the issues associated with the feedback question together with illustrative estimates of the feedback rates for different fiscal policy changes based on simulations of econometric models. Efforts are made to show how much these estimates might be affected by changes in underlying conditions. Chapter II gives a brief overview of the economic and budgetary factors that underlie feedback effects. Chapter III discusses in detail the feedback effects of four important types of budget policy change using quantitative estimates from simulations of various econometric models.

The economic and budgetary impacts of policy changes that affect the economy as a whole--like cuts in personal or corporate tax rates--may differ from those of changes that focus on only a small part of the economy. Appendixes A and B develop estimates of the feedbacks from two such special provisions--reduced tax rates on capital gains, and the federal tax exemption for the interest on certain bonds such as industrial revenue bonds. Appendix C, finally, provides technical data relevant to feedback rate estimation, and briefly describes the feedback-estimation procedures used by the Congressional Budget Office (CBO).

CHAPTER II. HOW FEEDBACK EFFECTS WORK

The effects of changes in budget policy are estimated with the aid of economic forecasts. The static impact of a cut in personal tax rates, for example, is calculated by multiplying the change in effective rates by a forecast of taxable income made without taking the tax change into account. But the change in tax policy may be expected to stimulate the economy, changing gross national product GNP, taxable income, employment, and other factors. The budget feedback effect is estimated from increases in expected tax revenues and changes in the forecasts of other budget components that are sensitive to increased economic activity.

Changes in fiscal policy may exert feedback effects through their effects on the demand for goods and services and on the supplies of labor and other inputs to the process of production. Tax cuts and spending increases, for example, may cause GNP to expand through these channels, and may thus increase taxable incomes and tax revenues. The reverse may be true of tax increases or spending cuts. The result is a set of revenue feedbacks that may at least partially offset the static impact of the policy change.

Fiscal policy changes can also cause feedback effects through induced changes in budget outlays. A tax cut or spending increase may increase employment, reducing outlays for unemployment compensation and other programs that provide "transfer payments." The reverse may be true of tax increases or spending cuts.

Other feedback effects are more complex. A tax cut may increase the rate of inflation by raising the demand for goods and services. The increase in inflation would increase budget outlays for programs like Social Security that are "indexed" to the price level. This feedback effect working through increased outlays would increase the deficit and thus reinforce the static deficit impact of the fiscal policy change.

A final significant feedback impact of changes in tax or spending policy works through changes in interest payments on the federal debt. A tax cut or spending increase, for example, may increase interest rates in the financial markets at the same time that it forces the government to issue more debt to cover the

budget impact of the change. Both the increase in debt and the higher interest rates are likely to cause budget outlays for interest to increase. This is also generally a negative feedback, reinforcing the static deficit impact of the policy change.

ESTIMATING FEEDBACK EFFECTS

This paper presents illustrative estimates of the feedback effects of several important types of change in federal spending and tax policy. In each case, the estimated budget impact is described in terms of its feedback rate—the percentage of the static budget impact of a given policy change that is offset by feedback. The net result reflects the overall impact of the policy change on the budget. For example, a tax cut that has a feedback rate of zero increases the deficit by an amount equal to its static revenue loss estimate, while a cut with a positive feedback rate of 100 percent has no impact on the deficit--it is "self financing" in that its feedback effects offset its static revenue loss entirely.

The process of estimating revenue feedback effects can be broken down for analytic convenience into five steps:

- Estimating the static impact of a given policy change;
- Estimating the impact of the change on GNP, unemployment, inflation, and interest rates;
- Estimating the response of various components of taxable income to the change in GNP;
- Estimating the effective tax rates applicable to these changes in taxable incomes; and, finally,
- Estimating feedbacks involving changes in budget outlays using direct estimates of the responsiveness of outlays to changes in unemployment, inflation, and interest rates.

Technical issues associated with these analytic steps, and CBO's estimating procedures, are discussed in Appendix C.

Estimating Static Budget Impacts

The static budget impacts of changes in federal spending policy are normally estimated by CBO, while those for changes in tax policy are usually estimated by the staff of the Joint Committee on Taxation. In each case, estimates are made using a single, standard economic forecast. This forecast assumes a particular set of economic policies and is generally not adjusted to reflect the economic impacts that the change in policy may have.[1]

Economic Impacts of Changes in Fiscal Policy

As the next chapter points out, there is much controversy and uncertainty in the analysis of the economic impacts of changes in federal fiscal policy. This implies that any quantitative estimate must be regarded as tentative, since it is based on a particular economic point of view.

According to the traditional economic analysis that underlies much of the discussion in this paper changes in federal tax rates and spending levels may affect GNP by causing changes in aggregate demand and in the amounts of labor and savings that are supplied. The initial GNP impacts of these changes may then be augmented through the action of multiplier effects.[2]

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1. Both static and reflow estimates are sensitive to the underlying economic forecast; a given estimate is accurate only if the forecast is. One important reason for which a given budget impact estimate can be misleading is that the economic policy that was assumed in making the economic forecast may not actually be put in place. For example, as the discussion below will show, budget impact estimates based on a forecast assuming a relatively liberal "accommodating" monetary policy may be inaccurate if the actual monetary policy is tight or "nonaccommodating." Similarly, estimates made assuming that certain fiscal policy changes have already been enacted will be inaccurate if those changes are not made. For these reasons it is important to pay attention to underlying assumptions when using "static" or "reflow" estimates.

2. For a detailed discussion of traditional views of the ways in which tax and spending changes affect the economy, see Congres-

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Cuts in individual income tax rates may exert impacts on GNP by increasing taxpayers' disposable incomes, which may increase their demand for goods and services (if no offsets occur) and consequently increase GNP. In addition, cuts in tax rates may increase the willingness of individuals to work and save, and this may increase GNP by increasing the supplies of labor and capital, two important inputs to the process of producing GNP. Most analysts and model builders, however, believe that these effects are small. Initial increases in GNP that may occur through these channels may be augmented through "multiplier" effects as recipients of new income from the increases in production spend some of this increase, causing GNP to expand still more. Firms may, in addition, expand their investment, motivated partly by the new supplies of individual saving and partly also by a need to expand their productive capacity to meet the increases in consumer demand that they foresee as a result of the tax change.

Cuts in business taxes, such as reductions in statutory corporate tax rates, may induce firms to expand their investments because the tax cut reduces the after-tax cost of funds and increases business cash flow. The increases in investment may in turn cause larger increases in GNP, first through the multiplier effects described in the previous paragraph, and, after some time has passed, through their effects in expanding the stock of capital that can be used in producing GNP. As the next section will show, however, estimates of both the magnitude and the timing of increases in investment in response to business tax cuts are especially uncertain.

Reductions in federal purchases of goods and services such as outlays for payroll costs may cause GNP to fall by reducing the demand for goods and services. The ultimate reduction in GNP may be larger than the cuts in federal spending themselves because of multiplier impacts.

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sional Budget Office, Understanding Fiscal Policy (April 1978). For different points of view, see Norman B. Ture, "'Supply-Side' Economics and Public Policy," testimony presented to the Joint Economic Committee, U.S. Congress, May 21, 1980, and Stanley Fischer, ed., Rational Expectations and Economic Policy (University of Chicago Press, 1980).

Reductions in transfer payments to persons, such as Social Security or unemployment insurance benefits, may reduce GNP through channels much like those for changes in personal tax rates. The disposable incomes of recipients are reduced, and this may reduce their demand for goods and services. Cuts in transfers may also have effects on the supply of labor if they affect the attractiveness of extra work for their potential recipients.

Changes in Taxable Incomes

The federal revenue impact of the changes in economic activity described above cannot be estimated without first calculating the resulting changes in the tax base. Since most federal revenue is derived from income taxes, this means that the impacts must be estimated for three taxable income aggregates: wages and salaries, corporate profits, and taxable nonwage personal income (unincorporated business and farm profits, rental income, dividends, and personal interest income).[3] Changes in wages and salaries are taxed under the individual income tax and the payroll taxes for Social Security and unemployment insurance. Nonwage personal income is taxed under the individual income tax, and corporate profits before tax under the corporation income tax.[4] Certain other sources of federal revenue, such as excises and customs duties, respond more directly to GNP itself, while others, such as the windfall profits tax and Federal Reserve profits, have specialized bases.

Tax Rates Applicable to Changes in Taxable Incomes

A final step in determining the feedback effects of changes in federal fiscal policy on federal revenues is estimating the tax

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3. The behavior of the different components of the tax base in response to a change in GNP is discussed in more detail in Appendix C and in Congressional Budget Office, "A Model of Taxable Incomes for Forecasting and Analysis," unpublished technical paper, 1981.

4. Parts of nonwage personal income are subject to tax under the self-employed provisions of the Social Security tax, while dividends, because they are counted under both nonwage personal income and corporate profits before tax, are taxed under both the corporation and the individual income taxes.

rate that applies to the change in each component of the tax base, as well as the timing patterns according to which the resulting federal revenues are reflected in the Unified Budget. Different rates apply to different parts of the tax base. Moreover, some of these rates can be expected to change in response to changes in the economy, including those caused by federal fiscal policy.

Budget Feedbacks Working Through Changes in Outlays

Changes in federal fiscal policy may exert feedback effects on the budget not only through changes in revenues, but also through impacts on budget outlays that are responsive to changes in the economy. This is true regardless of whether the initial policy change involves taxes or outlays. In particular, changes in employment caused by the policy change have impacts on transfer programs; changes in prices cause changes in programs that are legally or effectively indexed to inflation such as Social Security, federal pensions, Medicare, and others; and changes in interest rates and in outstanding debt change the interest paid on the federal debt.[5] Changes in interest payments can be quite large, as the estimates presented in this paper show. However, they are quite sensitive to the assumed "baseline" level of interest rates; should interest rates fall from their early 1982 levels, the sensitivity of interest outlays could change.

ARE STRONG FEEDBACK EFFECTS ALWAYS GOOD?

It is tempting to conclude that policy changes having strong positive feedback effects are especially attractive because they have relatively small impacts on the budget deficit. To the extent that the revenue loss from personal tax cuts is offset by revenue feedback, for example, economic changes that may be achieved through the policy change, such as increases in economic growth, appear to be without cost in terms of lost revenues.

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5. For discussions of the effects of economic variables on federal budget outlays, see Congressional Budget Office, Baseline Budget Projections: Fiscal Years 1982-1986 (July 1981), pp. 53-58; and Frank de Leeuw et. al., "The High-Employment Budget: New Estimates, 1955-80," Survey of Current Business (November 1980), pp. 13-43.

Such arguments can be misleading, however, because they may overlook certain economic costs of these policy changes in order to focus more narrowly on the federal budget effects. Expansionary fiscal policies such as tax cuts or spending increases may produce strong revenue feedback effects because they may increase the rate of inflation, which (until tax indexing is introduced in 1985) will increase revenues relatively strongly by pushing individual taxpayers into higher tax rate brackets. Thus, the strong revenue feedback effects of such policy changes result in part from undesirable economic effects--increases in inflation. A second reason why budget policy changes with strong feedbacks are not necessarily desirable is, of course, that feedbacks apply to both increases and decreases in tax rates or spending levels. Just as strong feedbacks imply that relatively little increase in the deficit may result from some tax cuts or spending increases, they also mean that little reduction in the deficit may be achieved when spending is cut or taxes raised.

THE IMPORTANCE OF MONETARY POLICY

The impact of changes in fiscal policy on the economy and the budget depends critically on the behavior of monetary policy. The Federal Reserve's response may determine whether the fiscal policy change causes, at one extreme, a small short-run impact on GNP, unemployment, and prices, together with a large change in interest rates; a relatively large economic impact with little or no change in interest rates at another extreme; or something in between. In the longer run, too, the relationship between the stances of fiscal and monetary policy can have significant implications for important economic magnitudes such as productivity and inflation.

Because of these economic effects, budgetary feedback effects are quite sensitive to the stance of monetary policy. In particular, as the estimates in the next chapter will show, if changes in fiscal policy are accompanied by strict Federal Reserve efforts to control the money supply, relatively sharp changes in interest rates may result. These may cause federal outlays for interest on the debt to fluctuate strongly enough to dominate other feedback effects.

CHAPTER III. FEEDBACK RATES FOR SELECTED FISCAL POLICY MEASURES: EVIDENCE FROM ECONOMETRIC MODELS

This chapter provides feedback estimates for each of four major types of fiscal policy change: reductions in individual income tax rates, reductions in corporation income tax rates, reductions in federal purchases of goods and services, and reductions in federal government transfer payments to persons. Estimates are given of feedback rates over several fiscal years for each type of change, together with a discussion of the degree of uncertainty associated with each estimate. The procedure is to derive ranges of estimates based on simulation results from various econometric models, together with "model consensus" estimates developed at CBO.

Uses of Econometric Models

Econometric models are collections of statistical equations expressing economic relationships in quantitative terms. These collections of equations are designed to replicate the actual economy so as to show how the economy and the budget deficit would be affected by particular events, such as a hypothetical tax or spending cut. Because several different reactions occur simultaneously in response to any policy change, a framework of different equations is needed that can be solved simultaneously, taking into account and reconciling these conceptually separate but nevertheless simultaneous events.

While models are useful for estimating the likely magnitudes of the economy's responses to changes in policy, they also raise many problems. Neither the economic theories on which models are based nor the statistical techniques used in translating theory into concrete form are sufficiently developed to prevent different models from generating divergent estimates of the same economic magnitude. One reason among many is perhaps that the structure of the economy is changing in ways that statistical relationships based on historical data do not recognize. For such reasons, results from any given model must be used critically.

Modeling Alternative Views of How the Economy Works

In recent years, conventional ideas about how government policies affect the economy have undergone extensive criticism. One set of criticisms from a "supply-side" perspective has been based on the view that government tax and spending policies exert their major effects on the supply of labor and savings, rather than on aggregate demand as in traditional analysis. A second critical view, from a "rational expectations" point of view, also focuses on supply, but its main emphasis is on the role of policy in relation to workers' and employers' expectations of the future course of the economy.[1]

The analysis presented in this paper is based on traditional and, to a lesser extent, supply-side analysis. Rational expectations discussion is not presented, mainly because it is intended more for long-run analysis than for the short-run purposes of this paper, and because few quantitative rational expectations models are available. Indeed, some rational expectations economists have expressed grave doubts about the accuracy of current methods of quantitative policy analysis.[2] Because alternative approaches are possible, however, the estimates presented in this paper are far from definitive.

The Importance of Initial Conditions

The estimates presented below are based on the assumption that the specified policy changes go into effect on October 1, 1981. The initial economic conditions are therefore those that were in effect on that date. The economic conditions that exist when a fiscal policy change takes effect have an impact, of course, on its

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1. For discussion of these points of view, see Norman B. Ture, "'Supply Side' Economics and Public Policy" testimony presented to the Joint Economic Committee, U.S. Congress, May 21, 1980; and Herschel I. Grossman, "Rational Expectations, Business Cycles, and Government Behavior," in Stanley Fischer, ed., Rational Expectations and Economic Policy (University of Chicago Press, 1980), pp. 5-22.

2. See Robert Lucas, "Econometric Policy Evaluation: A Critique" in Karl Brunner and Allan Meltzer, eds., The Phillips Curve and Labor Markets (North Holland, 1977), pp. 19-46.

feedback rate. If the unemployment rate is relatively high, for example, the likelihood that a stimulative policy change such as a tax cut will generate increases in inflation may be reduced. The level of interest rates is also important to the feedback rate. Since most fiscal policy changes affect the amount of new federal debt that must be issued and financed, interest rates help determine the amount by which outlays for interest respond to the policy change.

The feedback estimates presented below reflect economic and budgetary conditions prevailing in the fall of 1981, and as projected at the time. These include high levels of interest rates, and moderately high unemployment rates. Projections made then did not include the recession of 1981-1982, with its higher level of unemployment and slightly lower level of interest rates. Should those levels be sustained, the feedback rate estimates would need to be adjusted accordingly. The projections also did not include the significantly higher federal budget deficits that are expected currently. These imply that feedback effects working through interest on the federal debt may be noticeably stronger than in the estimates reported in this paper.

Feedback Rates for Combined Proposals

The estimates presented here are for specific policy changes made in isolation. The figures for a cut in individual income tax rates, for example, assume that no other tax or spending changes are made at the same time. In fact, however, various tax and spending changes are usually put into effect at the same time. The feedback rates for such combined policies may be expected to differ from the sum of the individual rate estimates presented here, although there is no reason to believe that the differences would be large. Similarly, the feedback rates for policy changes that are the same as the isolated changes shown here, but of a different size, may be expected to differ.

The Estimation Period

A final caveat concerns the length of the period for which the estimates are made. Estimated feedback rates are given for each policy change for a five-year period, 1982-1986. Because the models on which these estimates are based are meant for use in more short-term contexts, however, the estimates for the later years,

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1984-1986, should be regarded as especially uncertain. These figures are presented because a multiyear planning horizon is important, but they really represent only educated guesses.

REDUCTIONS IN INDIVIDUAL INCOME TAX RATES

Table 1 shows estimated feedback rates from different models for a 3 percent reduction in the levels of individual income tax rates, leaving bracket widths and all other provisions unchanged. Feedback rates show the percentage of the direct revenue loss caused by the tax change that is offset by reductions in the deficit occurring through feedback effects. The calculations assume that the tax change takes effect on October 1, 1981, and that the Federal Reserve holds the nonborrowed reserves of the commercial banking system unchanged from their baseline path.[3] As the discussion in Chapter II pointed out, this represents a "partially accommodating" monetary policy because it allows the money supply to increase automatically as a result of the tax cut as banks borrow monetary reserves to support expansion of checking accounts and other components of the money supply. Partially accommodating monetary policy permits larger changes in GNP, and larger budget feedbacks in response to changes in federal fiscal policy, than an alternative monetary policy that holds the path of the money supply fixed. The consequences of a "nonaccommodating" monetary policy with a fixed money supply path are discussed more fully below.

The results show that there is significant variation among models in feedback rate estimates, especially later in the projection period. The range of variation is smaller for feedbacks involving changes in revenues alone, however, than for those

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3. The "baseline" forecast on which these and subsequent simulations are based includes the 23 percent individual income tax rate cut as well as other tax and spending provisions passed by the Congress during the summer of 1981. The baseline underlying the simulations of the Wharton model differs from those in the other models in that it includes the 1981-1982 recession. For this reason, minor differences in the estimated feedback rates in the Wharton model may occur relative to the levels they would have if estimated on a baseline comparable to those used in the other models.

TABLE 1. ESTIMATED FEEDBACK RATES FOR A 3 PERCENT REDUCTION IN INDIVIDUAL INCOME TAX RATES ASSUMING THAT MONETARY POLICY IS PARTIALLY ACCOMMODATING[a] (By fiscal year and model number)

	1982				1983				1984				1985				1986			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Total	14	8	23	2	31	19	16	8	35	18	6	11	34	27	-5	9	29	43	-23	4
Revenues	18	14	22	6	39	35	29	20	46	43	33	28	49	59	36	31	49	81	37	31
Outlays	-5	-6	0	-5	-8	-15	-13	-12	-12	-25	-27	-17	-15	-32	-42	-21	-20	-38	-60	-27
Interest	-6	-7	-6	-3	-12	-19	-18	-8	-16	-27	-30	-13	-20	-31	-43	-16	-23	-32	-60	-19

Note: The change is assumed to take effect on October 1, 1981. Results are drawn from simulations on the econometric models of Chase Econometrics, Inc. (Model 1); Data Resources, Inc. version US81C (Model 2); Wharton Econometric Forecasting Associates, Inc. version 6.1 (Model 3); and Evans Economics, Inc. (Model 4). Budgetary estimates from models using a National Income Accounts accounting basis were converted to a Unified Budget accounting basis by CBO.

a. Given as the percentage of static revenue loss offset by budget feedback; a negative sign denotes feedback that reinforces the static deficit impact rather than offsetting it. Detail may not sum to totals because of rounding.

involving changes in both revenues and outlays. This is partly because outlay feedbacks are heavily influenced by changes in interest on the federal debt, which are variable from model to model for reasons that will be explored below.

The revenue feedback rates differ significantly from model to model. Generally, the figures suggest that between roughly one-tenth and two-tenths of the static revenue loss from the tax cut may be recouped through induced increases in revenues during the first fiscal year after the tax change, and that roughly one-third to one-half of the static revenue loss may be recovered in later years. In the last year of the forecast period, the figures for one model even suggest that revenue feedback may be as high as 81 percent.

The "supply-side" model of Evans Economics, Inc., generally exhibits the lowest revenue feedback rates. Tax rate cuts in this model reduce the growth of wages; this holds down nominal income growth, and with it the growth of tax revenues.[4]

Considering feedbacks that occur through changes in outlays as well as revenue suggests a less optimistic, and still less precise, view of the overall impact of the tax cut on the deficit. Outlay feedbacks increase the deficit, reinforcing the impact of the static revenue loss rather than offsetting it as revenue feedbacks do; this is shown by the negative sign on the estimated outlay feedback rates shown in the table. The main cause of the net deficit-widening impact of the outlay feedbacks is the extra interest on the federal debt that the tax cut makes necessary: since the tax cut may raise interest rates and also make it necessary to issue new federal debt, outlays for net interest increase, more than offsetting reductions in transfer payments and other outlay programs that may be caused by the tax cut. The projected outlays for interest are quite sensitive to the assumed "baseline" levels of interest rates, however. Should interest rates fall signifi-

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4. The way in which this phenomenon has been embodied in the Evans model has come in for especially strong criticism. See Stephen Braun, "Discussion of the Evans Paper," in The Supply-Side Effects of Economic Policy: Proceedings of the 1980 Economic Policy Conference (St. Louis: Federal Reserve Bank). For more discussion, see "Those Disappearing Reflows" in Evans Economics, Inc., Analysis (September 4, 1980).

cantly from their current levels, these estimates of interest feedback effects could prove to be too high.

The ranges of outlay feedback estimates show, moreover, that estimates of the change in interest payments are more uncertain than those of other feedback components. This is because interest payments are determined through a more complex process than the others. Unlike other feedbacks, for example, the change in interest payments during a given year depends directly on the other feedbacks during that year (because they help determine how much new debt must be financed); it also depends on feedbacks during all other years since the tax change took place (because these help determine how much new debt that needs to be serviced this year was issued during those years); and it depends directly on the "baseline" forecasts of both the federal debt and the levels of interest rates. Each of these factors plays a role in making the feedback rates for changes in interest very different in different models. Tests of the sensitivity of overall feedback rates to the assumed path of the Treasury bill rate, for example, show that the feedback rate might vary by as much as 32 percentage points by 1986 for every percentage point difference in the interest rate forecast during the projection period.

Underlying Changes in Economic Behavior

What change in the economy does the tax cut cause in order to produce the feedback effects shown here? Table 2 shows the induced changes in nominal GNP and in taxable incomes, which have to do primarily with revenue feedbacks, and the changes in the rates of inflation, interest, and unemployment, which determine feedback occurring on the outlay side.

Impacts on GNP and Taxable Incomes. The change in GNP that occurs in response to the tax change amounts to slightly less than the static revenue loss from the tax cut in the year of enactment, but rises through the "multiplier" process described in Chapter II to roughly 1.5 to 3 times the contemporaneous static revenue loss by 1986. Wages and salaries rise in most models at first by less than half the change in GNP, but by 1986 they rise to approximately half the contemporaneous GNP change. The change in corporate profits, on the other hand, exhibits a pattern that varies from model to model. The change in nonwage personal income, finally, generally rises as a fraction of the change in GNP. This pattern is due largely to increases in interest rates, which increase

personal interest income. As a result of these changes and the tax rates that apply to the separate components of the tax base, the overall effective tax rate relating the increase in calendar-year GNP stimulated by the tax change to increases in fiscal-year revenues varies between 14 and 28 percent in 1982, and 22 and 25 percent in 1986.

All models except the Evans agree that the tax cut causes a reduction in the unemployment rate, an increase in interest rates, and an increase in inflation. The Evans model, unlike the others, projects that the unemployment rate rises in response to the tax cut as more persons enter the labor force without finding employment. Despite the reductions in transfers that are caused by declining unemployment rates, all models show a net negative outlay feedback rate reflecting increases in interest and, in some cases, an increase in outlays for indexed budget programs.

Table 3 gives "model consensus" feedback rate estimates for a 3 percent individual income tax rate cut assuming a partially accommodating monetary policy.[5] These show revenue feedbacks rising from 19 percent in 1982 to 57 percent in 1986, and outlay feedbacks from -8 percent to -52 percent in those same years.

The Impact of Inflation on Revenues

How much of the changes in nominal GNP and taxable incomes shown in Table 2 represent increases in prices alone? Although the changes in inflation rates shown in Table 2 seem modest, even these small changes are sufficient to imply that a large part of the increase in nominal GNP stimulated by the tax change is due to induced increases in prices. Because of the interaction between inflation and the progressive income tax, moreover, an even larger fraction of the resulting revenue feedback is due purely to infla-

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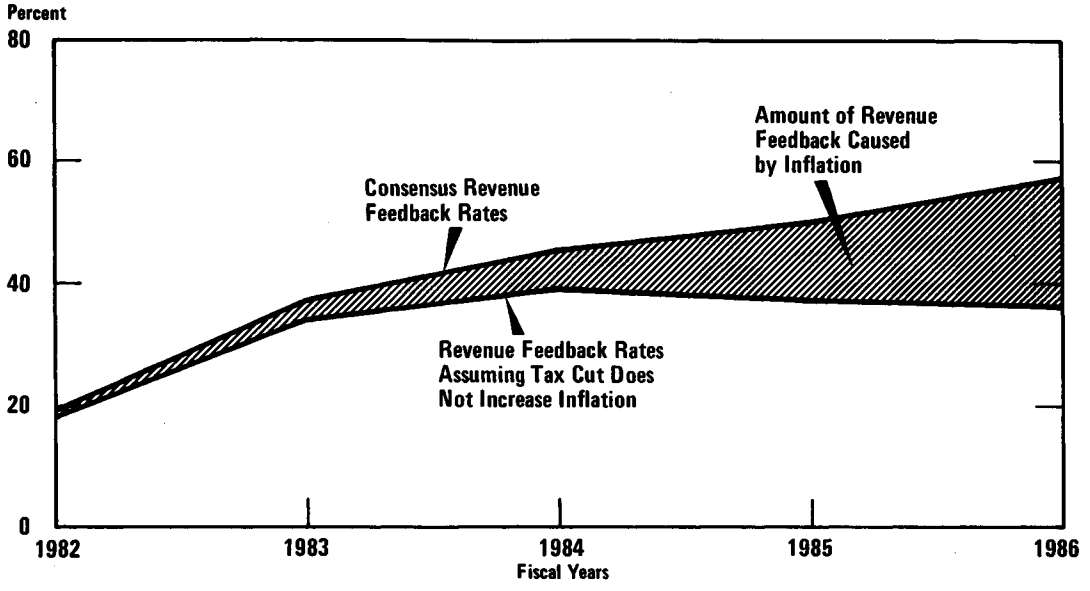
5. The consensus estimates were developed using CBO's Multipliers Consensus Framework as revised through the addition of new procedures for determining the behavior of prices, real output, and employment. Results from the Evans model have not been incorporated in the "consensus" estimating procedure mainly because of severe criticisms that have been made of the model, such as that cited in footnote 4. For a description of the elaborated Multipliers Framework, see Appendix C.

Figure 1.

Revenue Feedback Rates for a Reduction in Individual Income Tax Rates



tion. Figure 1 compares the feedback estimates given in Table 3 with those that would result if the tax cut caused no increase in prices over what they would have been anyway.[6] The revenue feedbacks would be reduced significantly from their 1986 level of 57 percent given in the consensus feedback estimate in Table 3 to only 36 percent. Although these figures are not shown, the overall feedback rate estimate in 1986 would be reduced even more sharply because smaller revenue feedbacks during the earlier years would necessitate issuing more federal debt, which would increase outlays for interest. These results indicate that strong positive feedback rates, which seem desirable for cuts in tax rates, may largely reflect undesirable increases in inflation.

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6. These estimates are derived by holding the GNP deflator at its "baseline" level during each year and using this revised deflator to recompute the levels of nominal GNP that occur after the tax change. This is equivalent to assuming that the response of real GNP to the tax cut is the same as in the "consensus" result, but that prices are unaffected. Corresponding changes

TABLE 2. ECONOMIC IMPACTS UNDERLYING BUDGET FEEDBACKS SHOWN IN TABLE 1 FOR A 3 PER billions of dollars unless otherwise noted)

	1982				1983			
	1	2	3	4	1	2	3	4
GNP	6.6	6.3	6.6	4.0	12.7	12.1	8.6	8.4
Wages and salaries	2.3	2.7	1.6	1.5	5.1	5.6	3.5	3.8
Nonwage personal income[a]	1.3	1.5	1.5	0.3	2.9	3.5	3.2	0.1
Corporate profits before tax	3.4	2.0	3.8	1.4	5.1	3.4	3.0	2.9
Inflation rate (GNP) deflator, percent)	0.0	0.0	0.04	0.03	0.05	0.0	0.06	0.04
Treasury Bill rate (percentage points)	0.20	0.17	0.07	0.10	0.25	0.19	0.09	0.06
Unemployment rate (percentage points)	-0.07	-0.05	-0.10	-0.01	-0.16	-0.10	-0.09	-0.02
Static revenue loss (fiscal years)	8.3	8.6	8.4	9.2	8.6	9.5	8.8	9.6

NOTE: The change is assumed to take effect on October 1, 1981. Results are drawn from sumulations on the econometric models of Chase Econometrics, Inc. (Model 1); Data Resources, Inc. version US81C (Model 2); Wharton Econometric Forecasting Associates, Inc. version 6.1 (Model 3); and Evans Economics, Inc. (Model 4).

Alternative Monetary Policy Assumptions

There is some uncertainty about how the Federal Reserve might react to a shift in fiscal policy such as a cut in personal tax rates. The Fed has historically been concerned to a varying degree with controlling both the level of interest rates and the level of

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in the components of taxable income are computed by applying the same shares to this change in GNP that were observed in the actual simulation underlying Table 3. In computing budget impacts, finally, the elasticity of the individual income tax to taxable income was held at the relatively low level applicable when the only source of "bracket creep" is changes in worker productivity.

CENT REDUCTION IN INDIVIDUAL INCOME TAX RATES (By calendar year and model number; in

1984				1985				1986			
1	2	3	3	1	2	3	4	1	2	3	4
17.5	16.8	11.1	12.5	21.5	26.5	13.5	16.2	25.6	41.1	15.6	17.5
7.7	8.1	5.1	5.9	10.2	12.9	16.5	7.0	12.8	19.9	7.7	6.2
5.0	5.1	4.9	0.3	7.3	6.8	7.0	0.7	10.1	9.1	9.5	0.9
5.0	4.1	2.8	3.8	4.0	6.4	2.6	4.7	2.7	9.5	2.2	5.6
0.08	0.08	0.08	0.05	0.07	0.12	0.08	0.06	0.10	0.10	0.07	0.07
0.29	0.13	0.12	0.07	0.32	0.09	0.19	0.10	0.34	0.04	0.26	0.10
-0.18	-0.10	-0.06	0.02	-0.17	-0.10	-0.03	0.02	-0.15	-0.20	0.00	0.05
9.6	10.5	9.5	10.0	10.6	11.7	9.9	11.2	11.6	12.9	10.0	12.3

a. Nonwage personal income is the sum of farm proprietors' income, nonfarm proprietors' income, rental income, personal interest income, and personal dividend income.

the money supply, both of which come under pressure from a fiscal policy change. If the Fed were to hold the path of nonborrowed reserves unchanged, as has been assumed in the simulations presented above, both interest rates and the money supply might rise somewhat under a cut in personal tax rates. Consequently, this policy of "partial accommodation" would permit the tax cut to have bigger GNP impacts and feedback effects than a "nonaccommodating" policy, which might not allow the money supply to change at all while interest rates rose substantially. A policy of "full accommodation," on the other hand, would hold interest rates constant while both the money supply and GNP would respond quite strongly.

While partial accommodation has proved a satisfactory assumption about Federal Reserve behavior in the past, the Fed's announced policy since October 6, 1979, has been to put much heavier emphasis on control of the money supply. There is still, however,

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TABLE 3. "MODEL CONSENSUS" FEEDBACK RATE ESTIMATES FOR A 3 PERCENT REDUCTION IN INDIVIDUAL INCOME TAX RATES ASSUMING THAT MONETARY POLICY IS PARTIALLY ACCOMMODATING[a] (By fiscal year)

	1982	1983	1984	1985	1986
Total	11	13	12	10	5
Revenues	19	37	45	50	57
Outlays	-8	-24	-33	-40	-52
Interest	-12	-29	-38	-43	-49

Note: The change is assumed to take effect October 1, 1981. Estimates are on a Unified Budget accounting basis; figures are based on estimated economic impacts of the tax change drawn from simulation on CBO's Multipliers Consensus Framework, which are then fed through CBO's outlay- and revenue-estimating models. For a description of these procedures, see Appendix C.

a. Given as the percentage of static revenue loss offset by budget feedback; a negative sign denotes feedback that reinforces the static deficit impact rather than offsetting it. Detail may not sum to totals because of rounding.

widespread uncertainty about how far the Fed will actually allow money and interest rates to respond to changes in fiscal policy and other factors that put upward pressure on interest rates.[7] There is also widespread debate as to whether the Fed should continue this policy.

7. See, for example, Michael Hamburger and Burton Zwick, "Deficits, Money, and Inflation," Journal of Monetary Economics, vol. 7 (1981), pp. 141-50.

TABLE 4. ESTIMATED FEEDBACK RATES FOR A 3 PERCENT REDUCTION IN INDIVIDUAL INCOME TAX RATES ASSUMING A NONACCOMMODATING MONETARY POLICY[a] (By fiscal year and model number)

	1982		1983		1984		1985		1986	
	2	3	2	3	2	3	2	3	2	3
Total	-4	22	-22	14	-36	1	-48	-16	-57	-43
Revenues	4	22	5	29	6	32	7	35	10	34
Outlays	-8	0	-27	-14	-41	-31	-55	-51	-68	-77
Interest	-9	-6	-28	-20	-43	-34	-57	-51	-70	-74

Note: The change is assumed to take effect on October 1, 1981. Estimates were made from simulations on the econometric models of Data Resources, Inc. version US81C (model 2); and Wharton Econometric Forecasting Associates, Inc. version 6.1 (model 3). Other models are not included because of difficulties in analyzing nonaccommodating monetary policy on those models. Budgetary estimates from models using a National Income Accounts accounting basis were converted to a Unified Budget accounting basis by CBO.

a. Given as the percentage of static revenue loss offset by budget feedback; a negative sign denotes feedback that reinforces the static deficit impact rather than offsetting it. Detail may not sum to totals because of rounding.

The reduced feedback rates that may obtain if the Fed does stick to its emphasis on controlling the money supply are illustrated in Table 4, which shows feedback rate estimates from two econometric models for a simulated personal tax cut identical in all respects to that considered above, except that the response of the Federal Reserve is assumed to be nonaccommodating rather than partially accommodating as before.[8] The revenue feedbacks are

8. That is, the path of M1 was assumed to be held fixed, rather than the path of nonborrowed reserves. Two of the models used

smaller than those shown in Tables 1 and 2 for the alternative monetary policy option. The negative feedbacks from increased outlays for interest on the national debt, moreoever, are stronger, both because interest rates rise further and because, with smaller revenue feedbacks, the amount of new debt on which interest must be paid is larger. As a result, the overall feedback rate is more likely to be negative. This implies that if taxes are cut while the Federal Reserve holds to a predetermined money supply path, the deficit may be increased by more than the static revenue loss estimate of the tax cut.

Revenue Feedback Through Reduced Tax Evasion

Would reductions in personal tax rates raise tax revenues by reducing tax evasion? While it is likely that the answer to this question is "yes," so little is known about this behavior that reliable estimates cannot be made. The subject is important enough, however, that some attention to the magnitudes involved is worthwhile.

The Internal Revenue Service has estimated that the amount of unreported income in 1976 was between $100 and $135 billion, or 6 to 8 percent of official GNP. Of this, $75 to $100 billion--4 to 6 percent of GNP--consisted of unreported but otherwise legal income, such as tips, cash retail receipts, and expense accounts, while the remainder, $25 to $35 billion, was estimated to be from illegal transactions such as gambling, racketeering, and prostitution.[9] Published statistics on GNP include an estimate of unreported production. The income that this production generates, however, is still missing from the tax base, so while estimated GNP is not affected by the unreported economy, actual tax receipts are.

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in estimating feedbacks under partially-accommodating monetary policy are excluded from the estimates in Table 4 because it has not been possible as yet to make estimates for nonaccommodative monetary policy on these models.

9. Internal Revenue Service, Estimates of Income Unreported on Individual Income Tax Returns, U.S. Treasury Department publication 1104 (9-79) (September 1979).

The IRS has estimated that the loss in 1976 tax revenues from this unreported income was $19 to $26 billion. Preliminary IRS figures for the revenue loss in 1981, moreover, suggest that it has grown substantially, to perhaps $95 billion.[10] If a reduction in income tax rates could return a significant portion of reported income to the tax rolls, then the feedback rate of the tax cut might be increased significantly. Of course, no change in tax rates would cause all unreported income to be reported, so the increase in taxes would be a small fraction of this figure.[11]

While no reliable estimates of the sensitivity of tax evasion to changes in tax rates are available, the potential impact on budgetary feedback rates can be illustrated by noting that the estimated revenue loss from unreported GNP is roughly equal to the static revenue loss from a 30 percent cut in individual income tax rates in 1982. If a 30 percent tax cut was enacted, and if it reduced the amount of unreported GNP by only one percent, this would increase the feedback rate of that tax cut by one percentage point. Thus, even a modest percentage reduction in unreporting of GNP in response to tax rate cuts could have a noticeable impact on feedback rates.

Legal Tax Avoidance

The amount of tax avoidance through legal tax sheltering, as opposed to the illegal tax evasion described above, is clearly

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10. This figure implies that unreported production has grown significantly as a percentage of GNP. See "Statement of Roscoe L. Egger, Jr., Commissioner of Internal Revenue, before the Subcommittee on Oversight of the Internal Revenue Service, Committee on Finance, U.S. Senate," March 22, 1982. This estimate takes account of the fact that, according to the IRS report, most persons who fail to report legal income have relatively low incomes and marginal tax rates. This implies that a lower tax rate applies to this income than to taxable personal income as a whole.

11. Economic theory postulates that a tax evader, in deciding whether to report an extra dollar of income, would weigh the extra income to be gained by nonreporting against the extra penalty he might incur, together with any increase in the probability of getting caught and having to pay the penalty.

quite large. How much of this activity would disappear in response to reduced marginal tax rates has not been estimated. The response might, however, be large enough to affect tax revenues, and consequently the feedback rates estimated in this paper, significantly. As with tax evasion, published GNP statistics would not be likely to be affected.

REDUCTIONS IN BUSINESS TAX RATES

Reductions in business taxes generate budget feedback by improving business cash flow and the after-tax rate of return on new capital goods, thereby stimulating business investment. While there is general agreement about this broad proposition, the magnitudes of the investment responses and budget feedbacks are highly uncertain. Most econometric models take the same general approach, but their conclusions about the likely magnitudes of the effects vary widely, as the results in this section show.[12] Moreover, if certain arguably reasonable modifications of these models are made, the results vary still more.[13]

Since neither the extra penalty nor the extra risk of getting caught is very sensitive to the amount of tax evasion for most persons involved, evaders might reduce their tax evasion relatively sharply in response to a reduction in tax rates. Reduced tax rates would cut the benefit from extra evasion, while the risk attached to extra evasion would stay the same (unless IRS enforcement was simultaneously reduced). Some would argue, however, that these considerations apply mainly to persons considering becoming tax evaders. Once the skills are acquired, they may be used indefinitely unless the benefits are reduced quite sharply.

12. For a survey of the ways in which investment decisions are treated in different models, see R. Jeffery Green, "Investment Determinants and Tax Factors in Major Econometric Models," in George M. Von Furstenberg, ed., The Government and Capital Formation (Ballinger, 1980).

13. Robert S. Chirinko and Robert Eisner, "The Effects of Tax Parameters on the Investment Equations in Macroeconomic Econometric Models," U.S. Treasury, Office of Tax Analysis Paper 47 (January 1981), and Chirinko and Eisner, "The Effects of Tax

These arguments are meant to show that there is unusual uncertainty about the feedback effects of any particular business tax change. There is still more uncertainty, however, about whether the range of estimates for a particular plan accurately reflects the range for business tax changes generally. It is possible that the range of estimated effects for a different proposal would itself be quite different. A change whose benefits are distributed among firms in a different pattern, for example, can be expected to have different investment effects because firms in different industries vary considerably in their sensitivity to tax changes.[14] Some programs, in any case, like the Accelerated Cost Recovery System implemented in 1981, involve changes that are so large relative to experience that any projection of their effects on investment is extraordinarily uncertain.

Another complication is that the static revenue loss is different for different types of business tax cuts. Broadly speaking, the static loss from a reduction in statutory corporation tax rates varies with the current level of corporation profits, while that for changes in the investment tax credit varies primarily with the current levels of investment and profit. The loss from changes in depreciation provisions, finally, varies primarily with profits and cumulative investment after the tax change takes place.

Table 5 shows budgetary feedback rates for a 3 percent reduction in the levels of statutory corporation income tax rates based on simulations of four econometric models. The change is assumed to take effect October 1, 1981, and the policy of the Federal Reserve is assumed to be partially accommodating.

The variation from model to model in the estimates in Table 5 is even wider than that shown earlier for reductions in individual

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Policies on Investment in Macroeconometric Models: Full Model Simulations," U.S. Treasury, Office of Tax Analysis Paper 46 (January 1981). For a rejoinder, see Allen Sinai and Otto Eckstein, "Tax Policy and Business Fixed Investment Revisited," Data Resources, Inc., unpublished paper (February 16, 1981).

14. Clopper Almon and Anthony J. Barabera, "Investment in Producer Durable Equipment 1976-1990," in George M. Von Furstenberg, ed., Capital, Efficiency, and Growth (Ballinger, 1980).

TABLE 5. ESTIMATED FEEDBACK RATES FOR A 3 PERCENT REDUCTION IN CORPORATION INCOME TAX RATES ASSUMING THAT MONETARY POLICY IS PARTIALLY ACCOMMODATING[a] (By fiscal year and model number)

	1982				1983				1984				1985				1986			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Total	10	1	-11	13	23	26	-6	27	34	69	-7	30	45	113	-14	24	42	146	-26	22
Revenues	16	6	-9	14	34	33	2	31	46	70	10	37	58	105	13	36	58	129	12	40
Outlays	-6	-5	-1	-1	-11	-6	-8	-3	-12	-1	-17	-8	-14	8	-28	-12	-16	17	-38	-18
Interest	-6	-5	-6	-3	-11	-10	-18	-7	-14	-8	-30	-10	-17	1	-38	-12	-18	13	-46	-15

Note: The change is assumed to take effect on October 1, 1981. Results are drawn from simulations on the econometric models of Chase Econometrics, Inc. (Model 1); Data Resources, Inc. version US81C (Model 2); Wharton Econometric Forecasting Associates, Inc. version 6.1 (Model 3); and Evans Economics, Inc. (Model 4). Budgetary estimates from models using a National Income Accounts accounting basis were converted to a Unified Budget accounting basis by CBO.

a. Given as the percentage of static revenue loss offset by budget feedback; a negative sign denotes feedback that reinforces the static deficit impact rather than offsetting it. Detail may not sum to totals because of rounding.

income tax rates. Nevertheless, most of the estimates suggest that revenue feedback rates are lower early in the five-year projection period than are the corresponding rates for personal tax cuts shown in Table 1. This is because of the relatively long time that is required before business investment responds to a tax change in these econometric models. As time passes, however, the revenue feedback rates for the business tax cut rise to levels generally equal to, or even greater than, those for the personal tax cut. As in the case of personal income tax cuts, some of the deficit-closing impact of this revenue feedback is offset by negative outlay feedbacks. Most models suggest, however, that the overall feedback effect helps narrow the deficit.

Underlying Changes In Economic Behavior

Table 6 shows the changes in GNP and taxable incomes underlying the feedback rate estimates in Table 5, as well as the changes in interest rates, unemployment, and inflation. The figures for the Wharton model reflect the possibility that reductions in corporation tax rates might initially reduce prices relative to what they would be without the tax cut. Consequently, nominal GNP would be reduced despite a slight increase in real GNP accompanying expanded demand for investment goods. This might come about because firms, given an increase in after-tax profits per dollar of sales, could reduce the markup over labor and materials costs that they use in setting prices. The models are far from unanimous, however, in predicting that a reduction in prices and nominal GNP might come about in response to a corporation tax cut. The other models predict a more conventional outcome in which increased demand for investment goods causes prices to rise instead. In these cases, nominal GNP rises strongly because of increases in prices as well as in real GNP fueled by increases in investment.

The behavior of taxable incomes varies with that of nominal GNP. Where prices are predicted to fall in response to the tax change, wages and salaries and nonwage personal income fall as well, while corporate profits increase. In models in which prices are predicted to rise, on the other hand, the pattern of changes in the components of taxable income is more like that experienced in response to a cut in personal tax rates: corporate profits, wages and salaries, and nonwage personal income all rise, but the change in wages and salaries generally rises as a percentage of the change in GNP, while the reverse is true of the change in corporate profits. Subsequently, however, the percentage increases in wages and

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TABLE 6. ECONOMIC IMPACTS UNDERLYING BUDGET FEEDBACKS SHOWN IN TABLE 5 FOR A 3 PER in billions of dollars unless otherwise noted)

	1982				1983			
	1	2	3	4	1	2	3	4
GNP	2.0	0.7	-0.5	2.4	4.0	4.0	-0.1	4.6
Wages and salaries	0.5	0.4	-0.6	1.0	1.4	1.9	0.1	2.4
Nonwage personal income[a]	0.0	0.4	0.2	0.3	0.0	1.0	0.8	0.7
Corporate profits before tax	1.4	0.3	-0.5	1.2	2.9	1.5	-0.1	1.6
Inflation rate (GNP) deflator, percent)	-0.05	0.0	-0.09	0.03	0.05	0.0	-0.02	0.04
Treasury Bill rate (percentage points)	0.09	-0.01	0.00	0.03	0.09	-0.07	0.01	0.05
Unemployment rate (percentage points)	0.00	0.00	-0.02	-0.02	-0.03	0.00	-0.06	-0.04
Static revenue loss (fiscal years)	3.4	2.6	1.9	2.8	3.9	3.0	2.4	3.5

NOTE: The change is assumed to take effect on October 1, 1981. Results are drawn from sumulations on the econometric models of Chase Econometrics, Inc. (Model 1); Data Resources, Inc. version US81C (Model 2); Wharton Econometric Forecasting Associates, Inc. version 6.1 (Model 3); and Evans Economics, Inc. (Model 4).

in nonwage personal income grow relative to that of corporate profits. Partially as a result, the effective tax rate on the change in GNP is between 22 and 34 percent in 1982, and 19 and 36 percent in 1986.

The responses of the rates of unemployment and interest are closely related to the price and real GNP effects mentioned above. Unemployment is projected to fall slightly in response to increases in real output, while the response of interest rates is less clear. Interest rates increase in most models.

"Model consensus" feedback estimates for reductions in statutory corporation tax rates assuming a partially accommodating monetary policy are shown in Table 7. The estimates are smaller than those for personal tax cuts; the revenue feedback rates reach 48 percent in 1985, while increases in outlays offset about half of the revenue feedbacks.

CENT REDUCTION IN CORPORATION INCOME TAX RATES (By calendar year and model number;

1984				1985				1986			
1	2	3	3	1	2	3	4	1	2	3	4
6.9	8.7	0.5	6.6	9.4	13.4	1.2	9.7	10.4	18.0	2.3	12.0
2.7	4.3	0.6	3.6	3.9	6.9	1.3	5.3	4.7	7.5	2.1	7.3
0.4	1.5	1.4	1.0	0.3	1.4	2.1	1.5	-0.08	0.9	3.1	2.0
4.5	2.6	-0.1	1.7	6.1	3.4	-0.4	1.8	6.5	3.9	-0.8	1.7
0.00	0.04	0.02	0.04	0.08	0.08	0.05	0.04	0.03	0.03	0.06	0.04
0.11	-0.13	0.03	0.05	0.12	-0.17	0.04	0.08	0.15	-0.21	0.07	0.09
-0.06	-0.08	-0.07	-0.05	-0.07	-0.10	-0.08	-0.06	-0.06	-0.10	-0.06	-0.05
4.8	3.1	2.7	4.3	5.6	3.3	3.3	5.1	6.5	3.4	4.1	5.8

a. Nonwage personal income is the sum of farm proprietors' income, nonfarm proprietors' income, rental income, personal interest income, and personal dividend income.

Feedback Rates Under a Nonaccommodating Monetary Policy

Table 8 shows feedback rates for a 3 percent cut in corporation tax rates assuming that the Federal Reserve follows a nonaccommodating policy of holding the path of the money supply rigidly fixed. All other assumptions are identical to those underlying Table 6 and 7. As in the case of personal tax cuts, the revenue feedback rates are reduced relative to the levels in Tables 5 and 7, and negative outlay feedbacks for interest appear more likely to be sufficiently strong to dominate all other feedbacks. As a result, the possibility exists that a cut in corporation tax rates might increase the deficit by an amount greater than its static revenue loss estimate.

TABLE 7. "MODEL CONSENSUS" FEEDBACK RATE ESTIMATES FOR A 3 PERCENT REDUCTION IN CORPORATION INCOME TAX RATES ASSUMING THAT MONETARY POLICY IS PARTIALLY ACCOMMODATING[a] (By fiscal year)

	1982	1983	1984	1985	1986
Total	-2	13	25	28	20
Revenues	8	26	40	48	42
Outlays	-10	-13	-15	-20	-22
Interest	-10	-13	-25	-31	-33

Note: The change is assumed to take effect on October 1, 1981. Estimates are on a Unified Budget accounting basis; figures are based on estimated economic impacts of the tax change drawn from simulations on CBO's Multipliers Consensus Framework, which are then fed through CBO's outlay- and revenue-estimating models. For a description of these procedures, see Appendix C.

a. Given as the percentage of static revenue loss offset by budget feedback; a negative sign denotes feedback that reinforces the static deficit impact rather than offsetting it. Detail may not sum to totals because of rounding.

REDUCTIONS IN FEDERAL PURCHASES

Table 9 shows feedback rates based on different econometric models for a $10 billion reduction in federal purchases of goods and services effective October 1, 1981, assuming that the Federal Reserve follows a partially accommodating monetary policy as described above.[15] Purchases of goods and services include spending

15. The static budget impact of the assumed spending cut in fiscal year 1982 is $10 billion. In subsequent years the static size of the cut is assumed to represent the same percentage of baseline federal purchases as in 1982. Accordingly, the static budget impact changes over time, as is shown in the

TABLE 8. ESTIMATED FEEDBACK RATES FOR A 3 PERCENT REDUCTION IN CORPORATION INCOME TAX RATES ASSUMING A NONACCOMMODATING MONETARY POLICY[a] (By fiscal year and model number)

	1982		1983		1984		1985		1986	
	2	3	2	3	2	3	2	3	2	3
Total	-1	-11	0	-5	-17	-6	-36	-14	-43	-27
Revenues	4	-9	15	2	11	10	5	13	8	12
Outlays	-5	-1	-15	-7	-28	-16	-41	-27	-50	-40
Interest	-5	-5	-16	-18	-29	-30	-41	-38	-50	-46

Note: The change is assumed to take effect on October 1, 1981. Results are drawn from simulations of econometric models of Data Resources, Inc., version US81C (model 2); and Wharton Econometric Forecasting Associates Inc., version 6.1 (model 3). Other models are not included because of difficulties in analyzing nonaccommodating monetary policy on those models. Budgetary estimates from models using National Income Accounts accounting basis were converted to a Unified Budget accounting basis by CBO.

a. Given as the percentage of static revenue loss offset by budget feedback; a negative sign denotes feedback that reinforces the static deficit impact rather than offsetting it. Detail may not sum to totals because of rounding.

on the federal payroll, defense procurement, highway construction, and the like. In fiscal year 1981, purchases accounted for 33 percent of federal spending using a National Income Accounts account-

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last line of Table 8, and varies from model to model with the baseline forecasts of purchases in those models. "Partially accommodating" monetary policy in this context, as above, means a policy of holding the path of nonborrowed reserves unchanged.

TABLE 9. ESTIMATED FEEDBACK RATES FOR A $10 BILLION REDUCTION IN FEDERAL PURCHASES OF GOODS AND SERVICES ASSUMING THAT MONETARY POLICY IS PARTIALLY ACCOMMODATING[a] (By fiscal year and model number)

	1982				1983				1984				1985				1986			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Total	48	39	43	27	62	40	47	33	68	31	47	48	74	43	39	64	75	65	26	68
Revenues	46	42	41	26	61	52	49	37	71	54	56	61	78	72	60	89	82	96	59	104
Outlays	2	-3	2	2	0	-12	-2	-4	-3	-23	-10	-13	-5	-29	-21	-25	-7	-30	-33	-37
Interest	-4	-6	-4	-3	-9	-18	-13	-9	-11	-27	-23	-13	-13	-31	-31	-15	-13	-31	-40	-17

Note: The change is assumed to take effect on October 1, 1981. Results are drawn from simulations on the econometric models of Chase Econometrics, Inc. (Model 1); Data Resources, Inc. version US81C (Model 2); Wharton Econometric Forecasting Associates, Inc. version 6.1 (Model 3); and Evans Economics, Inc. (Model 4). Budgetary estimates from models using a National Income Accounts accounting basis were converted to a Unified Budget accounting basis by CBO.

a. Given as the percentage of static budget saving offset by budget feedback; a negative sign denotes feedback that reinforces the static deficit impact rather than offsetting it. Detail may not sum to totals because of rounding.

ing basis. Since a cut in purchases reduces GNP in these models, the feedback represents lower tax revenues and increases in transfer payments that partially offset the direct reduction in the deficit caused by the spending cut.

The feedback rates in fiscal year 1982 range from 27 to 48 percent, meaning that between 27 and 48 percent of the deficit-reducing value of the reduction in purchases may be lost in 1982 because of feedbacks that tend to widen the deficit. By fiscal year 1986 the feedback rates in the different models vary widely, ranging from 26 to 75 percent.

Revenue feedback rates are generally higher than these overall figures, suggesting that revenues might fall by about half the size of the spending cut by the second year after its enactment. Both the revenue feedback rates and the overall rates, moreover, are generally higher throughout the forecast period than those for personal tax cuts shown in Table 1. This is because cuts in federal purchases have stronger effects on GNP per dollar of static budget impact in the models used in this exercise than do cuts in taxes.

Underlying Economic Factors

Table 10 shows the changes in GNP, taxable incomes, and other economic factors that underlie the feedback rate estimates given in Table 9. The figures show a reduction in GNP ranging from roughly two to more than four times the static impact of the spending cut in 1986. As time passes a larger and larger share of the change is reflected in wages and salaries and nonwage personal income. This pattern of change in the components of the tax base corresponds generally to those observed for the tax cuts discussed above, as well as to the analytic considerations that are described in Appendix C. The effective tax rate on the change in GNP is between 18 and 32 percent in 1982, and 20 and 26 percent in 1986.

The spending cut reduces inflation and increases the unemployment rate in all models. The effects of the increase in unemployment on budget outlays are more than offset, however, by the decrease in outlays for interest, part of which is due to the fall in interest rates shown in Table 10.

"Model consensus" feedback estimates for a reduction in federal purchases assuming a partially accommodating monetary policy are

TABLE 10. ECONOMIC IMPACTS UNDERLYING BUDGET FEEDBACKS SHOWN IN TABLE 9 FOR A $10 model number; in billions of dollars unless otherwise noted)

	1982				1983			
	1	2	3	4	1	2	3	4
GNP	-14.5	-16.4	-12.7	-14.3	-21.8	-18.1	-15.7	-25.5
Wages and salaries	-6.0	-9.9	-3.5	-8.2	-10.3	-11.3	-6.4	-17.8
Nonwage personal income[a]	-0.6	-2.3	-2.0	-0.9	-2.5	-3.8	-3.9	-2.6
Corporate profits before tax	-7.9	-3.0	-7.6	-3.3	-8.9	-2.6	-6.1	-4.0
Inflation rate (GNP) deflator, percent)	-0.10	-0.05	-0.05	-0.08	-0.13	-0.04	-0.09	-0.17
Treasury Bill rate (percentage points)	-0.30	-0.26	-0.06	-0.20	-0.38	-0.27	-0.07	-0.29
Unemployment rate (percentage points)	0.30	0.15	0.14	0.19	0.41	0.20	0.21	0.31
Static budget saving (fiscal years)	9.8	9.8	9.8	9.8	10.6	9.8	9.6	10.5

NOTE: The change is assumed to take effect on October 1, 1981. Results are drawn from sumulations on the econometric models of Chase Econometrics, Inc. (Model 1); Data Resources, Inc. version US81C (Model 2); Wharton Econometric Forecasting Associates, Inc. version 6.1 (Model 3); and Evans Economics, Inc. (Model 4).

shown in Table 11. They show the overall feedback rate varying from 25 percent in 1982 to 18 percent in 1986. For revenue feedbacks alone, the figures are 30 percent in 1982 and 68 percent in 1986.

Feedback Rates Under a Nonaccommodating Monetary Policy

Table 12 shows feedback rates for a $10 billion reduction in federal purchases assuming that the Federal Reserve follows a nonaccommodating monetary policy of holding the path of the money supply rigidly fixed. All other assumptions are identical to those underlying the results in Tables 9 to 11. As in earlier estimates, the assumption of a tighter monetary policy results in lower revenue feedback rates, more strongly negative outlay feedback rates due to changes in interest rates, and a stronger likelihood that the overall feedback rate estimate will be negative. This implies

BILLION REDUCTION IN FEDERAL PURCHASES OF GOODS AND SERVICES (By calendar year and

1984				1985				1986			
1	2	3	3	1	2	3	4	1	2	3	4
-28.8	-20.8	-18.6	-38.7	-35.6	-30.5	-23.2	-52.8	-42.3	-44.5	-28.4	-63.1
-14.3	-13.2	-8.9	-27.6	-18.5	-18.1	-11.4	-37.8	-22.8	-25.1	-14.1	-44.8
-4.4	-4.7	-5.6	-4.7	-6.5	-6.3	-7.5	-6.2	-8.7	-8.0	-10.0	-7.2
-9.5	-2.5	-4.9	-6.0	-9.0	-5.0	-4.8	-7.0	-7.9	-7.9	-4.4	-6.8
0.16	-0.04	-0.13	-0.20	-0.10	-0.07	-0.14	-0.26	-0.16	-0.17	-0.10	-0.30
-0.40	-0.22	-0.10	-0.29	-0.39	-0.13	-0.15	-0.29	-0.37	-0.07	-0.22	-0.26
0.41	0.13	0.23	0.34	0.37	0.18	0.20	0.32	0.31	0.20	0.15	0.22
11.5	10.2	9.0	11.2	12.4	11.1	9.3	11.8	13.3	12.1	10.1	12.4

a. Nonwage personal income is the sum of farm proprietors' income, nonfarm proprietors' income, rental income, personal interest income, and personal dividend income.

that if monetary policy is nonaccommodating, reducing federal spending might narrow the deficit by an amount greater than the static estimate of budget savings.

REDUCTIONS IN TRANSFER PAYMENTS

Feedback rates are shown in Table 13 for a $10 billion reduction in transfer payments to persons, effective October 1, 1981, and assuming that the Federal Reserve follows a partially accommodating monetary policy.[16] Transfer payments cover such programs as

16. Like the cut in federal purchases, the static impact of the cut in transfers is assumed to grow over time so that it always represents the same percentage of federal transfers in the "baseline" forecast in each model.

TABLE 11. "MODEL CONSENSUS" FEEDBACK RATE ESTIMATES FOR A $10 BILLION REDUCTION IN FEDERAL PURCHASES OF GOODS AND SERVICES ASSUMING THAT MONETARY POLICY IS PARTIALLY ACCOMMODATING[a] (By fiscal year)

	1982	1983	1984	1985	1986
Total	25	33	29	21	18
Revenues	30	49	57	61	68
Outlays	-5	-16	-28	-40	-50
Interest	-9	-25	-34	-40	-45

Note: The change is assumed to take effect on October 1, 1981. Estimates are on a Unified Budget accounting basis; figures are based on estimated economic impacts of the spending change drawn from simulations on CBO's Multipliers Consensus Framework, which are then fed through CBO's outlay- and revenue-estimating models. For a description of these procedures, see Appendix C.

a. Given as the percentage of static budget saving offset by budget feedback; a negative sign denotes feedback that reinforces the static impact on deficit rather than offsetting it. Detail may not sum to totals because of rounding.

welfare, Social Security, and unemployment compensation; in fiscal year 1981, they accounted for 42 percent of federal spending, using a National Income Accounts accounting basis. The feedback rates range between 2 and 20 percent in fiscal year 1982, and -23 to 39 percent four years later, in fiscal 1986. Like the feedback rates in Tables 9 and 11 for reductions in federal purchases, these feedbacks reflect reductions in tax revenues and increases in some outlays that are stimulated by the cut and serve to offset some of the deficit-reducing effects of cutting transfers. The feedback rates for reductions in transfers, however, are lower than for reductions in purchases, implying that more deficit-reducing progress can be made per dollar of outlay reduction by cutting transfers than by cutting purchases. The reason that feedbacks are weaker for transfer payments than for purchases is that,

TABLE 12. ESTIMATED FEEDBACK RATES FOR A $10 BILLION REDUCTION IN FEDERAL PURCHASES OF GOODS AND SERVICES ASSUMING A NON-ACCOMMODATING MONETARY POLICY[a] (By fiscal year and model number)

	1982		1983		1984		1985		1986	
	2	3	2	3	2	3	2	3	2	3
Total	3	44	-12	47	24	45	-42	33	-45	14
Revenues	16	41	17	49	21	56	17	59	25	57
Outlays	-12	2	-30	-2	-45	-12	-59	-26	-70	-43
Interest	-14	-4	-33	-13	-48	-24	-61	-36	-72	-48

Note: The change is assumed to take effect on October 1, 1981. Results are drawn from simulations on the econometric models of Data Resources, Inc. version US81C (model 2); and Wharton Econometric Forecasting Associates, Inc. version 6.1 (model 3). Other models are not included because of difficulties in analyzing nonaccommodating monetary policy on those models. Budgetary estimates from models using a National Income Accounts accounting basis were converted to a Unified Budget accounting basis by CBO.

a. Given as the percentage of static revenue loss offset by budget feedback; a negative sign denotes feedback that reinforces the static deficit impact, rather than offsetting it. Detail may not sum to totals because of rounding.

according to these econometric models, the demand effects of cuts in purchases are stronger because they affect GNP more directly. The models on which these estimates are based do not include supply-side impacts from reductions in transfers, such as the effects of greater incentives to work.

Underlying Economic Factors

The induced changes in GNP and in other economic variables that underlie these feedbacks are shown in Table 14. The table shows a drop in GNP as a result of the spending cut amounting to less than the static size of the cut in 1982, and about 2 to 3 times the static cut in 1986. The drop is reflected in corporate profits as well as wages and salaries, although, as with other policy changes, wages and salaries take up a larger share of the change in GNP later in the estimation period. The inflation rate falls noticeably, and the unemployment rate rises. The effective tax rate is 19 to 25 percent of the change in GNP in 1982, and 21 to 26 percent in 1986. This increase reflects "bracket creep" and scheduled increases in Social Security taxes, which more than offset the 1981 tax rate reductions in these models.

"Model consensus" feedback rate estimates for cuts in transfer payments assuming a partially accommodating monetary policy are shown in Table 15. These figures show revenue feedback rates rising from 19 percent in 1982 to 59 percent in 1986; outlay feedbacks varying from -8 percent to -50 percent in the same years; and, as a result, the overall feedback rate varying from 11 percent in 1982 to 9 in 1986.

Nonaccommodative Monetary Policy

Table 16 shows feedback rate estimates for a $10 billion reduction in federal transfer payments to persons assuming that the Federal Reserve holds the path of the money supply fixed--a policy of nonaccommodation. All other assumptions are the same as those underlying the estimates in Tables 13-15. As in earlier estimates, the assumption of monetary nonaccommodation reduces revenue feedback rates and makes overall feedback rates more likely to be negative, again suggesting that the cut in spending, by reducing outlays for interest, might reduce the deficit by more than the static estimate of budget savings.

CONCLUSION

The range of feedback rates that is suggested by different models for each type of policy change makes clear that such estimates are quite uncertain. This is especially true of estimated rates for business tax cuts: the corporation income tax cut, for example, is the only case in which the econometric models

TABLE 13. ESTIMATED FEEDBACK RATES FOR A $10 BILLION REDUCTION IN FEDERAL TRANSFER PAYMENTS TO PERSONS ASSUMING THAT MONETARY POLICY IS PARTIALLY ACCOMMODATING[a] (By fiscal year and model number)

	1982				1983				1984				1985				1986			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Total	10	8	20	2	25	20	16	3	29	18	8	10	28	25	-5	20	25	39	-23	18
Revenues	14	14	19	7	33	35	26	16	42	41	31	31	45	56	37	50	46	76	38	56
Outlays	-5	-6	1	-5	-9	-15	-10	-13	-13	-23	-23	-21	-17	-31	-42	-30	-21	-37	-61	-39
Interest	-6	-7	-6	-4	-13	-19	-19	-9	-17	-27	-32	-14	-21	-32	-48	-18	-24	-34	-65	-21

Note: The change is assumed to take effect on October 1, 1981. Results are drawn from simulations on the econometric models of Chase Econometrics, Inc. (Model 1); Data Resources, Inc. version US81C (Model 2); Wharton Econometric Forecasting Associates, Inc. version 6.1 (Model 3); and Evans Economics, Inc. (Model 4). Budgetary estimates from models using National Income Accounts accounting basis were converted to a Unified Budget accounting basis by CBO.

a. Given the percentage of static budget saving offset by budget feedback; a negative sign denotes feedback that reinforces the static deficit impact rather than offsetting it. Detail may not sum to totals because of rounding.

TABLE 14. ECONOMIC IMPACTS UNDERLYING BUDGET FEEDBACKS SHOWN IN TABLE 13 FOR A $10 number; in billions of dollars unless otherwise noted)

	1982				1983			
	1	2	3	4	1	2	3	4
GNP	-6.3	-7.2	-7.5	-3.6	-13.3	-13.6	-9.1	-9.0
Wages and salaries	-2.1	-3.0	-1.7	-1.6	-5.3	-6.1	-3.7	-5.3
Nonwage personal income[a]	-1.4	-1.8	-1.6	-0.3	-3.1	-4.2	-3.5	-0.4
Corporate profits before tax	-3.3	-2.2	-4.4	-1.3	-5.4	-3.8	-3.1	-2.9
Inflation rate (GNP) deflator, percent)	-0.05	-0.00	-0.03	-0.04	-0.05	-0.05	-0.06	-0.07
Treasury Bill rate (percentage points)	-0.25	-0.21	-0.09	-0.14	-0.30	-0.24	-0.10	-0.15
Unemployment rate (percentage points)	0.06	0.05	0.14	0.03	0.16	0.10	0.17	0.08
Static budget saving (fiscal years)	9.8	9.8	9.8	9.8	10.6	10.9	9.6	10.4

NOTE: The change is assumed to take effect on October 1, 1981. Results are drawn from sumulations on the econometric models of Chase Econometrics, Inc. (Model 1); Data Resources, Inc. version US81C (Model 2); Wharton Econometric Forecasting Associates, Inc. version 6.1 (Model 3); and Evans Economics, Inc. (Model 4).

used in this exercise gave conflicting results regarding the direction of the impact on nominal GNP. There is still more uncertainty about whether the estimated range for other business tax cuts would be similar.

Despite the variation in feedback rates, there are clear differences in the estimates for different tax and spending changes, as reflected either in the relative sizes of the consensus feedback rate estimates for different policy changes or in the estimates drawn from different econometric models. Cuts in federal purchases appear initially to have the strongest feedback rates in terms both of overall feedbacks and of revenue feedbacks alone. The estimates of revenue and outlay feedbacks together imply that these effects may offset as much as half of the static budget impact of cuts in federal purchases by the third year of enactment. Considering

BILLION REDUCTION IN FEDERAL TRANSFER PAYMENTS TO PERSONS (By calendar year and model

1984				1985				1986			
1	2	3	3	1	2	3	4	1	2	3	4
-18.5	-18.2	-11.4	-17.5	-23.0	-28.3	-14.0	-25.8	-27.6	-43.2	-16.9	-31.7
-8.2	-8.6	-5.5	-11.4	-11.1	-13.4	-7.3	-17.4	-14.1	-20.6	-9.2	-21.8
-5.3	-6.1	-5.3	-1.2	-8.0	-8.4	-7.4	-1.8	-10.9	-11.0	-9.9	-2.2
-5.5	-4.4	-2.5	-5.0	-4.5	-6.7	-1.9	-6.0	-3.2	-9.7	-1.1	-5.6
-0.08	-0.04	-0.09	-0.09	-0.07	-0.08	-0.10	-0.13	-0.06	-0.14	-0.09	-0.15
-0.35	-0.21	-0.14	-0.19	-0.39	-0.16	-0.20	-0.21	-0.42	-0.11	-0.28	-0.22
0.20	0.10	0.16	0.14	0.20	0.18	0.12	0.16	0.17	0.20	0.08	0.13
11.5	12.0	9.8	11.2	12.7	13.4	9.4	12.1	13.9	14.9	9.4	13.2

a. Nonwage personal income is the sum of farm proprietors' income, nonfarm proprietors' income, rental income, personal interest income, and personal dividend income.

revenue feedbacks alone suggests that the offset is even higher, and may approach a dollar-for-dollar level after several years have passed.

Cuts in transfer payments and in individual taxes appear to have slightly smaller feedback effects of roughly equal magnitude. Considering outlay and revenue feedbacks together suggests that tax and transfer cuts have feedback effects of less than half their static budget impacts during the entire forecast period. When revenue feedbacks are considered alone, the feedback rates are slightly larger, but are still well below those of cuts in purchases. Cuts in corporation income tax rates, finally, are harder to predict because they are more uncertain than other feedbacks. The consensus estimate is that revenue feedbacks from across-the-board corporation tax cuts approach 40 percent after three years when investment responses are felt. Overall feedback rates are lower mainly because of increases in interest outlays.

TABLE 15. "MODEL CONSENSUS" FEEDBACK RATE ESTIMATES FOR A $10 BILLION REDUCTION IN FEDERAL TRANSFER PAYMENTS TO PERSONS ASSUMING THAT MONETARY POLICY IS PARTIALLY ACCOMMODATING[a] (By fiscal year)

	1982	1983	1984	1985	1986
Total	11	13	13	10	9
Revenues	19	37	46	52	59
Outlays	-8	-24	-33	-41	-50
Interest	-12	-29	-37	-45	-50

Note: The change is assumed to take effect on October 1, 1981. Estimates are on a Unified Budget accounting basis; figures are based on estimated economic impacts of the tax change drawn from simulation on CBO's Multipliers Consensus Framework, which are then fed through CBO's outlay- and revenue-estimating models. For a description of these procedures, see Appendix C.

a. Given as the percentage of static budget saving offset by budget feedback; a negative sign denotes feedback that reinforces the static deficit impact rather than offsetting it. Detail may not sum to totals because of rounding.

In the case of each policy change, the estimates of revenue feedbacks alone vary less from model to model than do the estimates of outlay and revenue feedbacks combined. This is due to the sensitivity of outlay effects, which consist largely of changes in interest payments, and to the differences between models in "baseline" forecasts and in estimates of other feedbacks. The qualitative implications of the outlay feedback estimates reported in this chapter are nevertheless important: changes in outlays for interest on the debt that are occasioned by cuts in spending or in taxes can be large, especially after several fiscal years have passed, and especially at current high rates of interest. With tax cuts, for example, the interest on the increased debt that the government must issue to cover the net revenue loss from the cut can swamp other outlay feedback effects.

TABLE 16. ESTIMATED FEEDBACK RATES FOR A $10 BILLION REDUCTION IN FEDERAL TRANSFER PAYMENTS TO PERSONS ASSUMING A NONACCOMMODATING MONETARY POLICY[a] (By fiscal year and model number)

	1982		1983		1984		1985		1986	
	2	3	2	3	2	3	2	3	2	3
Total	-3	20	-23	15	-31	3	-44	-16	-52	-43
Revenues	5	19	3	26	7	30	7	34	10	35
Outlays	-8	1	-26	-11	-38	-28	-51	-50	-61	-78
Interest	-9	-6	-29	-21	-42	-35	-55	-55	-66	-79

Note: The change is assumed to take effect on October 1, 1981. Results are drawn from simulations on the econometric models of Data Resources, Inc. version US81C (model 2); and Wharton Econometric Forecasting Associates, Inc. version 6.1 (model 3). Other models are not included because of difficulties in analyzing nonaccommodating monetary policy on those models. Budgetary estimates from models using a National Income Accounts accounting basis were converted to a Unified Budget accounting basis by CBO.

a. Given as the percentage of static revenue loss offset by budget feedback; a negative sign denotes feedback that reinforces the static deficit impact rather than offsetting it. Detail may not sum to totals because of rounding.

It would be tempting to conclude that the relatively high revenue feedback rates reported in this chapter for cuts in taxes make such tax cuts nearly "costless" in terms of revenues after several years. In most models, however, large parts of these revenue feedbacks are brought about by increases in inflation caused by the tax cuts. Increases in prices swell taxable income and increase the effective rate of the personal income tax. When

both of these factors are discounted, estimated revenue feedbacks are reduced significantly.

The estimated feedback rates for cuts in personal income tax rates that have been presented in this chapter do not take explicit account of potential reductions in tax avoidance that such cuts might bring about. While estimates of the sensitivity of tax avoidance to cuts in tax rates are not available, the impact on estimated feedback rates could be significant.

APPENDIXES

APPENDIX A. SPECIAL CASES OF BUDGETARY FEEDBACKS: REDUCED TAX RATES ON CAPITAL GAINS

Chapter III discussed the feedback effects of changes in major federal fiscal policies that have a broad impact on the economy. The economic and budgetary issues can be quite different, however, for policies that affect smaller segments of the economy. Two examples are taken up in this and the following appendix: special provisions governing taxation of capital gains, and special-purpose tax-exempt bonds.

Capital gains income receives preferential treatment under the federal income tax law.[1] Low capital gains tax rates are thought to increase investment and risk taking, and to allow existing investment capital to flow from one asset to another in response to changing economic rates of return.[2]

Proposals are often made to reduce capital gains tax rates further as means of maintaining or increasing these desirable investment effects. In evaluating the consequences of these proposals for federal revenues and the deficit, it is necessary to consider not only their static revenue costs, which assume no changes in economic behavior, but also the new revenues that such cuts might produce by stimulating new taxable sales of capital assets. Investors who previously had been deterred from selling these assets by the level of the capital gains tax rate may find it

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1. Individual taxpayers may exclude 60 percent of net long-term capital gains from taxable income, so the marginal tax rate on capital gains for a given taxpayer is 40 percent of the marginal rate on income from other sources. Taxation of capital gains for corporations is similar.

2. Another reason for lower capital gains tax rates is to reduce the burden on a taxpayer that occurs when a capital gain accruing over several years is realized, requiring the taxpayer to pay tax at progressive rates on several years' income all in one year.

advantageous to sell after the rate is reduced.[3] These realizations generate new revenue--revenue feedback--through the capital gains tax, thus reducing the overall revenue cost of such tax cuts.[4]

Capital gains tax reflows have become quite controversial even though few reliable studies of their magnitude have been available.[5] Recently, however, two new studies of the possible magnitudes of such revenue effects have been published permitting detailed analysis of arguments about feedback. This appendix summarizes the evidence contained in these studies.[6]

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3. For detailed statements of the theory of this "locking-in effect," see Charles C. Holt and John P. Shelton, "The Lock-In Effect of the Capital Gains Tax," National Tax Journal, vol. 15 (December 1962), pp. 337-52; and Beryl W. Sprinkel and B. Kenneth West, "Effects of Capital-Gains Taxes on Investment Decisions," Journal of Business, vol. 35 (April 1962), pp. 122-34.

4. Capital gains tax cuts may also have broader feedback effects through their impacts on business investment, GNP, and employment. These impacts are extraordinarily hard to estimate. Moreover, most current interest centers on the more narrowly-defined feedback effects discussed here. For these reasons, the broader feedback effects are not analyzed in this appendix.

5. For a typical exchange, see "The Impact of the 1978 Capital Gains Tax Cut," Tax Notes (January 12, 1981), pp. 57-58.

6. One eagerly awaited source of evidence was a forthcoming Treasury Department study of the feedback caused by the capital gains tax cuts in the Revenue Act of 1978. While the Treasury paper had been rumored to contain evidence that capital gains feedbacks are very strong, these reports were circulated while the study was in its very early stages. The study was not available at the time of this writing.

   The study was required under Section 533 of the Revenue Act of 1978, P.L. 95-600. The act established a deadline for its release of September 30, 1981, although in May 1982 the report had still not been issued. For an unofficial account, see "Large Unlocking Effect from '78 Gains Cut," Tax Notes (Feb-

HOW TAX CUTS INDUCE CAPITAL GAINS REALIZATIONS

The level of capital gains tax rates partially determines whether it is worthwhile for holders of assets with accrued capital gains to realize these gains, pay the capital gains tax liability, and reinvest the proceeds in higher-yielding assets. As capital gains tax rates are reduced, the rate of return on alternative assets that is required for such transactions to be worthwhile becomes lower.

A capital gains tax cut should stimulate a surge of new realizations in the first year or so after the cut, representing all the gains which had accrued before the tax cut but which only became worthwhile to realize after the cut took place. After this marginal stock of accrued capital gains is depleted, new realizations should settle at a level determined by the stocks of accrued gains on assets with various rates of return, and by the frequency with which rates of return on alternative assets rise high enough relative to those on assets with accrued gains to make it worthwhile to convert these gains. How often this will occur, what assets will be involved, and how much tax revenue will result is difficult to determine. On the basis of theoretical reasoning it seems probable that the rate of realization will be increased by the tax cut. Accurate estimation, however, requires detailed financial analysis and equally detailed data on the tax rates of wealthholders and on the assets that they own in different years. Existing data are not adequate for a fully satisfactory analysis.

EVIDENCE FROM 1973 INCOME TAX RETURNS

Without sufficient data to analyze the capital gains realization problem precisely, analysts have had to make do with approaches tailored to the available information. One such approach is the analysis of data on capital gains realizations of different taxpayers in the same year, which is published periodically by the Internal Revenue Service.[7] Such figures permit

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ruary 23, 1981), p. 382. The act increased the fraction of net long-term capital gains that may be excluded from taxable income from 50 to 60 percent.

7. Most recently the IRS published 1973 Statistics of Income, Supplemental Report: Sales of Capital Assets Reported on Individual Income Tax Returns (November 1980).

inferences to be made about the influences of different tax rates on realizations using formal statistical procedures to compare the realizations of taxpayers with different tax rates, while taking account of other relevant personal characteristics such as age and income from sources other than capital gains.

An analysis of this type by Joseph Minarik suggests that the response of high-income taxpayers to changes in tax rates may be strong enough to increase their net tax payments, but that this is not true of all taxpayers (see Table A-1).[8] Overall, according to

TABLE A-1. ESTIMATED RESPONSIVENESS OF TAXPAYERS WITH DIFFERENT AMOUNTS OF DIVIDEND INCOME TO CHANGES IN CAPITAL GAINS TAX RATES (Percentage increase in realized capital gains per percentage reduction in tax rates)

Dividends (1973)				
$3,000-10,000	10,000-20,000	20,000-50,000	50,000	Average
0.76	0.79	1.08	1.27	0.79

SOURCE: Joseph J. Minarik, "Capital Gains," p. 263.

Minarik's results, taxpayers appear to respond to reductions in tax rates by increasing realizations but not by enough to eliminate any revenue loss from the tax cut.

8. These estimates are reported in Joseph J. Minarik, "Capital Gains" in Henry Aaron and Joseph Pechman, eds., How Taxes Affect Economic Behavior (The Brookings Institution, 1981), pp. 241-77. Minarik's approach represents an improvement on one developed in an earlier study by Feldstein and associates. See Martin Feldstein, Joel Slemrod, and Shlomo Yitzhaki, "The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains," Quarterly Journal of Economics, vol. 94 (June 1980), pp. 777-91; and Joseph J. Minarik, "The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains: Comment," Quarterly Journal of Economics (forthcoming).

Minarik has analyzed the revenue implications of the capital gains provisions in the Revenue Act of 1978 using the estimated realization responses reported above. His results are reported in Table A-2. The most important estimate is that capital gains

TABLE A-2. ESTIMATED CHANGES IN TAX LIABILITY RESULTING FROM 1978 CAPITAL GAINS TAX REDUCTION (1973 income levels; returns with dividend income $3,000 or more only)

Adjusted Gross Income (dollars)	Change in Tax Liability (percent)
0 - 2,500	-98.0
2,500 - 5,000	-9.1
5,000 - 7,500	-8.4
7,500 - 10,000	-1.7
10,000 - 15,000	-2.0
15,000 - 20,000	-2.1
20,000 - 25,000	-2.5
25,000 - 30,000	-1.4
30,000 - 50,000	-3.2
50,000 - 100,000	-3.7
100,000 - 200,000	-6.1
200,000 - 500,000	-11.1
500,000 -1,000,000	-16.5
1,000,000 and Over	-20.9
Average	-5.8

SOURCE: Joseph J. Minarik, "Capital Gains."

realizations should increase by approximately 0.79 percent for each percentage-point reduction in the capital gains tax rate. Since a 1.00 percent response would be needed to offset entirely and permanently the static revenue loss from the tax cut, this estimate suggests that the increase in realizations is strong enough to eliminate most, but not all, of the static loss. CBO estimates very roughly that these figures imply an overall loss of $1.4 billion in

calendar year 1979 tax liability as a result of the capital gains provisions of the 1978 act.[9]

EVIDENCE FROM REALIZATIONS IN DIFFERENT YEARS

The Minarik study is forced by a lack of information to neglect the role played by the accrued stocks of capital gains and the behavior of rates of return on alternative assets. Another study by Mai N. Woo uses data on total accrued gains in different years to attempt to remedy this problem.[10] On the basis of a relatively simple analysis involving only the effective capital gains tax rate and the stock of accrued gains in different years, Woo concludes that the response of realizations to a tax cut should be quite strong in the first year after the cut, but significantly smaller later on because of the depletion of the stock of accrued gains that is caused by the initial surge of realizations. When applied to the 1978 capital gains tax rate cut, Woo's analysis suggests that the cut should have caused an overall increase in capital gains tax revenue of $0.24 billion in calendar 1979, and smaller (but still positive) net revenue gains in subsequent years. Because of the depletion of the stock of gains caused by the 1978 cut, however, Woo concludes that enactment of further cuts in capital gains tax rates would be unlikely to raise overall revenues.

The Woo study makes an important contribution by analyzing the influence of the stock of accrued gains on the response of realizations to a tax cut. Like the Minarik paper, however, it unavoidably excludes from consideration other factors that play a role in determining realizations, such as the behavior of rates of return

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9. On the basis of recent IRS figures cited below, Minarik's estimate appears quite accurate. See Joseph Minarik "Did the 1978 Capital Gains Tax Cuts Pay for Themselves?" Tax Notes (April 5, 1982).

10. Mai N. Woo, "How Far Can Gains Tax Rates Be Cut Without Loss of Revenue?" Tax Notes (May 11, 1981); and Mai N. Woo, "A Time-Series Analysis of the Lock-In Effect of Capital Gains Taxation in the United States," unpublished doctoral dissertation, Georgetown University (Spring 1981).

on alternative assets and income from sources other than capital gains.[11]

CONCLUSION

While the Minarik and Woo studies disagree over the precise revenue implications of the 1978 capital gains tax cut, they agree that the "unlocking" response should not have been large enough to raise significant amounts of new revenues, as had been argued in earlier studies.[12] This broad conclusion seems to derive support from preliminary Internal Revenue Service data on realizations after the 1978 tax cut, which show a reasonably strong realization response in the first year but a decline during the second year.[13] (The precise revenue implications of this response remain to be determined by the Treasury Department.) The Minarik and Woo studies both suggest, moreover, that further cuts in capital gains tax rates like that implicit in the general individual income tax rate cut enacted in 1981 are unlikely to be net revenue raisers.

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11. Woo excludes from consideration many factors that may influence capital gains realizations while retaining only the ones that she believes are "relevant and dominant"--the marginal tax rate and the stock of accrued capital gains. Many other variables are also relevant, however, and their exclusion can bias the measured influence of the included variables because the excluded and included factors are unlikely to be statistically independent, and because some serial correlation may result. Projected levels of capital gains tax revenue that do not take these variables into account, moreover, can be quite inaccurate. Examples of variables that Woo did not consider but which are potentially important are income from sources other than capital gains, capital losses on other assets and accumulated capital loss carryover, and yields on alternative assets.

12. See Feldstein, Slemrod, and Yitzhaki, "The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains."

13. Noreen Hoffmeier, "Preliminary Income and Tax Statistics from 1980 Individual Income Tax Returns," SOI Bulletin 1,3 (Winter 1981-82), p. 5.

APPENDIX B. SPECIAL CASES OF BUDGETARY FEEDBACKS: TAX-EXEMPT BONDS

During the past 20 years, the Congress has allowed state and local governments to issue bonds that are exempt from the federal income tax. These bonds are used to finance investment in pollution control, home mortgages, student loans, general industrial development, and other programs that extend beyond the public activities traditionally financed by state and local tax-exempt bonds. The cost to the federal government of these bonds has grown rapidly; the revenue loss is estimated to total $4.6 billion in fiscal year 1982 (see Table B-1). Critics of these programs argue that these costs are excessive, while supporters counter that conventional static revenue cost estimates ignore the budget feedbacks from induced increases in investment and GNP. As a result, the budget

TABLE B-1. REVENUE COST OF TAX-EXEMPT SPECIAL PURPOSE BONDS (By fiscal year; in billions of dollars)

	1982	1983	1984	1985	1986
Industrial development bonds	1.6	2.2	2.8	3.4	4.2
Pollution control bonds	0.8	1.0	1.1	1.2	1.3
Housing bonds	1.5	1.9	2.2	2.5	2.6
Student loan bonds	0.1	0.1	0.2	0.3	0.3
Hospital bonds	0.6	0.8	0.9	1.0	1.1
Total	4.6	6.0	7.2	8.4	9.5

SOURCE: Joint Committee on Taxation, Estimates of Federal Tax Expenditures for Fiscal Years 1982-1987, 97:2 (March 8, 1982).

feedbacks associated with tax-exempt bonds have become quite controversial.

Measuring the feedback effects of tax-exempt bonds is difficult because the underlying economic relationships are complex. This appendix summarizes the economic interactions that underlie these feedbacks and develops estimates of their size. The discussion is intended to clarify the issues associated with this topic rather than to encourage wider use of revenue feedbacks in evaluating individual budget programs like tax-exempt bonds. The usefulness of revenue calculations for such small budget programs is limited by the fact that all budget programs may have feedbacks, as was illustrated in Chapter III. Calculating the feedback implications of particular programs like tax-exempt bonds is useful only if these differ significantly from those of other programs. Otherwise, different budget items may be compared on the basis of their static budget implications alone, in confidence that the feedback implications of a dollar's direct budgetary effect in one program is roughly the same as that in another. This saves the trouble of making repeated estimates of feedback effects, many of which involve complex calculations and are highly uncertain.

ECONOMIC EFFECTS OF TAX-EXEMPT BONDS: THE CASE OF INDUSTRIAL REVENUE BONDS

New issues of tax-exempt industrial revenue bonds (IRBs) totaled $8.4 billion in 1980, and are projected to reach $21.0 billion by 1986. These bonds are issued by state and local government agencies at below-market interest rates reflecting the tax savings available to holders.[1] The proceeds are made available to private firms, which bear the interest costs. Effectively, these firms have borrowed on the private financial market at tax-subsidized rates of interest.

The tax subsidy to these firms' borrowing costs represents a reduction in their overall cost of capital. This may lead to increases in their desired stock of capital, giving rise to increases in investment and consequently in GNP, provided that new savings become available to finance the added investment. Increases

1. For a detailed discussion of industrial revenue bonds, see Congressional Budget Office, Small Issue Industrial Revenue Bonds (1981).

in GNP, in turn, imply increased tax revenues and changes in budget outlays--budget feedback effects.

The critical issue in this chain of economic responses to the issuance of IRBs is whether or not savings increase, permitting increases in overall investment to go forward. There are two reasons for believing that such increases may occur. If there is some initial unemployment, expanded investment plans may themselves stimulate increased saving. Firms planning new projects order new equipment or hire construction firms, and the increased wages and profits that result give rise to increases in saving. Moreover, the "multiplier" effects discussed in Chapter II may expand incomes and savings further.[2] Even if there is no significant initial unemployment, however, an increase in saving may occur as a direct result of the tax exemption for interest on the new IRBs. The tax exemption represents an increase in the after-tax rate of return to saving, and this may induce individuals to increase the fraction of their current incomes that is saved, expanding the total supply of savings. On the other hand, if few unemployed resources are available and if the sensitivity of the savings rate to the after-tax rate of return is low, investments may be financed by savings attracted away from other projects; in that case, there may be no net increase in investment.

Unless the increase in saving that is stimulated by the tax exemption is large enough to finance the entire increase in outstanding IRBs, there is likely to be an increase in the interest rates on other borrowing instruments that will partially choke off new investment. Under these conditions, some of the funds invested in new IRBs must be attracted away from other financial assets--other tax-exempt bonds, partially or fully taxed bonds, bank accounts, corporate stocks, mortgages, or other assets. When this happens, interest rates on these alternative financial assets may rise, increasing the cost of investment and at least partially off-

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2. This process does not go forward if the federal government offsets the expansionary effects of the increase in IRB supplies with increases in other taxes or reductions in other spending programs. One reason that the government might have for doing so is that it may have an overall target for the budget deficit as part of its fiscal policy strategy. Such a target would imply that increases in IRB supplies would be matched with decreases in other programs to offset the deficit-widening effects that their tax-exempt status entails.

setting the original investment-stimulating effects of the expansion in IRB supplies.

ESTIMATING FEEDBACK RATES FOR IRB TAX EXEMPTIONS

Revenue feedback effects for removal of the tax exemption for interest on IRBs can be estimated in a three-step process representing reversal of the effects of IRB issuance as described above. The first step is to calculate the increase in the cost of capital that withdrawal of the tax subsidy implies for eligible firms, and the consequent decrease in their desired stock of capital. The second step is to estimate the corresponding path of decreases in investment, and consequently of changes in GNP and other economic variables. The final step is to calculate revenue feedback effects on the basis of these economic changes.

Effects on the Cost of Capital and Desired Capital Stock

The cost of IRB financing for eligible firms can be estimated by multiplying the interest rate on alternative means of finance by the average marginal tax rate of holders of IRBs. The result, the effective after-tax interest rate on alternative financial instruments, is the rate of interest that must be paid on IRBs in order to make them at least as attractive as taxable issues. Since CBO estimates the average marginal tax rate of holders of IRBs to be 30 percent, the interest cost of financing with IRBs may be 30 percent lower than the cost of alternative means of finance.[3] Eliminating new supplies of IRBs increases financing costs to affected firms by this amount.

Assuming that there is no offset to this 30 percent interest increase in the form of reductions in other financing costs--as was done in making these estimates--results in a relatively large estimate of the ultimate impact on investment and GNP. This is equivalent to assuming that there is a relatively large decrease in saving in response to reductions in IRB issues. This is an exaggerated figure given current estimates of the responsiveness of saving to changes in its rate of return. The actual decrease in saving and increase in financing costs for firms are likely to be smaller.

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3. For details on CBO estimates of IRB financing costs, see Small Issue Industrial Revenue Bonds.

Assuming a full 30 percent increase in borrowing costs does not, however, imply that the increase in the overall cost of capital for eligible firms would be a full 30 percent, since the cost of capital includes depreciation and the costs of other financing instruments that are not affected by the change. A standard approach to estimating the after-tax cost of capital, taking account of such factors as marginal tax rates, tax depreciation allowances, and investment tax credit rates, suggests that a 30 percent increase in borrowing costs may imply only a 0.3 percent rise in the cost of capital. This in turn is estimated to imply a 0.3 percent reduction in the desired stock of capital for firms eligible for IRB finance.[4]

Impacts on Investment, GNP, and the Budget

The magnitude of the budgetary effects of these decreases in desired capital depends critically on how fast firms are assumed to reduce their investment in response to the decrease. Evidence from studies of business investment behavior suggests that it may take as little as five years for firms to carry out a change in desired investment, but that taking account of various complications in investment behavior increases this estimate to 30 years or even more.[5]

The implications of different assumptions about these investment periods for budget feedback effects are illustrated in Tables B-2 and B-3. These tables show the estimated impacts on investment and GNP and the estimated budgetary feedbacks of eliminating all

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4. This estimate is a consequence of the assumption that firms' production technology exhibits a unit elasticity of substitution between labor and capital. These and other technical factors used in developing these estimates are described in detail in Small Issue Industrial Revenue Bonds, Appendix F.

5. A relatively low five-year estimate of this time period is in Peter K. Clark, "Investment in the 1970's: Theory, Performance and Prediction," Brookings Papers on Economic Activity (1979:I), p. 86. Higher estimates are in Allen Sinai and Otto Eckstein, "Tax Policy and Investment Behavior Revisited" (Data Resources, Inc., 1981).

TABLE B-2. EFFECTS OF ELIMINATION OF NEW ISSUES OF INDUSTRIAL REVENUE BONDS EFFECTIVE JANUARY 1, 1982, ASSUMING INVESTMENT RESPONSE REQUIRES FIVE YEARS (By fiscal year; in billions of dollars)

Change in	1982	1983	1984	1985	1986
(1) Investment[a]	-0.02	-0.28	-0.82	-1.48	-2.08
(2) GNP[a]	-0.40	-0.72	-1.86	-3.92	-5.05
(3) Revenues	-0.07	-0.15	-0.36	-0.58	-0.84
(4) Static revenue gain	0.47	0.97	1.49	2.04	2.62
(5) Net revenue gain ((4)+(3))	0.40	0.82	1.13	1.46	1.78
(6) Feedback rate (in percent) ((3)÷(4))	15	16	24	28	32

SOURCE: CBO estimates.
a. Calendar year change.

increases in IRB supplies effective January 1, 1982.[6] Table B-2 reflects the assumption that a period of only five years is needed

6. These estimates are constructed by first estimating the increase in the aggregrate capital stock implied by a 1 percent increase in the desired capital stock of firms using IRB financing. This was done by multiplying the percentage increase in desired capital for eligible firms by the ratio of the increase in IRB supplies in each year to total business fixed investment in that year, and then applying this factor to the projected level of the total business capital stock. The timing patterns of the increases in investment were taken from those reflected in simulations of investment-expanding tax changes on the Data Resources, Inc., econometric model. The increases in GNP induced by each increase in investment were deduced using CBO estimates of the investment/GNP multiplier, and of the rates of return to, and depreciation of, changes in the capital stock. These increases in GNP were then translated into taxable incomes using the percentages of actual GNP represented by each component of taxable income in1980. The final feedback estimates

TABLE B-3. EFFECTS OF ELIMINATION OF NEW ISSUES OF INDUSTRIAL REVENUE BONDS EFFECTIVE JANUARY 1, 1982, ASSUMING INVESTMENT RESPONSE REQUIRES FIFTEEN YEARS (By fiscal year; in billions of dollars)

Change in	1982	1983	1984	1985	1986
(1) Investment[a]	-0.01	-0.12	-0.35	-0.62	-0.88
(2) GNP[a]	-0.38	-0.42	-0.88	-1.47	-1.98
(3) Revenues	-0.07	-0.10	-0.18	-0.26	-0.34
(4) Static revenue gain	0.47	0.97	1.49	2.04	2.62
(5) Net revenue gain ((4)+(3))	0.40	0.87	1.31	1.78	2.28
(6) Feedback rate (in percent) ((3)÷(4))	14	10	12	13	13

SOURCE: CBO estimates.

a. Calendar year change.

for all reductions in investment that are required to implement each decrease in the desired stock of capital, while Table B-3 assumes that the period is 15 years. In fact, as the references cited in footnote 5 point out, the period may be much longer. The tables show that the budgetary feedback rates fall as the investment period is assumed to grow longer. This is because the reduction in investment occurring each year because of a given decrease in IRB supplies is less with the longer investment period.

With the assumption of a 15-year investment period, the revenue feedback as a percentage of the static revenue gain from eliminating new issues of IRBs is 13 percent in 1986, 19 percentage points less than the 1986 figure assuming a five-year investment period. CBO has not made estimates of the feedbacks that might occur on the out

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were calculated using CBO's revenue-estimating models. The estimates differ from earlier CBO estimates cited in Small Issue Industrial Revenue Bonds because of refinements in estimating technique and changes in the economic outlook.

lay side of the budget. Given the estimates for general business tax cuts presented in Chapter III, however, it is likely that these would show reductions in outlays due mainly to reductions in interest on the debt: since the revenue feedbacks only partially offset the static revenue gain, eliminating the program reduces the budget deficit and permits a reduction in federal borrowing. This reduces outlays for interest on the debt, contributing an outlay feedback effect that helps reduce the deficit.

The estimates of feedback effects for a general business tax cut shown in Chapter III suggest that different estimating techniques result in different estimates. The same is true in the context of the estimates shown here for decreases in the supplies of IRBs. It is unlikely, however, that different estimating techniques would produce higher feedback rates, since the assumptions used in developing these figures were chosen deliberately to produce the highest likely feedbacks. In particular, as has already been pointed out, these estimates assume a strong saving response to changes in IRB supplies, reflected in the assumption that no offsetting changes in other interest rates were assumed to occur. In addition, a relatively high degree of responsiveness of desired capital to changes in its cost was assumed, the investment period was assumed to be shorter than in some estimates, the percentage reduction in the cost of capital from IRB finance was overestimated by assuming that all IRB-financed investment is in structures (which have a relatively low depreciation rate), and the importance of tax-exempt financing in the debt structures of investing firms was deliberately overstated.[7] The overall stance of fiscal and monetary policy, finally, was assumed to be flexible enough to allow any budgetary implications of changes in IRB supplies to be realized.

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7. These assumptions are discussed in more detail in Small Issue Industrial Revenue Bonds, Appendix F.

APPENDIX C. TECHNICAL ISSUES IN FEEDBACK ESTIMATION AND CBO ESTIMATION PROCEDURES

As the introduction pointed out, the economic analysis of the budget feedback process can be broken for analytic convenience into four distinct stages: the measurement of the response of such variables as GNP, prices, interest rates, and employment to a change in budget policy; the determination of the resulting behavior of wages, profits, and other parts of the tax base; the estimation of induced changes in effective tax rates; and the determination of the response of budget outlays to induced changes in interest, unemployment, and inflation rates.[1] The procedure in the first stage is already well documented: it is detailed in earlier CBO publications as well as in various macroeconomics textbooks at all levels.[2] The analysis involved in the other three stages, however, is not as well known. For that reason, this appendix describes the technical issues involved in each of these stages. This discussion is followed by a brief description of CBO's procedures for carrying out the corresponding quantitative analysis.

1. In fact the different parts of the analysis are not independent and should be considered as a whole. Beyond its convenience as an aid to understanding the analysis, however, the description in terms of separate parts corresponds to the separate contributions to CBO's quantitative estimates by different groups of specialists. A detailed discussion of CBO's estimating procedures is presented in this appendix.

2. See, for example, Congressional Budget Office, Understanding Fiscal Policy (April 1978); and William J. Baumol and Alan S. Blinder, Economics: Principles and Policy (Harcourt Brace Jovanovich, Inc., 1979), pp. 163-96.

RESPONSES OF TAXABLE INCOMES TO CHANGES IN FISCAL POLICY

When economic activity (real GNP) changes because of a change in federal tax or spending policy, taxable incomes respond in characteristic ways.[3]

Wages and salaries normally change at first by a percentage smaller than the percentage change in GNP. This is typically because firms do not change the number of workers, or the number of hours worked, promptly when their production changes. Rather, they normally keep some excess labor available to permit them to increase production easily when demand rises. If the change in economic activity turns out to be long lasting, however, employment and wages gradually adjust so that they change by approximately the same percentage as GNP does after a period of roughly two years.

Profits and dividends, for their part, change initially by a greater percentage than GNP. This is simply a consequence of the fact (cited above) that wage changes lag behind changes in GNP; profits, which are what is left over after wages are paid, expand or contract to make up the difference. However, there appears to be a difference in the degree of sensitivity of the profits of corporations and unincorporated businesses: corporate profits are more volatile with respect to changes in GNP than are the profits of unincorporated businesses.[4]

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3. The generalizations reported in this section are based on William Nordhaus, "The Falling Share of Profits," Brookings Papers on Economic Activity, 1974, 1, pp. 169-218; Congressional Budget Office, "A Model of Taxable Incomes for Forecasting and Analysis," unpublished working paper (1981); and Frank deLeeuw, Thomas Holloway, Darwin Johnson, David McClain, and Charles A. Waite, "The High-Employment Budget: New Estimates, 1959-80," Survey of Current Business (November 1980), pp. 31-32.

4. The reasons for this difference are not obvious. It may be that it is easier to lay off workers in unincorporated enterprises, and that in very small businesses entrepreneurs also perform labor. Profits may therefore represent a steadier share of income.

Personal interest income is related more closely to the behavior of interest rates and the stock of interest-bearing assets than to that of profits. Expansionary changes in federal tax or spending policy may increase both the stock of assets and the level of interest rates (and conversely for restrictive policy measures), so interest income is initially quite sensitive to changes in policy.

These generalizations about the changes in different components of taxable incomes as percentages of their baseline levels permit other generalizations about these changes as percentages of the change in GNP. Since wages and salaries normally represent a relatively large fraction of GNP (about half), the small percentage of their own former level by which wages and salaries initially change in response to a change in fiscal policy represents a significant fraction of the change in GNP. Corporate profits are normally a small fraction of GNP (about 10 percent), so the large percentage of their former level by which profits initially change in response to a change in fiscal policy represents a smaller percentage of the change in GNP. Roughly speaking, then, the change in GNP may initially give rise to equal changes in corporate profits and in wages and salaries--somewhat less than half the change in GNP. As time passes, the change in profits declines toward a percentage of the change in GNP about equal to the normal fraction of GNP represented by profits--about 10 percent. Meanwhile the change in wages and salaries rises to about half the GNP change.[5]

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5. Certain modifications to these generalizations must be made for particular changes in federal policy. Changes in federal purchases that involve payrolls have larger effects on wages and salaries, and smaller effects on profits, since in such cases nearly the entire direct GNP effect of the policy change is reflected in wages and salaries. Liberalization of depreciation allowances reduces reported profits directly, since tax-allowable depreciation is one item deducted from gross business income before arriving at taxable profits. Changes in Social Security tax provisions, finally, may ultimately affect wages and salaries relatively strongly, since firms treat their Social Security tax payments as part of the total compensation of labor, and may reduce direct wage payments to compensate for increases in the employer share of Social Security taxes. It may take several years, however, for this pattern to emerge. The more immediate effect may be an increase in prices.

TAX RATES APPLICABLE TO CHANGES IN TAXABLE INCOMES

A final step in determining the revenue feedback effects of changes in federal fiscal policy is estimating the tax rates that apply to the changes in each component of the tax base, as well as the timing patterns according to which the resulting federal revenues are reflected in the Unified Budget. There are differences in the rates that apply to different parts of the tax base. Moreover, some of these rates can be expected to change in response to changes in the economy, including those caused by fiscal policy.

The Individual Income Tax. The effective marginal tax rate applicable to changes in wages and salaries and nonwage personal income under the individual income tax depends on the extent to which those changes reflect increases in prices alone as opposed to increases in aggregate real income. This is because increases in aggregate real income often reflect increases in the number of taxpayers while income increases representing inflation alone are more likely to accrue to existing taxpayers. If in the first case the new taxpayers have average income close to that of existing taxpayers, the tax rate applicable to the aggregate increase in taxable income is close to the existing average tax rate. Increases in income accruing to existing taxpayers, however, are taxed at these taxpayers' highest current rates; moreover, if the increase in income is sufficient to push these taxpayers into higher tax brackets, it is taxed at still higher rates.[6] In either case, the

6. Inflation also affects the effective individual income tax rate in ways that are harder to predict if it increases the wages that taxpayers receive at rates that differ from the rates of increase for items that they deduct from taxable income. If the prices of deductible items rise significantly faster than current wage rates, the effective marginal tax rate on wages and salaries can fall since taxpayers' deductions will rise. This sort of difference in rates of increase appears to have raised the effective individual income tax rate on adjusted gross income substantially in 1972-74 since wages rose faster than deductions during that period. See David Greytak and Richard McHugh, "Inflation and the Individual Income Tax," Southern Economic Journal, vol. 45 (July 1978), 168-80.

tax rate applicable to an inflation-induced increase in aggregate income is significantly higher than the existing average rate.[7] CBO estimates that the individual income tax rate applicable to increases in wages and salaries and in nonwage personal income reflecting increases in aggregate real income alone in 1982 would be approximately 17 percent. For increases reflecting inflation, the estimate is higher--roughly 24 percent. Because of the combined effects of inflation and the recently-enacted cut in personal tax rates, both rates should fall slightly over the next two years before nearly leveling off in 1985 because of the indexing provisions of the 1981 tax bill.

This tax rate determines the accrual of tax liability under the individual income tax. These revenues appear in the Unified Budget on a slightly different schedule because of delays in withholding and remittance of estimated payments, and because of the final settlements that take place during the January-June period of each year. As a result of these considerations, CBO currently estimates that 75 to 76 percent of individual income tax liability accruing during a given calendar year is recorded in budget receipts during that same fiscal year, with the remaining 24 to 25 percent recorded the following fiscal year.

Payroll Taxes for Social Insurance. The overall marginal tax rate on aggregate wages and salaries is increased by contributions to Social Security. The wages and salaries of all workers except federal and some state and local government employees are taxable under the Social Security tax at a flat rate of 13.4 percent up to a limit of $32,100 per worker in 1982.[8] In future years the statutory limit will increase automatically, roughly according to the rate of wage inflation lagged by two years; the statutory tax

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7. For further discussion of these points, see Congressional Budget Office, "Bracket Creep and the Elasticity of the Individual Income Tax," unpublished working paper (1981); and Frank deLeeuw, Thomas Holloway, Darwin Johnson, David McClain, and Charles A. Waite, "The High-Employment Budget: New Estimates, 1955-80," Survey of Current Business (November 1980), pp. 13-43.

8. Participation of state and local governments in the Social Security system is optional. Seventy-two percent of all state and local government workers are covered.

rate is scheduled to increase as well.[9] For calendar year 1982, CBO estimates that the effective marginal tax rate relating changes in Social Security tax liabilities to changes in aggregate wages and salaries is approximately 11 percent. Seventy-two percent of liabilities accruing during a given calendar year are estimated to flow into Unified Budget receipts in the same fiscal year, while the remaining 28 percent are received the following fiscal year.

The Corporation Income Tax. CBO estimates that an effective marginal tax rate of 36 percent applies to increases in corporate profits before tax in 1982. While the statutory marginal tax rate is 46 percent, the effective rate in recent years has been lower because part of any increase in corporate profits accrues in nontaxed forms such as tax-exempt interest income, or is offset by deductions of state and local taxes paid or carryovers of losses from other years. Moreover, increases in taxable profits also tend to be associated with increases in the dollar magnitudes of credits

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9. This tax structure means that the effective Social Security tax rate on aggregate wage and salary income may fall temporarily when wages are increased by inflation, because a greater percentage of some workers' incomes is lifted above the taxable limit, which is not affected until two years later. When aggregate wage income is increased by increases in employment, on the other hand, the aggregate effective tax rate will be roughly unchanged if the wages of the newly employed are roughly the same as those of existing workers. The indexing formula states effectively that the amount of taxable wages per worker in a given year will be given by the ratio of total taxable wages in the first quarter of the year two years earlier to total taxable wages in the first quarter of the year before that. This ratio times the previous year's taxable wage base gives the new base. See Social Security Bulletin: Annual Statistical Supplement, 1976, p. 23. For more on the effects of changing economic conditions on Social Security revenues, see Congressional Budget Office, Paying for Social Security: Funding Options for the Near Term (February 1981), pp. 15-18; and John C. Hambor, "An Econometric Model of OASDI," U.S. Department of Health, Education, and Welfare, Social Security Administration Working Paper No. 10 (November 1977).

claimed against tax, such as the investment tax credit and the foreign tax credit.[10]

Because the accounting and tax payment systems of corporations are complicated and long drawn out, CBO estimates that only 50 percent of a change in corporate tax liability accruing during a given calendar year appears in Unified Budget receipts in the same fiscal year; 48 percent appears the following fiscal year, and 2 percent the year after that.

Other Federal Revenue Sources. The remaining sources of federal revenues are indirect taxes (excise taxes, including the windfall profits tax, customs duties, and estate and gift taxes), and miscellaneous receipts, which consist largely of profits returned to the Treasury by the Federal Reserve banks. Among these, customs duties and excises other than windfall profits tax receipts vary with changes in GNP such as those caused by changes in fiscal policy, and therefore contribute to feedback. CBO estimates that the effective tax rate relating customs and excise tax liabilities to GNP is approximately one percent. This effective rate is expected to decline slightly in future years under the impact of recent Multilateral Trade Negotiations on customs duties. Federal Reserve profits, finally, vary with interest rates and various economic factors determining the size of the Federal Reserve System's portfolio of Treasury debt instruments. 1982 Federal Reserve profits are estimated to change by approximately 0.8 billion for every one percentage point change in the Treasury bill rate. CBO estimates that 75 percent of Federal Reserve profits and indirect tax liability for a given calendar year appear in the Unified Budget in that fiscal year, while the remaining 25 percent is received in the following fiscal year.

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10. The rule of thumb used here and based on these tendencies in recent experience is highly uncertain. When the economy is emerging from a recession and more corporations than usual have been suffering losses, the effective tax rate may be lower because of larger loss carryovers. The behavior of credits such as the investment tax credit is variable, depending on factors such as investment behavior and the profitability of operations overseas. The effective tax rate is also sensitive to the distribution of profits across corporations, which differ in their individual tax rates.

Overall Effective Tax Rates

Taken together, the information developed here on the behavior of income shares and marginal tax rates permits inferences to be drawn about the overall effective tax rate that applies to changes in GNP that are stimulated by fiscal policy changes. For GNP changes that are substantially "real"--that is, that do not result from induced increases in inflation--the effective overall marginal tax rate may be roughly 21 percent in the first year after the fiscal policy change takes effect (1982). If on the other hand the GNP change results entirely from induced increases in prices, implying that a higher income tax rate applies to wages and salaries and nonwage personal income, the overall tax rate on GNP is closer to 26 percent in 1982. The actual rate will be somewhere between these extremes in the first year, depending on how much real GNP and prices change in response to the change in fiscal policy. In subsequent years, moreover, the rate might change because of the action of several factors, such as changes in the share of the impact on GNP that is purely "real" as opposed to inflationary; reductions in personal income tax rates, and increases in Social Security tax rates scheduled under recent legislation; the ongoing effects of "bracket creep" before indexation is implemented in 1985; and the decline in the share of the change in GNP going to profits in favor of wages and other shares that are taxed at different rates, as described above.[11]

RESPONSES OF BUDGET OUTLAYS TO CHANGES IN UNEMPLOYMENT, INFLATION, AND INTEREST RATES

Impacts of Changes in the Unemployment Rate. The main outlay impact of changes in the unemployment rate is through the Unemploy-

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11. At least two other complications attend this calculation. The tax rates cited here are those determining the accrual of tax liability. These accruals are not reflected immediately in receipts by the federal government because liabilities are only paid off after a lag which is as long as two years in the case of the corporation income tax. The figures do not reflect changes in receipts of earnings from the Federal Reserve System, which contribute noticeably to changes in overall federal receipts, although in ways which are hard to quantify at this general level.

ment Compensation program. Increases in unemployment expand outlays as more workers become eligible, and the average benefit increases because newly unemployed beneficiaries have higher wage histories. For 1982, CBO estimates that outlays for Unemployment Compensation change by about $5 billion for each percentage point by which the unemployment rate changes in the same year. Smaller increases occur in outlays for food stamps and other "transfer payment" programs whose beneficiary populations rise.[12]

Outlays Indexed to the Inflation Rate. Several outlay programs are indexed by law so that they increase automatically when prices increase.[13] The principal examples are Social Security and federal employee retirement. Other programs, like Medicare, Medicaid, and unemployment compensation, are indirectly indexed because outlays rise automatically with the prices of the services that they finance, or because of increases in the wage histories of beneficiaries. If a change in fiscal policy increases or decreases the rate of inflation, outlays for these programs are increased or decreased relative to the levels projected at baseline inflation rates. CBO has estimated most recently that a one-percentage-point increase in the inflation rate during 1982 would add $0.5 billion to outlays for automatically and indirectly indexed programs in 1982.

Interest on the Federal Debt. Fiscal policy changes affect federal outlays for interest on the debt by changing market interest rates and federal borrowing. These feedbacks work against most other feedback effects. A tax cut, for example, increases both interest rates and federal borrowing, and this increases outlays for interest. This feedback works to increase the deficit, thus offsetting the other feedback effects of the tax cut. The magnitude of these negative feedbacks can be substantial, as is shown in Chapter III.

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12. For further quantitative discussion of these and other spending programs discussed in this section, see Congressional Budget Office, Baseline Budget Projections: Fiscal Years 1982-1986 (July 1981), pp. 53-58.

13. Other programs are often increased, not automatically, but at the discretion of the Congress. Such programs are not included in this discussion.

CBO'S ESTIMATING TECHNIQUES

CBO's procedures for estimating budgetary magnitudes involve the joint efforts of the Fiscal Analysis Division, which is responsible for economic forecasting; the Budget Analysis Division, which carries out forecasts of budget outlays on the basis of economic forecasts as well as other data; and the Tax Analysis Division, which develops the corresponding forecasts of revenues. Entirely new forecasts of the levels of economic and budgetary magnitudes are developed two or more times per year according to the requirements of the Senate and House Budget Committees. At other times, estimates of changes in economic and budgetary variables that might be caused by specified changes in policy or in economic conditions are made using special procedures within each division. These procedures were used to develop the "model consensus" feedback estimates presented in this paper.

The Multipliers Consensus Framework

The Multipliers Consensus Framework maintained by the Fiscal Analysis Division is a facility for reconciling diverse estimates from different economic models of the economic response to changes in budgetary policy. The approach is an algebraic procedure for averaging key components of fiscal policy "multipliers" in different large-scale econometric models. This framework is currently geared to generate "consensus" nominal GNP impacts from the econometric models of Chase Econometrics, Inc; Data Resources, Inc.; and Wharton Econometric Forecasting Associates, Inc.[14] The

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14. For detailed description of the "Multipliers" framework, see Congressional Budget Office, The CBO Multipliers Project: A Methodology for Analyzing the Effects of Alternative Economic Policies (1977). While CBO has been using the Evans Economics, Inc., model as well as those mentioned in the text, this model has not been incorporated in the "Multipliers" framework because of technical difficulties with the current version of the model; for an account of these problems, see Albert Ando, "Discussion of the Evans Paper," in The Supply-Side Effects of Economic Policy, Proceedings of the 1980 Economic Policy Conference, Federal Reserve Bank of St. Louis (May 1981), pp. 103-112. Another commercial model that is in use at CBO, the Townsend-Greenspan model, has not yet been incorporated in the "Multipliers" framework because it is quite new.

associated impacts on real GNP and the GNP deflator are estimated by a newly-developed "consensus" procedure that has recently been added to the framework,[15] while the impacts on interest rates and taxable incomes are estimated using a consensus procedure representing an extension of the original "Multipliers" approach.

These procedures were used in generating consensus estimates for this report of the economic impacts of the changes in individual income taxes, federal purchases, and federal transfer payments to persons. In the case of each policy change, the static impact on a National Income Accounts basis was estimated within each full-scale econometric model.[16] These impacts were then averaged, and the result was used in generating economic impacts using the Multipliers Consensus Framework and associated procedures as described above.

The economic impacts of the cut in corporation income tax rates studied in this report were not estimated using the formal consensus framework, since the economic response to a cut in business tax rates is quite different from those of other changes in budget policy. For this policy change, the impact on real GNP was taken to be the average of those estimated by the two full-scale econometric models that were judged to have the most reasonable overall response patterns (those of Chase Econometrics, Inc., and Data Resources, Inc.). The GNP deflator was assumed to be unaffected by the policy change, while the changes in interest rates and taxable income shares were generated by the procedures described above.

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15. See Congressional Budget Office, "Real-Price Decomposition of Nominal GNP Changes," unpublished technical paper (1981).

16. As is noted in Chapter III, the static impact of the personal income tax rate cut was generated in each model by multiplying the cut in tax rates by the baseline forecast of the tax base in that model. The static impacts of the cuts in purchases and in transfers in each model were estimated by cutting spending by $10 billion during the first fiscal year, and by an amount during each subsequent year that represented the same percentage of spending in the model's "baseline" forecast as did $10 billion during the first year. This procedure implied that the static impact of each cut was estimated to grow over time.

Estimated Outlay Impacts

Once the estimated economic impacts of changes in budget policy were computed, the corresponding changes in budget outlays were estimated by the Budget Analysis Division.

The impacts of projected changes in the inflation rate were accounted for using current baseline projections of spending levels in relevant programs together with the statutory scheduling of price adjustments, where applicable. Estimated outlay impacts of projected changes in unemployment rates were computed using current baseline projections of benefit levels of unemployment compensation, Social Security, food stamps, and other programs in which the eligible population is sensitive to the unemployment rate, together with econometric estimates of the sensitivity of these eligible populations to the aggregate unemployment rate. Estimates of outlays for net interest were based on a current baseline projection of new federal financing and refinancing together with projected baseline levels of interest rates. Forecasted changes in interest rates and in overall deficits were also incorporated, together with projected timing patterns and maturity structures for the resulting federal financing needs. Account was also taken of changes in outlays for student loans and other programs that are sensitive to interest rates.[17]

Estimated Revenue Impacts

The revenue impacts of the four budget policy changes were estimated by the Tax Analysis Division using estimated impacts on taxable income shares, interest rates, prices, and other economic variables developed by the Fiscal Analysis Division as described above. The estimates were made using a simple accounting framework that applies the Tax Analysis Division estimate of the appropriate effective marginal tax rate to the estimated changes in each taxable income component. These figures are then combined with timing factors reflecting the accrual of receipts under the Unified Budget. This procedure accounted for revenues collected under the individual and corporation income taxes as well as the payroll taxes for social insurance. A similar procedure applying effective

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17. For quantitative aspects of these estimating techniques, see Congressional Budget Office, Baseline Budget Projections: 1982-1986 (July 1981), pp. 17-22.

tax rates to nominal GNP as a whole accounted for revenues accruing from federal excise taxes and customs duties, while changes in the earnings of the Federal Reserve banks were estimated as a function of projected levels and changes in Federal Reserve holdings of Treasury debt and interest rates.[18]

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18. For discussion of the magnitudes of revenue effects estimated using these procedures, see Congressional Budget Office, Baseline Budget Projections: Fiscal Years 1982-1986 (July 1981), pp. 33-35.

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