



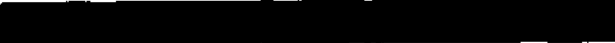
CBO PAPERS

**EFFECTS OF LOWER
CAPITAL GAINS TAXES
ON ECONOMIC GROWTH**

August 1990



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PREFACE

This paper responds to separate requests from the Committee on Ways and Means, the Senate Committee on the Budget, and the House Committee on the Budget. It examines the effects of cutting capital gains taxes on saving, investment, and economic growth. The study was prepared under the direction of Rosemary Marcuss and Frederick Ribe by Joseph Cordes, Leonard Burman, and Larry Ozanne of CBO's Tax Analysis Division and Kim Kowalewski of CBO's Fiscal Analysis Division. Other individuals inside CBO who made valuable comments include Robert Dennis, Maureen Griffin, Jon Hakken, Robert Hartman, Richard Kasten, and Joyce Manchester.

Francis Pierce and Sherry Snyder edited the manuscript, and Denise Thomas typed the drafts.

Robert D. Reischauer
Director

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SECTION I

INTRODUCTION AND SUMMARY

A number of proposals have recently been made to cut taxes on capital gains. The proposals were intended, in part, to spur economic growth by fostering saving, investment, entrepreneurial activity and risk-taking. For example, in his 1991 budget, President Bush proposed to exclude a portion of realized capital gains from taxation. The exclusion would vary with how long an asset was held: 10 percent for assets held between one and two years, 20 percent for assets held between two and three years, and 30 percent for assets held for three or more years. The exclusion would not apply to capital gains earned by corporations or to works of art and other collectibles held by individuals.

Reducing the taxation of capital gains could affect growth in several ways. Lower taxes on capital gains raise the real after-tax rate of return to savers, which may lower the cost of capital to businesses. Various quantitative models can be used to show how changing the rate of return and the cost of capital affects the level of saving, investment, and gross national product (GNP). These models, however, do not take account of the fact that cutting taxes on capital gains could change the mix as well as the amount of investment and saving--for example by reducing the double taxation of corporate equity, and improving incentives for entrepreneurship and risk-taking. Though these latter effects are difficult to quantify, they also influence economic growth and should be considered in assessing the effects of proposals to lower taxes on capital gains.

EFFECTS OF CUTTING CAPITAL GAINS TAXES ON THE LEVEL OF SAVING, INVESTMENT, AND GNP

This paper discusses several quantitative analyses of whether lower taxes on capital gains are likely to raise GNP by increasing the total amount of saving and investment in the economy. Most of the studies, including two by the Congressional Budget Office (CBO), consider the effects of a 30 percent capital gains exclusion. Of the eight studies reviewed, five, including the two CBO studies, found that cutting taxes on capital gains is not likely to increase saving, investment, and GNP much if at all. Three studies found that cutting capital gains taxes increases GNP by enough so that the additional tax revenue collected on the higher level of income offsets the initial losses in tax revenue that the Joint Committee on Taxation and the Congressional Budget Office have estimated would result from such tax cuts.

The findings vary for several reasons. The studies make different assumptions about how saving responds to changes in the return to saving and how investment responds to changes in the cost of capital. Studies that have estimated the effects of a 30 percent exclusion also use different estimates of the degree to which an exclusion of this size would raise the return to savers and lower the cost of capital to businesses.

The more that a capital gains tax cut raises the return to savers and lowers the cost of capital to businesses, and the more that saving and investment respond to such changes, the more likely it is that such a tax cut will spur saving and investment and raise GNP. Studies that found that cutting capital gains taxes has large positive effects on GNP made optimistic assumptions about how much cutting capital gains taxes would raise the real after-tax return received by savers and reduce the cost of capital faced by businesses. These studies also made optimistic assumptions about the responsiveness of saving and investment to changes in the rate of return and the cost of capital. These assumptions--especially that private saving is quite responsive to changes in the real after-tax rate of return--are at the high end or outside of the range of most empirical evidence, and are thus likely to overstate the positive effects of cutting capital gains taxes. If these assumptions do not hold, cutting capital gains taxes has little or no positive effect. Under plausible assumptions, cutting taxes on capital gains could even slow capital formation and slow growth if the deficit was increased by more than the increase in private savings. Taken together, the studies thus raise doubt about whether cutting taxes on capital gains can be counted on to raise saving and investment enough to significantly increase GNP.

EFFECTS OF CUTTING CAPITAL GAINS TAXES ON THE COMPOSITION OF SAVING AND INVESTMENT

Lower capital gains taxes would favor assets that pay off in the form of capital gains. This would have both good and bad effects on the mix of investment. A lower capital gains tax would reduce the double taxation of corporate equity and might encourage risk-taking and investment in new, innovative ventures. But lower capital gains taxes would also create a tax incentive for corporations to retain earnings rather than pay dividends and would provide an impetus to tax shelters that does not exist under current law. Thus, it is uncertain whether cutting capital gains taxes would cause capital to be allocated more efficiently.

For these reasons, cutting taxes on capital gains could not be counted on to significantly boost output and increase economic growth. Moreover, even if cutting capital gains raised GNP somewhat, it is unlikely that the

increase in income would generate enough additional tax revenue to pay for the revenue losses estimated by the Joint Committee on Taxation.

SECTION II

EFFECTS ON SAVING, INVESTMENT, AND GNP

Several studies have estimated the effect of a 30 percent capital gains exclusion on growth in GNP. These studies first calculate how much the exclusion would raise the after-tax return to saving, or reduce the cost of capital to businesses, and then incorporate these changes in models of economic growth to determine the resulting effects on saving, investment, and output.

THE COMMON FRAMEWORK

All of the studies discussed in this paper start from the same general framework, which provides a guide for reviewing and comparing their findings. Saving, investment and rates of return are assumed to be determined in the marketplace by the interplay of the supply of savings by individuals and the demand for savings by businesses.

Individuals save, and their savings finance business investment. The rate of return that businesses must pay individuals for use of their savings is that which will equalize the demand for savings with the supply. Taxes on income from capital, which include capital gains taxes, drive a wedge between the return on business investment and the amount received by individuals. By reducing this wedge, a cut in taxes on capital gains can increase the incentive to save and invest. At the same time, cutting taxes on capital gains is also likely to reduce federal revenues and lead to increased government borrowing. A higher federal deficit lowers public saving, which reduces the amount of saving available to finance private investment. If the total increase in private and public saving is large enough, the economy can reach a permanently higher level of GNP. Otherwise GNP will be less than it would have been under existing tax law.

The Supply and Demand Analysis

In this framework, individuals supply savings by reducing current consumption. Individuals may save by directly investing in their own businesses or by channeling their savings into stocks and bonds, bank deposits, pension funds, and the like. When a corporation reinvests its profits, it is saving on behalf

of its stockholders. Individuals have an incentive to save more when the rate of return rises.¹

On the other side of the market, businesses demand saving to finance investments. Businesses face a range of investment projects paying different rates of return. The lower the rate of return that businesses must pay individuals for their saving, the more of these projects that can be profitably undertaken. Thus the amount of saving demanded--that is, investment--increases as the return that businesses must pay falls.

Taxes drive a wedge between the amount a business earns on a new investment and the amount an individual gets to keep. Higher taxes on both businesses and individuals add to the size of this wedge. Businesses will not undertake new investments unless they earn a high enough rate of return before tax to cover both the taxes on the income earned by such investments and the after-tax rate of return required by individuals. The before-tax rate of return businesses must earn on new investments is often referred to as the cost of capital.²

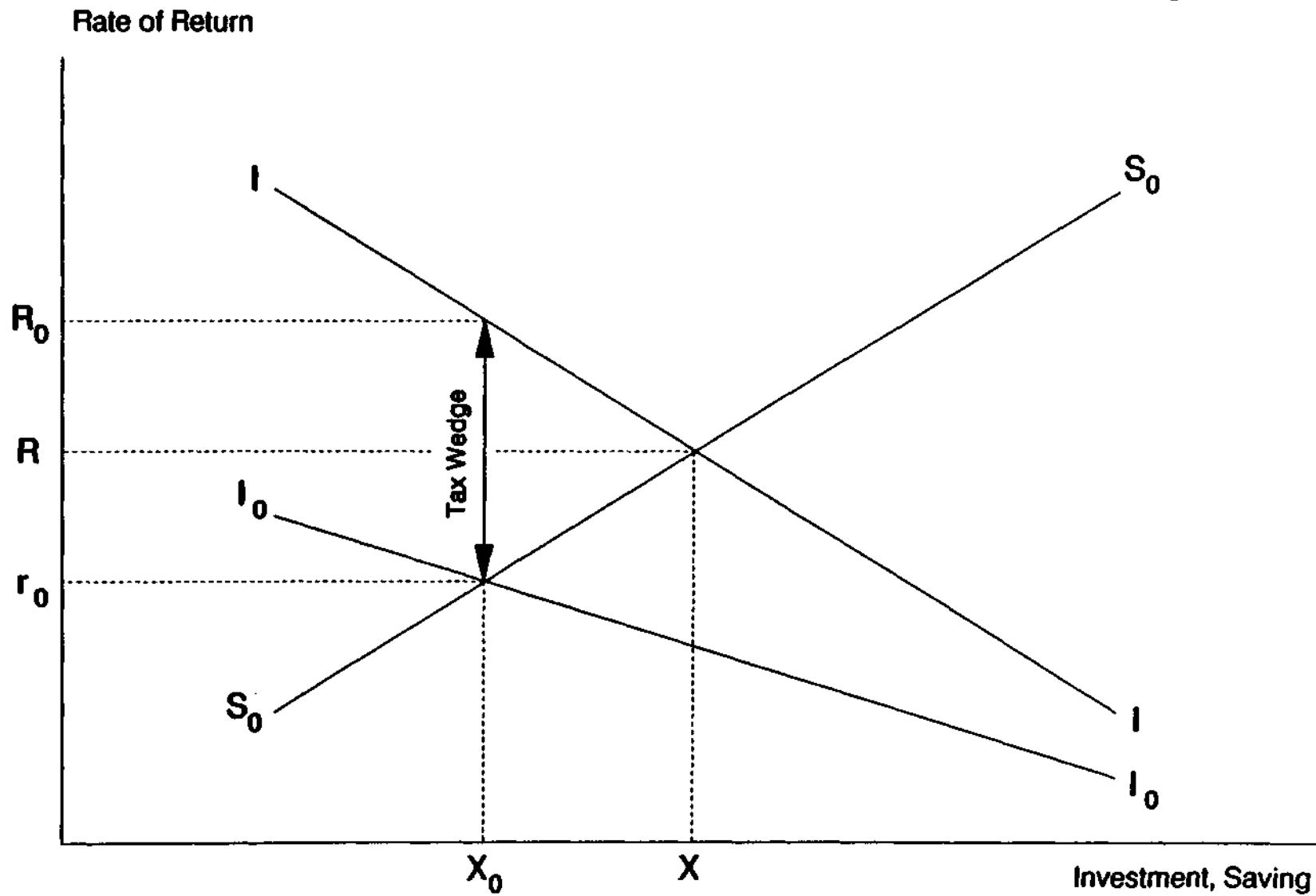
Figure 1 illustrates the way in which individuals and businesses interact to determine saving and investment. The horizontal axis is the annual rate of saving and investing relative to the size of the economy, and the vertical axis is the inflation-adjusted, or real, rate of return. The upward-sloping line from left to right, S_0S_0 , gives the amount of saving individuals will supply at each real after-tax rate of return. The line includes public saving or dissaving (deficits), assumed initially to be zero. The steepness of the line indicates how responsive individual saving is to changes in the real after-tax return. The flatter the line the more saving responds to either increases or decreases in the rate of return. The downward-sloping line, I , shows that higher levels of investment will be undertaken if the rate of return declines. The line slopes downward because more investment becomes profitable as the required return on investment declines. The steepness of this line indicates how responsive business investment is to changes in the before-tax rate of return. The flatter the line, the more business investment responds to such changes.

When income from capital is not taxed, the equilibrium rate of saving and investment would tend toward X , where business investment pays a return

1. A higher return also decreases the amount of saving needed to reach any specific future level of consumption. This raises the individual's lifetime real income, which can reduce the amount of saving supplied. This possibility is considered in a subsequent section.

2. The terms "required before-tax rate of return" and "cost of capital" are used interchangeably in the following discussion.

Figure 1. Determinants of Investment and Saving



of R just equal to the return savers must receive to supply enough saving to finance this level of investment. When capital income is taxed, however, the real after-tax rate of return that can be paid at any given level of investment is reduced. The reduction is shown in Figure 1 by I_0I_0 , which is the real after-tax return received by savers. The amount of saving individuals supply and the amount of investment businesses undertake is the amount at which the real before-tax return earned by businesses on an additional dollar invested just equals the taxes owed on the income from the investment plus the after-tax return individuals must be paid. This is shown in Figure 1 at a level of saving and investment of X_0 . At this amount the before-tax rate of return earned on an additional dollar of investment, R_0 , equals corporate and individual taxes--the "Tax Wedge" in Figure 1--plus the real after-tax return, r_0 .

Effects of a Capital Gains Exclusion

Excluding part of capital gains from taxation affects the level of saving and investment in two ways. It reduces the gap between the return businesses earn on investments and the return individuals receive. It is also likely to affect federal revenues and therefore the deficit. The Treasury Department has estimated that the President's proposal to exclude up to 30 percent of capital gains from taxation would raise revenues and reduce the deficit by \$12.5 billion between 1990 and 1995. The Congress's Joint Committee on Taxation has estimated that the President's proposal would lose revenue and add to the deficit by \$11.4 billion over the same period. Revenue estimates such as these assume that GNP is constant. They provide a measure of the direct impact of capital gains tax cuts excluding feedback effects.

CBO judges that the direct impact of the exclusion would be to reduce revenues for reasons explained in Appendix A. In the following analysis, the exclusion is thus shown as increasing the deficit and the amount of government borrowing.

An exclusion lowers the effective tax rate on capital gains, which reduces the gap between before- and after-tax returns. This raises the real after-tax return received by savers. If savers respond to the higher after-tax return by saving more, saving and investment will increase. If an exclusion increases the deficit, however, public saving falls, which offsets the increase in private saving. The overall effect of cutting taxes on capital gains depends on whether the increase in private saving is greater or less than the increase in the deficit.

Figure 2. Effect of Deficit-Financed Capital Gains Exclusion on Investment and Saving

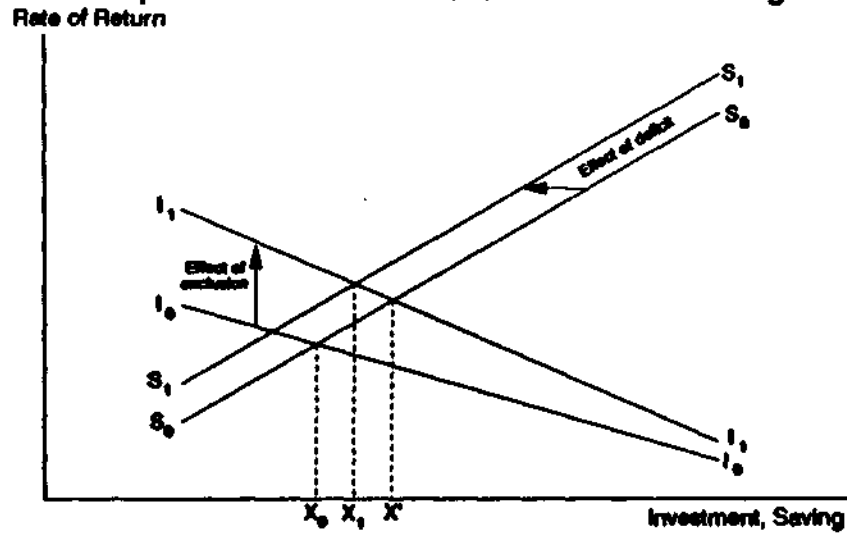


Figure 3. Effect of Capital Gains Exclusion When Saving is Infinitely Responsive

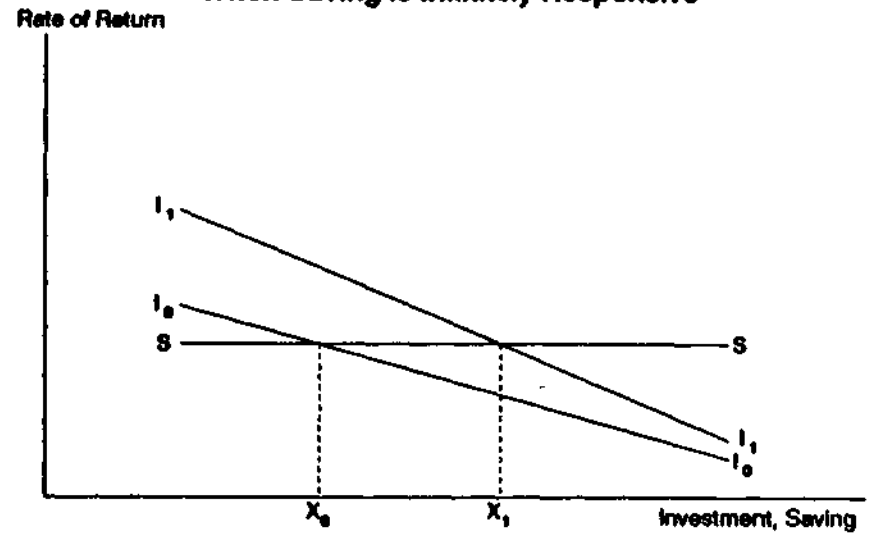


Figure 4. Effect of Capital Gains Exclusion When Investment is Infinitely Responsive

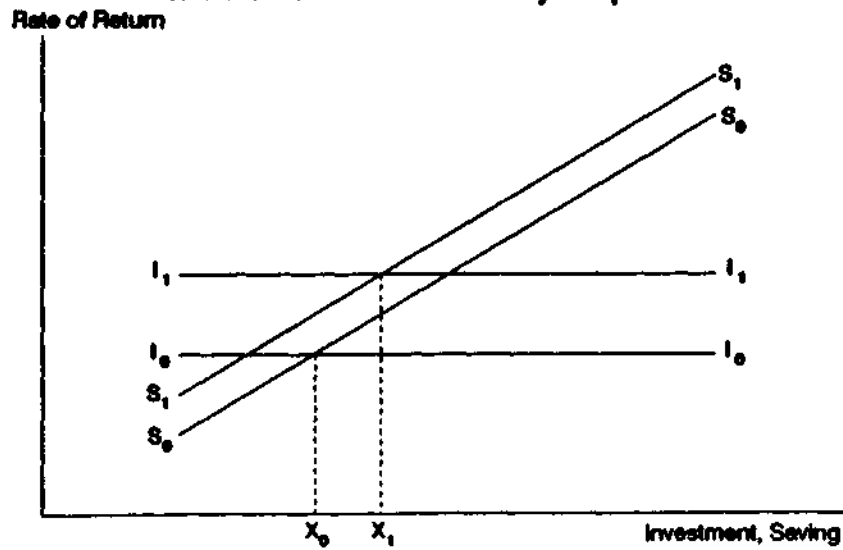
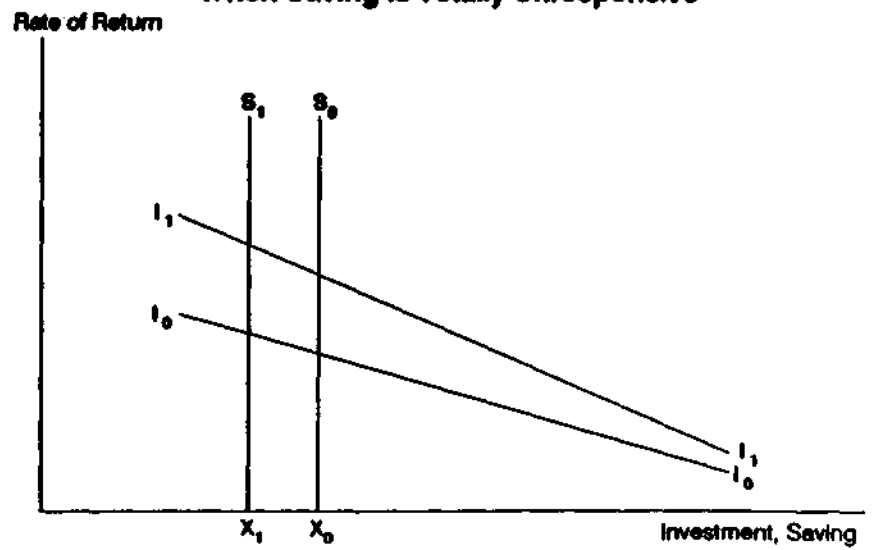


Figure 5. Effect of Capital Gains Exclusion When Saving is Totally Unresponsive



The effects of cutting capital gains taxes are shown in Figure 2. Lowering the tax rate on capital gains raises the real after-tax return received by savers by the amount of the tax reduction from I_0I_0 to I_1I_1 . If there were no other effects of the tax cut, the rise in the real after-tax return would cause private saving and investment to rise to X' . If the tax cut increases the deficit, however, the amount of total saving available to finance private investment will be less than that shown along S_0S_0 . National saving--private plus public saving--will be less at any interest rate than private saving so that the saving line shifts to the left by the amount of the revenue loss to S_1S_1 . This effect of cutting taxes tends to raise the cost of capital to business. The net effect of cutting taxes on capital gains on the level of investment is thus indeterminate. Investment could rise, to a level such as X_1 , which is less than X' , not change at all, or decline below X_0 .

Any increase in saving and investment will be larger, for a given deficit, the larger the reduction in the tax wedge (as shown by the upward shift in I_1I_1 in Figure 2). The increase in saving and investment will be larger the more that saving responds to changes in the rate of return and the more that business investment responds to changes in the cost of capital--that is, the flatter are the lines S_0S_0 and I_0I_0 in Figure 2. Total saving will increase more for a given change in private saving the smaller is the initial revenue loss from cutting taxes--that is the less S_1S_1 shifts to the left in Figure 2.

The analysis can be simplified if certain extreme assumptions are made about either supply or demand. One is that the supply of savings is infinitely responsive in the sense that savers are willing to accommodate any increased demand without an increase in the rate of return. The other is that business demand for investment is infinitely responsive in the sense that businesses are willing to accommodate any shift in total saving without a change in the before-tax rate of return.

When the supply of savings is infinitely responsive, the effect of an exclusion depends only on how much the tax wedge is reduced and on how much investment increases in response to the drop in the cost of capital. Figure 3 shows that when the supply of saving, S_0S_0 , is infinitely responsive, the upward shift in the demand for saving caused by the tax reduction does not change the real after-tax return. Because the after-tax return remains unchanged, the full tax rate reduction shows up as a lower before-tax rate of return that businesses must pay on new investment. As a result, the increase in the rate of saving and investment depends only on the responsiveness of business demand, as shown by the slope of line I_1I_1 . Additional borrowing by the government to finance a higher deficit does not crowd out any business investment because savers are willing to lend the government all it needs at the same after-tax return.

When private investment is infinitely responsive, the exclusion can either increase or decrease the rates of saving and investing, depending on the size of the revenue loss relative to the tax rate reduction and the responsiveness of saving. Figure 4 shows that when business investment demand is infinitely responsive, the upward shift in the demand for saving ends up entirely as an increase in the after-tax return to saving. Private saving rises by an amount that depends only on how responsive individuals are to the increased return. Greater private saving, however, would be offset by greater public dissaving through the deficit, reducing total saving to S_1S_1 . If the exclusion increases the deficit--that is, decreases public saving--by less than it increases private saving, total saving will increase, leading to greater investment. If the exclusion increases the deficit by more than it increases private saving, total saving and business investment will fall.

The extreme assumptions that the supply of saving is infinitely responsive or that the demand for savings is infinitely responsive place upper bounds on the increase in saving and investing that can be expected from cutting taxes on capital gains. As discussed below, there is considerable empirical evidence that neither saving nor business investment is highly responsive. As a result, the actual increases in saving and investment will be less than those indicated by using models that make either of these extreme assumptions. The net effects will depend on the specific magnitudes of all the factors discussed above and illustrated in Figure 2: the reduction in the tax gap, the increase in the deficit, and the responsiveness of saving and investment.

There is a good deal of evidence that, far from being infinitely responsive to changes in the rate of return, private saving is quite unresponsive. If private saving is completely unresponsive, as is shown in Figure 5, a tax cut that increases the deficit will reduce total saving and investment by the amount the deficit increases, from X_0 to X_1 , in Figure 5.

Effects on Economic Growth

Changes in the rates of saving and investing alter the rate of GNP growth for a period of time. If saving and investing increase, the rate of capital accumulation increases and this in turn leads to an initial surge in output. This higher output raises the dollar level of saving, even if the saving rate does not rise further, and the additional income adds to the tax base. If this initial increase in output is large enough to keep the dollar level of saving growing faster than the deficit, then output can permanently increase. After its initial surge, the rate of growth in GNP will fall back toward its trend rate. In the long run, the economy will grow at the same rate as before, though at

a permanently higher level of GNP than would have been achieved without the exclusion.

If output does not change, or does not increase by enough to make saving grow by more than the deficit rises, the deficit will either immediately or eventually crowd out business investment. As this happens, the rate of growth will initially fall below its previous trend rate, and output will eventually be permanently lower than it would have been without the cut in capital gains taxes.

International Capital Flows

The discussion above assumes that U.S. investment is financed entirely from domestic sources. This assumption tends to exaggerate the effects of cutting capital gains taxes on U.S. investment and GNP growth.

If a portion of domestic investment is financed from abroad, tax incentives for saving--as distinguished from those for investment--have a limited ability to affect GNP. For example, if the exclusion succeeds in increasing national saving, some of this increase may flow to investment abroad either by reducing foreign capital inflows to the U.S. or by increasing direct investment abroad by U.S. corporations or citizens. These effects raise the incomes of U.S. savers, but they also reduce the extent to which greater domestic saving translates into higher domestic investment and GNP. Alternatively, if the exclusion lowers national saving by adding more to the deficit than to private saving, increased capital inflows could limit the decline in domestic investment. The link between domestic investment and domestic saving undoubtedly still exists, but in the case of small changes in saving the link may not be very strong.

In the extreme case when the supply of foreign capital is unlimited at prevailing rates of return, a cut in the capital gains tax would have no effect on U.S. domestic investment.³ Depending on whether national saving rose or fell, the effect of lower taxes on capital gains would be to change the time pattern of consumption. Higher national saving would mean less current and more future consumption, while lower national saving would have the opposite effect.

3. This case is more likely to hold the smaller the U.S. economy is relative to world capital markets.

STUDIES OF THE EFFECTS OF CUTTING CAPITAL GAINS TAXES

Studies that have estimated the effect of a capital gains exclusion on GNP first calculate how much the exclusion would change either the before-tax rate of return to businesses (cost of capital) or the after-tax return to savers. These changes are then incorporated in models that determine levels of saving, investment, and output.

Some studies differ primarily in the assumptions made about the supply and demand sides of the market for saving and investment. Calculations by the Congressional Budget Office (CBO) and by Alan Auerbach focus on how a 30 percent capital gains exclusion would affect saving rates, assuming that business investment would be infinitely responsive. Calculations by the Council of Economic Advisers and by Gary and Aldona Robbins focus on how a 30 percent exclusion would change the cost of capital, assuming that the supply of savings would be infinitely responsive.

Other studies differ in how completely they represent the way in which the economy adjusts to different rates of return, saving, and investment. Jane Gravelle has estimated the effects of lower taxes on capital gains based on empirically reasonable relationships between aggregate saving, investment, and output. These relationships are incorporated in a simple model in which neither supply nor demand is assumed to be infinitely responsive. Laurence Kotlikoff uses a model conceptually similar to Gravelle's, but with more detail, particularly about household behavior. CBO (in a second analysis) and Allen Sinai use full-scale macroeconomic models. These models incorporate estimates of cyclical changes in employment and inflation as the economy adjusts to a new long-run level of output in response to the tax cut.

CBO's Analysis of Saving⁴

CBO has estimated the increase in national saving that would result from a 30 percent exclusion if the after-tax return to saving rose by the full amount of the reduction in the gap between the before- and the after-tax return. This approach assumes implicitly that the demand for saving is infinitely responsive. Using a range of likely saving responses, CBO finds that a 30 percent exclusion would have no effect on net private saving at one extreme and at the other would increase net private saving by \$14.7 billion cumulatively over the 1990-1995 period. With government borrowing

4. Further details of the CBO analysis appear in Appendix B. The analysis is based on an earlier analysis in Office of the Secretary of the Treasury, *Report to Congress on the Capital Gains Tax Reductions of 1978* (September 1985), pp. 99-103.

increasing by \$11.4 billion to cover the revenue loss from the exclusion, the total saving available for business investment over the six years would, at one extreme, decline by \$11.4 billion and, at the other extreme, increase by \$3.3 billion. A decline in saving and investment of \$11.4 billion would lower GNP slightly, while an increase of \$3.3 billion would be too small to affect GNP noticeably.

CBO calculates how much a 30 percent exclusion would raise the real after-tax rate of return for representative investments in assets that normally pay a portion of their return as capital gains. The assets comprise two types of corporate stock--a growth stock that reinvests all its earnings and a representative stock with a dividend payout ratio equal to the average for all corporate stock--as well as four types of noncorporate business assets--land, equipment, residential real estate, and other real estate.⁵

Among these cases, the 30 percent exclusion raises the after-tax real return most for the growth stock--an 8.7 percent increase--followed by the representative corporate stock with a 6.9 percent increase. The increases for the noncorporate investments are substantially smaller because more of the taxable return on these assets is paid out in rents and business income that are ineligible for the exclusion. Among the noncorporate examples, the 30 percent exclusion increases the rate of return for investment in land by 5 percent, for real estate by 1.9 percent, and for equipment not at all.

CBO uses two methods to aggregate the effects of the exclusion on specific investments into an overall increase in the real after-tax rate of return to all private saving. The first method weights the effects in proportion to the importance of each asset in household portfolios. The assets described above account for about one-third of all household assets. Under this weighting, CBO estimates that a 30 percent exclusion would raise the real after-tax return on all household saving by 1.5 percent. The second method weights the effect of raising the real after-tax return on the growth stock by the share of capital gains in all capital income. Because capital gains account for about 30 percent of all capital income, using this weighting CBO estimates that a 30 percent exclusion would raise the rate of return on all saving by 2.6 percent. Thus, if the full benefit of the 30 percent exclusion shows up as an increase in the real after-tax return to saving, CBO calculates that this return would increase by between 1.5 percent and 2.6 percent. For example, if the real after-tax return to all saving had been 2.0 percent, it would rise to between 2.03 and 2.05 percent because of the exclusion.

5. In each case, the increase in the after-tax return is calculated by assuming that the before-tax return earned by the investment does not change after enactment of the exclusion. This assures that the full reduction in the tax wedge is reflected in the change in the real after-tax return.

Increases in the after-tax real return on saving may or may not induce people to save more. A higher rate of return increases savers' lifetime resources and could induce them to consume more in every period, including the present. Most studies of how individuals respond to an increased return report results that range between no saving response and an increase in saving of 0.4 percent for each 1 percent increase in the after-tax real return.⁶

Using this range of saving responses, the calculation that the exclusion would raise the after-tax real return by at most 2.6 percent implies that private saving would increase between 0 and 1.04 percent. In January 1990, CBO forecast that total private saving will be \$1.4 trillion over the 1990-1995 period, so the exclusion would raise private saving by at most \$14.7 billion.⁷ The Joint Committee on Taxation has estimated that the President's capital gains proposal, which provides for a 30 percent exclusion of capital gains on assets held three or more years, would lose \$11.4 billion in revenue over the same period. Subtracting the \$11.4 billion revenue loss estimated by the Joint Committee on Taxation from the \$14.7 billion increase in net private saving leaves the change in total saving available for business investment. At one end of the range, total saving would actually fall by \$11.4 billion; at the other, it would rise by \$3.3 billion. Both amounts are so small relative to total national savings over the 6 year period that their effect on GNP is likely to be negligible.

Auerbach's Analysis of Saving and Growth⁸

In testimony before the Senate Finance Committee, Alan Auerbach reported an estimate of the change in the after-tax rate of return assuming that the after-tax return reflects the full impact of the 30 percent exclusion and that business demand is infinitely responsive. Using a different hypothetical investment than CBO and making the assumption that the proposal would not

6. A survey of estimates of saving responsiveness appears in Barry Bosworth, *Tax Incentives and Economic Growth* (Washington, D.C.: Brookings Institution, 1984). Further evidence of the unresponsiveness of consumption (and by implication, saving) to the rate of return appears in Robert Hall, "Intertemporal Substitution in Consumption," *Journal of Political Economy*, vol. 96 (April 1988), pp. 339-357.

7. The 1.04 percent increase in saving is calculated as the product of the 2.6 percent increase in the rate of return and the 0.4 response parameter, or elasticity, of savings. Net business saving is included with private saving to reflect the likelihood that individuals would prefer to increase their saving through retained earnings in response to the exclusion. The proposed exclusion would not apply to capital gains realized by corporations.

8. Alan Auerbach, *An Evaluation of the President's Capital Gains Tax Proposal*, Testimony presented to the Committee on Finance, U.S. Senate, March 28, 1990, pp. 9-10.

reduce revenues, he concluded that the exclusion would raise the after-tax real return to savers by at most 3.3 percent, which he calculated would increase saving by enough to raise income from saving by a cumulative \$4 billion over five years. He notes that under less optimistic assumptions, the exclusion would have no effect or even a negative effect on income.

The CEA Analysis of Investment and Growth

The Council of Economic Advisers has estimated the effect of a 30 percent capital gains exclusion by making the opposite assumption--that the supply of saving would be infinitely responsive and that the impact of the exclusion would translate into lower before-tax rates of return. If savers are willing to supply an unlimited amount of saving at a given real after-tax return, the CEA calculates that the required before-tax rate of return on investments--the cost of capital--will decline by 3.6 percent.⁹ During the first 5 years, from 1991 to 1995, the CEA estimated this reduction will raise GNP by a cumulative \$61 billion; during the first 10 years the increase in GNP is estimated to be a cumulative \$274 billion. During the first 5 years the higher level of GNP is estimated to yield an additional \$12 billion in tax revenue, thereby offsetting the Joint Committee's estimated revenue loss from the exclusion of \$11.4 billion. Tax revenues during the first 10 years will be \$55 billion higher, more than offsetting any continued revenue loss.

Two features of the CEA analysis appear to overstate the extent to which cutting capital gains taxes will increase GNP. The reduction in the cost of capital appears to be two to four times too large. The CEA also assumes that the supply of savings is highly elastic, an assumption that is not supported by most of the available evidence.

The CEA estimate that a 30 percent exclusion would reduce the cost of capital by 3.6 percent is based on published estimates of how much tax reform had raised the cost of capital. Those estimates were reported in a study by Yolanda Henderson, which built on estimates in an earlier study done at the Treasury Department by Don Fullerton, Yolanda Henderson, and James

9. Letter to Congressman Bill Archer from Michael Boskin, Chairman of the Council of Economic Advisers, and Robert R. Glauber, Under Secretary for Finance, Department of the Treasury, March 6, 1990.

Mackie.¹⁰ CBO has been able to approximate the CEA's cost-of-capital estimate using the equations and parameters in those studies.¹¹

An important implicit assumption in the CEA's analysis is that the required return that owners of existing shares of stock must be paid is determined only by the tax rate on capital gains, rather than by both the tax rate on capital gains and the tax rate on dividends. This assumption is consistent with the "new view" of corporate finance. The assumption is important because it magnifies the extent to which changing the tax rate on capital gains changes the cost of capital.¹²

The assumption is also controversial. This is reflected by the fact that the Fullerton, Henderson, and Mackie study also presents estimates based on the "old view" of corporate finance which holds that the required return that must be paid to owners of existing shares depends on both the tax rate on capital gains and the tax rate on dividends. This alternative assumption reduces the extent to which changing the tax rate on capital gains changes the cost of capital.

When CBO calculates the effect of a 30 percent exclusion on the cost of capital using assumptions consistent with the old view, the estimated change in the cost of capital is cut in half. Because the relevance of the two views continues to be debated, it would seem appropriate to consider estimates based on the old as well as the new view.¹³ If the estimated change in the cost of capital is 3.6 percent under the new view, then the corresponding reduction under the old view is 1.8 percent.

10. Don Fullerton, Yolanda K. Henderson, and James Mackie, "Investment Allocation and Growth Under the Tax Reform Act of 1986," in Department of the Treasury, Office of Tax Analysis, *Compendium of Tax Research 1987* (Washington, DC: 1987), pp. 173-201. See also Yolanda K. Henderson, "Capital Gains Taxation and the Cost of Capital for Mature and Emerging Corporations," Prepared for the American Council on Capital Formation Conference on Saving--The Challenge for the U.S. Economy, October 11-13, 1989.

11. The CBO estimates were made using the equations and parameters given on pages 174-182 of Fullerton, Henderson, and Mackie, "Investment Allocation and Growth." The calculations were made using the telephone and telegraph asset category which had effective tax rates before and after tax reform that were quite close to the average for corporate assets as a whole. In addition to approximating the CEA estimate, this method also approximates the findings of the preceding studies about the effects of tax reform on the cost of capital to corporations.

12. This point is discussed in Jane G. Gravelle, "Can a Capital Gains Tax Cut Pay for Itself?" Congressional Research Service Report for Congress, March 23, 1990.

13. The CEA applies its cost-of-capital estimate to the noncorporate sector as well as the corporate sector. The "new view" assumptions are inappropriate here. For a discussion of the new and old views of corporate finance, see Henderson, "Capital Gains Taxation," pp. 15-18.

The CEA's calculations of how the exclusion would change the effective capital gains tax rate also fails to adjust for step-up in basis at death.¹⁴ Since step-up in basis allows the gains on assets held until death to escape taxation, the 30 percent exclusion has no effect on the rate of return of these assets. The Fullerton, Henderson, and Mackie study makes no explicit adjustment for step-up in basis at death, although earlier work by Fullerton had assumed that the effective capital gains tax rate is cut in half because half of all gains are held until death.¹⁵ The Henderson article refers to the explicit adjustment for step-up in basis at death, but the results she reports omit that adjustment.¹⁶ Thus the CEA estimate, which is based on results reported by Henderson, also omits an explicit adjustment for step-up in basis at death.¹⁷ When CBO makes such an adjustment, the effect of a 30 percent capital gains exclusion on the cost of capital is cut in half. If this adjustment were made to the CEA estimate, the capital gains exclusion would reduce the cost of capital by 1.8 percent under the new view and 0.9 percent under the old view.

The CEA's estimates of the effects of an exclusion on GNP would be reduced proportionately with any reduction in its cost-of-capital effect. Thus, cutting the CEA's cost-of-capital effect from 3.6 percent to 1.8 percent would cut the CEA's estimate of the increase in GNP in half, from a cumulative 10-year increase of \$274 billion to \$137 billion. Cutting the CEA's cost-of-capital reduction to 0.9 percent reduces the cumulative 10-year GNP increase to \$68.5 billion.

The CEA estimates also implicitly assume that the supply of savings is infinitely responsive to the after-tax rate of return. Most empirical studies, however, find saving to be largely unresponsive to the rate of return. Nor can inflows of capital from abroad be expected to provide most of the funding for the new investment needed to raise GNP because the exclusion only applies to U.S. taxpayers. Thus, even when the CEA's estimate of the effects of the exclusion are adjusted downward to account for smaller changes in the cost of capital, their adjusted estimate appears to be an upper bound.

14. At death, heirs are allowed to "step up" the basis of an asset to current market value. As a result, if an inherited asset is sold, no tax is due on the gain accruing before the donor died.

15. Fullerton, Henderson, and Mackie, "Investment Allocation and Growth," pp. 177-178.

16. Henderson, "Capital Gains Taxation," p. 6.

17. Gravelle, "Can a Capital Gains Tax Cut Pay for Itself," p. 15.

The Robbins and Robbins Analysis of Investment and Growth¹⁸

Like the CEA analysis, the analysis by Robbins and Robbins assumes that the supply of savings would be infinitely responsive and that the full effect of the exclusion would be felt through a lower cost of capital. Robbins and Robbins estimate that a 30 percent exclusion would reduce the cost of capital by less than the amount estimated by the CEA. In spite of this difference, Robbins and Robbins estimate that the exclusion would raise output by more than the amount estimated by the CEA. Like the CEA, Robbins and Robbins estimate that output would rise by enough so that the exclusion would pay for itself through revenue increases.

The Robbins and Robbins growth model is described as a general equilibrium model that includes all main sectors of the economy and imposes normal conditions of efficient production and growth. The Robbins and Robbins model also includes considerable detail in the representation of taxpayers and federal tax laws.

The effect of the exclusion on the cost of capital as calculated by Robbins and Robbins depends on the size of the revenue effects of the exclusion. Using the Treasury's estimate that the exclusion would raise \$12.5 billion between 1990 and 1995, Robbins and Robbins calculate that the exclusion would reduce the cost of capital by 1.6 percent. Using the Joint Committee on Taxation estimate that the exclusion would lose \$11.4 billion over the same period, they calculate that the exclusion would reduce the cost of capital by 0.9 percent. These estimates are within the range of the CEA's estimate as revised to take account of step-up in basis at death and to reflect the old view of corporate finance.

Although Robbins and Robbins estimate that the reduction in the cost of capital is smaller than the CEA's unadjusted estimate, they find higher increases in growth than does the CEA. Compared with the cumulative 10-year GNP increase of \$274 billion calculated by the CEA, Robbins and Robbins find increases of \$622.8 billion using the 1.6 percent cost-of-capital reduction, and \$379.9 billion using the 0.9 percent cost-of-capital reduction.

The response of investment to the fall in the cost of capital appears to be quite high in the Robbins and Robbins model. The CEA finds that each percentage-point reduction in the cost of capital increases GNP over 10 years by \$76 billion (\$274 billion divided by 3.6 percent). In contrast, the Robbins

18. Aldona Robbins and Gary Robbins, "The Bush Savings Plan," National Center for Policy Analysis, NCPA Policy Report No. 152 (Dallas, June 1990). Additional documentation of the model used in the report has been made available to CBO by the authors.

and Robbins estimates imply that each percentage-point reduction in the cost of capital raises GNP by about \$400 billion (\$622.8 billion divided by 1.6 percent). This is over five times the size of the CEA estimate (\$400 billion divided by \$76 billion). CBO judges this implied level of response to be implausible.

Gravelle's Analysis¹⁹

Jane Gravelle's analysis of the effects of cutting taxes on capital gains is one of several studies that allow both the supply of savings by individuals and the demand for savings by businesses to be less than infinitely responsive. These studies differ primarily in the amount of detail with which they represent the economy.

Gravelle calculates that the 30 percent exclusion would have an initial impact of reducing the cost of capital by about 1 percent. A tax rate reduction consistent with this magnitude is used in a simple four-equation growth model of the economy to trace out illustrative paths of adjustment. These paths show an initial increase in saving and capital formation that soon is overwhelmed by increases in the government's deficit caused by the exclusion. When the saving rate is assumed to be highly but not infinitely responsive to the tax reduction, economic growth is little changed in the first five years and then declines below its trend thereafter. When the saving rate is assumed to be unresponsive to the tax rate reduction, growth falls below trend almost immediately. With these unfavorable growth effects, the exclusion does not generate enough revenue to offset the revenue loss calculated by the Joint Committee on Taxation.

Kotlikoff's Analysis²⁰

Laurence J. Kotlikoff examines the effects of cutting taxes on capital income in general using a model developed with Alan Auerbach.²¹ The model is similar to Gravelle's in its representation of economic growth, but with more

19. Gravelle, "Can a Capital Gains Tax Cut Pay for Itself," pp. 14-17 and 21-23.

20. Laurence J. Kotlikoff, "The Crisis in U.S. Saving and Proposals to Address the Crisis," forthcoming in *National Tax Journal* (September 1990).

21. Alan Auerbach and Laurence Kotlikoff, *Dynamic Fiscal Policy*, Cambridge University Press (Cambridge: 1987). One implication of this model is that tax incentives for saving will have less stimulative effect on output and growth than will tax incentives for investment, such as investment tax credits.

detail. The model separately represents households, businesses, and government, and calculates economic adjustments over a 150-year period with multiple generations of households.

Kotlikoff represents the 30 percent exclusion in the model as a tax rate reduction for capital income that increases the after-tax return by 3.3 percent. This is the same increase used by Auerbach to estimate the effects of a 30 percent exclusion reported above. Kotlikoff further assumes that the tax cut is maintained for 19 years, after which taxes must be raised if there is a government deficit. The model shows that the economy would adjust to the tax cut in a manner similar to that reported by Gravelle. Higher saving increases capital formation and output growth initially, but the cumulating deficit eventually causes these to fall below their baseline trend, which requires tax rates on all income to be increased. Ultimately, net output is reduced by 1.4 percent.

CBO's Analysis with WUMM²²

CBO has simulated the growth effects of a 30 percent capital gains exclusion using the Washington University Macroeconomic Model (WUMM), a product of Laurence H. Meyer and Associates. The structure of WUMM is similar to many other macroeconomic models of the U.S. economy because it is a relatively complete description of economic activity, and because it allows the major indicators of economic activity, such as output, prices, and interest rates, to determine each other jointly. This structure allows the model to trace out the path of adjustment in many dimensions of economic activity, including private saving, investment, GNP, and the federal deficit.

CBO has used WUMM for three primary reasons. First, it is broadly representative of large-scale macroeconomic models and embodies mainstream estimates of the responsiveness of saving and investment to the rate of interest. Second, WUMM has a more developed representation of capital gains taxes than other comparable models. Third, the long-run properties of WUMM are similar in spirit to those used in the other analyses above.

CBO's use of WUMM does not necessarily reflect an opinion that WUMM is superior to other macroeconomic models in other respects. Although WUMM embodies the mainstream view, it is important to stress that WUMM's estimates of the proposed reduction in the capital gains tax

22. Further details of the CBO simulations appear in Appendix C.

rate will differ from those of other macroeconomic models that embody the same mainstream view. Macroeconomic models tend to be large and sophisticated constructs, composed of many relationships depicting the important aspects and interactions of economic activity. Because no two models employ exactly the same relationships, no two will produce exactly the same estimates of the impact of the proposed capital gains tax cut.

In its simulations, CBO assumes that the 30 percent capital gains exclusion takes effect at the beginning of fiscal year 1991 and remains unchanged through the end of 1999. In WUMM, the impact of the 30 percent exclusion changes the cost of capital by 1.5 percent. This reduction is in the upper half of the range of estimates cited above. WUMM simulates the economy's adjustment to this reduction in the cost of capital over nine fiscal years. The resulting changes in economic activity are compared to WUMM's February 1990 baseline which reflects the tax treatment of capital gains under current law. WUMM does not incorporate the effects of the revenue loss from the exclusion in its estimation of business investment, which may lead WUMM to overstate the growth effects of the exclusion. CBO has added the revenue losses to WUMM's estimated federal government deficit.

The 30 percent capital gains exclusion in the WUMM simulation has a very small impact on real (inflation-adjusted) business fixed investment, as shown in Table 1. The table shows the cumulative changes in various measures of economic activity both five and nine years after the tax cut, and it shows the percentage change from the baseline in these measures in the ninth year. Nine years after the tax reduction, real business fixed investment is 2 percent greater than it would be without the tax cut. The cumulative change is also small. Over the nine-year period, the cumulative change in real business fixed investment is slightly more than \$66 billion. The small change in business fixed investment reflects the small effect of the exclusion on the cost of capital, the relative insensitivity of business fixed investment to changes in the cost of capital, and the insensitivity of saving to the rate of return.

The resulting change in the real capital stock of the business sector also is not large. After nine years, the real capital stock of the business sector is 0.8 percent greater than it would have been without the tax cut. The eventual increase in the capital stock predicted by WUMM would be closer to 1.5 percent, but that would not occur for many years.

With little change in the real capital stock, there is very little change in both nominal and real output. Both output measures are about three-tenths of a percentage point greater than they would be if the capital gains tax rate had not been reduced. The total amount of extra output created by the tax cut also is very small. The cumulative increase in nominal output after nine

TABLE 1. ESTIMATED ECONOMIC IMPACT OF THE 30 PERCENT CAPITAL GAINS TAX EXCLUSION
(Calendar years in billions of dollars unless otherwise noted)

	Cumulative Changes		Percentage Difference From Baseline
	After Five Years	After Nine Years	In Ninth Year
Real Business Fixed Investment	34.1	66.3	2.0
Real Capital Stock	n.c.	n.c.	0.8
Nominal Output	91.0	148.7	0.3
Real Output	35.3	38.1	0.3
Net Saving	16.6	22.6	1.6
Net Private Saving	14.3	53.0	3.3
NIPA Federal Deficit	4.6	37.3	n.c.
Real Consumption	10.5	-8.5	0.0
Real Net Exports	-4.8	-13.3	-12.7
Real Long-term Interest Rate (Percentage points)	0.2	0.4	n.c.
Unemployment Rate (Percentage points)	-0.2	0.1	n.c.

SOURCE: Congressional Budget Office, based on simulations using the Washington University Macroeconomic Model.

NOTE: n.c. means not computed.

years is \$149 billion, while the cumulative increase in real output is only about \$38 billion.

The proposed 30 percent capital gains exclusion also has little impact on net private saving. Cumulative net private saving is \$53 billion higher after nine years, and in the last year it is 3.3 percent greater than its baseline value.

After nine years, the federal deficit is a cumulative \$37 billion higher. In the WUMM simulations, the 30 percent capital gains exclusion does not pay for itself.

The difference between the WUMM and the CEA growth effects is larger than the dollar GNP figures indicate. Although GNP increases by \$149 billion after nine years in the WUMM simulations, compared with \$274 billion after 10 years in the CEA estimate, inflation accounts for most of the GNP increase in the WUMM simulations and none of the increase in the CEA analysis. Real output rises just \$38 billion in the WUMM simulations while the comparable real increase after nine years in the CEA model is about \$131 billion.²³ This difference will decline slightly in future years because the capital stock will take many more years to adjust to the exclusion in the WUMM model while the CEA model assumes complete adjustment in ten years. The smaller growth in real output in the WUMM simulations is attributable to the smaller effect of the exclusion on the cost of capital and to the smaller responsiveness of saving to the real after-tax return.

While the growth effect in the WUMM simulations is smaller than the CEA's estimate, it is larger than the estimates of no growth or declines in output reported in the above analysis of savings by CBO, and of output by Auerbach, Gravelle, and Kotlikoff. This difference, however, is quite small compared with total GNP. The \$38 billion increase in real GNP over nine years represents an increase of just 0.02 percent of the \$47 trillion in real GNP over the same period.

Sinai's Analyses²⁴

Allen Sinai has also simulated the economic effects of cutting taxes on capital gains. Unlike the analyses described above, Sinai considers the effects of cutting the top tax rate on capital gains to 15 percent instead of a 30 percent exclusion. His simulations have been done with the Sinai-Boston Econometric Model, another large macroeconomic model, with over 600 variables and 425 equations. It represents the financial sector in greater detail than other macroeconomic models, and has changes in financial asset valuations directly affecting investment.

23. The 9-year CEA estimate is 90 percent of the 10-year estimate of \$163 billion. The real GNP increase of \$38 billion reported for the WUMM simulation is from a base 1991 GNP expressed in constant 1982 dollars. To make the CEA real growth comparable, it was rebased to constant 1982 dollars. Using a replication of the CEA methodology, this gives a 10-year cumulative GNP increase of \$163 billion as well as the \$131 billion 9-year increase.

24. American Council for Capital Formation, "The Macroeconomic and Revenue Effects of a Capital Gains Tax Reduction," dated July 12, 1990; and Allen Sinai, "Prospects for the Economy and Policy at Midyear," Statement prepared for the Joint Economic Committee Hearings on the economic outlook at midyear, July 12, 1990.

Results from two different sets of simulations using the Sinai-Boston model have been reported. Simulations undertaken for the American Council for Capital Formation (ACCF) estimate the effects of reducing the maximum tax rate on capital gains to 15 percent for both individuals and corporations, leaving other provisions of current law and government spending programs unchanged. Separate testimony prepared by Sinai for the Joint Economic Committee describes the effects of including the capital gains rate reduction for individuals in a broader package of deficit reduction policies. The same version of the model and the same underlying economic conditions appear to be included in both sets of simulation as Sinai testified the same day ACCF announced the results from his other simulations.

Sinai finds that reducing the top capital gains tax rate to 15 percent for individuals and corporations, leaving other tax and spending policy unchanged, would cause relatively large increases in output and federal revenues. Assuming that the rate reduction had been effective April 1, 1990, Sinai simulates that output would grow steadily, with cumulative real GNP \$134.7 billion higher by the end of fiscal year 1995. This is an increase of 2.8 percent over what GNP would have averaged over the same period without the tax cuts. Over that period, the tax cuts raise federal revenues from all sources by between \$30 billion and \$40 billion. The lower revenue gain incorporates the Joint Committee on Taxation's revenue estimate, the higher gain incorporates the Treasury revenue estimate.

In contrast to these simulations, Sinai reports in his testimony to the Joint Economic Committee that a capital gains rate reduction for individuals has a shorter-term and smaller effect on growth when it is enacted with a deficit reduction package. This remains true whether or not monetary policy eases in response to a lower deficit.

The deficit reduction package excluding the capital gains tax reduction is estimated to reduce the federal deficit by \$53.8 billion in fiscal year 1991 and by proportionately larger amounts in years through fiscal year 1994.²⁵ When monetary policy is unchanged, adding the capital gains rate reduction to the package raises growth by just 0.2 percentage points in fiscal 1992 and has no effect in fiscal years 1991, 1993, or 1994. When monetary policy eases, adding the capital gains rate reduction increases growth by 1.6 percentage points from fiscal year 1991 to 1992 but then decreases growth by 0.6 percentage points from fiscal year 1993 to 1994.

25. The deficit package in fiscal year 1991 includes \$19 billion in reduced defense spending, \$11 billion in reduced entitlement spending, and \$23.8 billion in increased revenue. A gasoline tax increase raises the most additional revenue, followed by user fees, alcohol and tobacco excise taxes, and an increase in the top individual tax rate to 33 percent.

Sinai's estimates of the effects of the stand-alone capital gains tax cuts are well above those found by the other studies considered here, with the exception of the Robbins and Robbins study. For example, starting from a comparable real GNP base, the CEA growth analysis with the unadjusted cost-of-capital effect would find a cumulative real GNP increase of just \$42 billion by 1995. CBO's simulation with the WUMM model finds a cumulative real GNP increase of just \$35 billion by 1995. Revenue effects are much smaller in the CEA and WUMM projections as well.

The larger growth effects found in Sinai's stand-alone simulations are likely to be at the upper end of the plausible range of outcomes. First, the rate reduction simulated is larger than the 30 percent exclusion more commonly discussed. A 15 percent top rate is equivalent to a 45 percent exclusion for most gains realized by individuals and represents a maximum exclusion of 55 percent for corporations. Second, the large growth effect probably reflects in part an optimistic telescoping of longer-term effects into the first five years. The asset price effects on investment coupled with forward-looking asset valuations tends to focus the incentive effects into the years immediately following a policy change. The ability of the economy to respond rapidly to such a telescoped incentive also requires relatively large short-run saving and labor force responses. In contrast to the rapid response reported by Sinai, the CEA estimate takes over 8 years to achieve a similar output increase, and the WUMM simulation has not reached a much lower target after 9 years. Third, the total amount by which investment responds to changing asset valuations has been particularly difficult to quantify precisely, and partly for this reason, such influences have not been widely included in other macroeconomic models.

The effects on growth that are found when the capital gains tax reduction is added to a broader deficit reduction package are closer to those found in the majority of studies discussed above. The contrast between these smaller growth effects and those in the stand-alone simulation suggests that Sinai's model is quite sensitive to the exact specification of the tax reduction and to other conditions at the time the reduction takes place. This sensitivity may arise because of the particular way in which Sinai's model is formulated and estimated. It is likely, however, that the initial effects on growth of a capital gains tax reduction may also depend on the precise manner in which the tax cut is implemented, on whether other policy changes are made at the same time, and on the state of the economy. This possibility has not been addressed by the other studies.

SUMMARY

The eight analyses reviewed here reach a wide range of conclusions about the effects of cutting taxes on capital gains. Five of the studies--two by CBO and those by Auerbach, Gravelle, and Kotlikoff--find that a 30 percent capital gains exclusion would at best increase output by a very small amount. In these studies, increased GNP does not come close to offsetting the revenue losses that the Joint Committee on Taxation estimates would result from the exclusion. Two of the studies--by the CEA, and by Robbins and Robbins--find that a 30 percent exclusion would increase output by enough to offset the revenue losses estimated by the Joint Committee on Taxation. The final analysis consists of simulations presented by Sinai of two similar reductions in the top capital gains rate to 15 percent. When only the top rate on capital gains is cut, and other tax and spending policies are unchanged, GNP increases by enough to pay for any revenue losses as estimated by the Joint Committee on Taxation. But when the rate reduction for individuals is included in a deficit reduction package, Sinai finds smaller, more short-term effects.

Taken together, the studies raise doubt about whether cutting taxes on capital gains can be counted on to significantly increase GNP. Two of the studies reporting large positive effects on GNP have features that tend to overstate the stimulative effects of lower taxes on capital gains. The CEA study uses a cost-of-capital reduction that appears to be between two times and four times too large. The use of smaller cost-of-capital effects would reduce the CEA growth estimates proportionally. The Robbins and Robbins study appears to assume a much larger responsiveness of investment to the cost of capital than do other models, and, like the CEA model, assumes that the supply of savings is perfectly responsive. The conflict between the positive growth effects of the Sinai simulations reported by ACCF and the transitory effects mentioned in his testimony leaves the overall implications of his simulations uncertain.

SECTION III

CAPITAL GAINS TAXES AND THE EFFICIENCY OF INVESTMENT

The previous section concludes that the effect of lower capital gains taxes on the level of investment may be quite small. However, a capital gains tax cut could have other effects: it could enhance productivity and foster growth through its effect on the kinds of investments that are made, even if the overall level of savings did not change. A capital gains tax cut might reduce the distortions created by the double taxation of corporate income. A capital gains tax cut would also encourage investment in new small companies that might grow faster than old established businesses. More generally, lower capital gains taxes encourage risk-taking to the extent risky investments pay off in the form of capital gains.

However, assets that pay returns in the form of capital gains are not necessarily more socially productive than alternative investments. The overall economic effects of a tax preference aimed at capital gains are thus indeterminate. The present tax system already favors capital gains in several important respects. While many assets that pay returns in the form of capital gains are highly productive, a differential between capital gains tax rates and tax rates on ordinary income may also divert capital away from some productive uses in favor of less productive capital gains assets. A capital gains tax reduction would also make efforts to simplify the tax code more difficult.

CAPITAL GAINS TAXES AND RISK-TAKING

A tax on capital gains lowers the after-tax return from investing in risky assets. By itself, this would discourage risk-taking. If capital losses are fully deductible, however, a capital gains tax also lowers the variability of returns, which makes risky assets relatively more attractive.¹

The capital gains tax may be viewed as a risk-sharing arrangement between the government and investors: the government takes a share of profits, but rebates a share of losses. In this light, the net capital gains tax paid is similar to a premium payment in exchange for the insurance aspect of

1. On an investment that pays an uncertain return, which has variance s^2 , the variance of after-tax return is $(1-t)^2 s^2$, where t is the marginal tax rate on capital gains. For a risky investment ($s^2 > 0$), the variance is lower when the tax rate is higher.

the capital gains tax. Whether this "premium" is too high or too low relative to the value of the "insurance" depends on individual investors' attitudes toward risk and the cost of alternative methods available to limit risk.

Though the net effect on risk-taking of current tax law is uncertain, the concern that current law significantly deters risk-taking may be overstated. Capital losses are currently fully deductible against capital gains, and up to \$3,000 of capital losses in excess of capital gains may be deducted against ordinary income. For investors who have both gains and losses or only small net capital losses, current law thus amounts to taxation of capital gains with full loss offsets. Furthermore, current law favors assets that pay returns in the form of capital gains over income-producing assets because of the ability to defer taxes. Since risky assets are more likely to pay their returns in the form of capital gains, current law taxes the gain to risky investments relatively favorably, although less favorably than before passage of the Tax Reform Act of 1986.

A capital gains tax preference such as an exclusion or indexing is sometimes rationalized as a subsidy to encourage risk-taking by raising expected after-tax returns on risky investments. However, though an exclusion raises the after-tax return, it also lowers the government's share of the risk by reducing the effective marginal tax rate on capital gains.² For example, for assets held for the same length of time, a 30 percent exclusion at a 28 percent statutory tax rate on capital gains reduces the variance of return by 35 percent as compared with 48 percent under full taxation.

Taxpayers who are unable to diversify their portfolios face the possibility of large capital losses that would be only partially deductible under present law or under an exclusion because current law limits deductions for realized capital losses in excess of realized capital gains. This is primarily a problem for small entrepreneurs whose principal investment is the capital in their own businesses. Under a capital gains tax based on realization, there has to be a limitation on loss deductibility. Without loss limitations, taxpayers with diversified portfolios could reduce their effective tax rates on capital gains to zero or less by realizing capital losses and deferring capital gains whenever possible. However, a binding loss limitation would affect riskier investments much more than less risky investments since the former are more likely to produce losses.

Even for these entrepreneurs, however, the tax system provides some benefits. A large part of what entrepreneurs bring to a new business is their

2. The relative effects on risk-taking of an exclusion or indexing compared with present law are discussed in Congressional Budget Office, *Indexing Capital Gains* (August 1990).

human capital--that is, the special knowledge and abilities that make a business successful. Entrepreneurs invest their human capital by taking low salaries in the initial phase of a business in exchange for the prospect of capital gains in the future. Since the entrepreneurs do not pay tax on the wages that they invest (by taking a lower salary than they could earn elsewhere), they essentially receive a current tax deduction for this contribution. If the investment succeeds, the entrepreneur may earn a large capital gain, but unlike the outside investor who contributes after-tax earnings to the enterprise, the entrepreneur has contributed before-tax earnings. Thus, the ultimate tax on the capital gains represents one level of taxation on the human capital investment compared with two levels of tax on the outside investor. In other words, the entrepreneur's contribution of human capital is treated the same as are cash contributions to a fully deductible IRA under present law.

CAPITAL GAINS AND NEW VENTURES

As noted above, the primary drawback of the current tax treatment of capital gains is that it may discourage investment in small businesses because of the limitation on capital losses. Some see a reduction in the tax rate on capital gains as an effective way to stimulate the supply of venture capital, which is a source of equity for risky ventures, often in high-technology areas. It is, however, uncertain whether cutting capital gains taxes is an efficient way of providing financial incentives for new ventures.

A 1985 study by the Treasury Department and a recent follow-up by James Poterba cast doubts on the relationship between taxes on capital gains and flows of venture capital.³ These studies find that individual investors provide only a small fraction of the physical capital invested in new ventures. Poterba found that more than 80 percent of the funding for venture capital projects is from investors who are not affected by the personal income tax, such as institutional investors, foreigners, and corporations. Thus, changes in the capital gains tax rate would be unlikely to affect substantially the supply of capital to new ventures.

Less is known, however, about how the tax system affects ventures in the stages before outside funding is sought. There is some evidence that less formal sources of financing for new ventures, such as the potential entrepreneur's relatives and friends and other individuals, play a more

3. Office of the Secretary of the Treasury, Office of Tax Analysis, *Report to Congress on the Capital Gains Tax Reductions of 1978* (September 1985); and James M. Poterba, "Capital Gains Tax Policy Toward Entrepreneurship," *National Tax Journal*, vol. 42 (September 1989), pp. 375-389.

important role than formally organized venture capitalists in these earliest stages. These persons may be sensitive to the tax treatment of capital gains, but the evidence on the role played by such individuals is limited.⁴

In addition, a small fraction of capital gains represents returns on entrepreneurial activity. In 1985, 46 percent of net capital gains was on corporate stock, and only a fraction of that represented risky ventures. Thus, an across-the-board tax cut would be a very poorly targeted inducement to risk-taking. A small fraction of the subsidy would apply to the target capital, and that subsidy might have only a negligible effect on the overall level of investment. For large diversified investors in mature companies who face little risk, a capital gains exclusion would provide a windfall or push up prices.

CAPITAL GAINS AND THE DOUBLE TAXATION OF CORPORATE EQUITY

Some writers have advocated a preference for capital gains as an offset to the double taxation of corporate income. The corporate income tax, which only applies to dividends and retained earnings or equity, is thought to distort the allocation of capital and cause efficiency losses. Moreover, the double taxation of corporate equity encourages higher levels of debt than may be optimal. This preference for debt over equity has been an important factor in the boom in leveraged buyouts (LBOs).

The ideal solution to the double taxation of corporate equity would be to integrate the corporate income tax. An integrated income tax would treat corporate income, whether or not it is distributed as dividends, as income earned by shareholders and then tax that income only at the individual level. This system would have the combined virtues of removing the bias against corporate equity in general and against corporate distributions in particular, since shareholders' tax liabilities would be unaffected by corporate dividend policies. To the extent that this ideal tax encouraged dividend payouts, it would remove a possible source of inefficient investment at the corporate level that has been cited as a motive for hostile acquisitions and LBOs.

If corporate tax integration is infeasible, a tax preference limited to capital gains on corporate stock may be an appropriate second-best measure. Indexing may be superior to an exclusion in this regard because it creates less of a disincentive for corporate distributions. For example, the price of stock

4. Office of the Secretary of the Treasury, "Report to the Congress on the Capital Gains Tax Reductions," and JACA Corporation, *Access to Capital by Subcategories of Small Business*, Small Business Administration, Office of Advocacy, 1985.

in a company that paid out all of its real (inflation-adjusted) profits as dividends would increase only at the rate of inflation (holding everything else constant). The sale of stock in such a company would be subject to zero taxation if capital gains were indexed, but would be subject to capital gains tax, albeit at reduced rates, on the purely inflationary gains under an exclusion.

An exclusion might also promote LBOs in the short run. A tax preference for capital gains that applied to old as well as new investments would encourage LBOs because it would make it less expensive for acquiring investors to purchase stock in the acquired company.⁵ An exclusion would exacerbate this problem because it would reduce the tax rate on any increases in value that occurred after a company was "put in play." This would not be a problem under indexing, because the tax reduction under indexing would be a function solely of past inflation rather than of the sale price. Therefore, real price increases resulting from a buyout would be taxed at full statutory rates. A potential acquirer would have to pay more for outstanding shares under present law or if capital gains were indexed than under an exclusion.

CAPITAL GAINS AND TAX SHELTERS

Because of deferral and the nontaxation of capital gains at death, appreciating assets are tax-favored under present law relative to income-producing assets. A capital gains exclusion would magnify that preference and thus distort investment choices toward assets paying returns in the form of capital gains. While a capital gains preference might serve to mitigate the distortionary effects of double taxation of corporate equity, it would also shift capital into other kinds of assets such as real estate and away from bonds. The latter effect might be inefficient.

A capital gains exclusion would increase the relative tax advantage of assets for which income can be deferred. Deferral is a key element of tax shelters, which were severely curtailed as a result of several provisions of the Tax Reform Act of 1986 (TRA), including the full taxation of capital gains. If capital costs such as depreciation and interest expense are overestimated for tax purposes, then an investor can reap tax arbitrage profits by taking large current deductions at nominal tax rates that are only recaptured by the government later at the preferential capital gains tax rates. The recapture provisions of pre-TRA tax law were aimed at limiting this kind of tax

5. This problem would not occur if the tax preference only applied to assets purchased after the new tax law's effective date.

arbitrage, but they were imperfect.⁶ A major simplification of TRA was in rendering the complicated recapture provisions irrelevant.

There would be a further problem in expanding the favorable treatment of certain capital assets. As emphasized in the 1984 Treasury Department study of tax reform, deductibility of interest expenses can magnify the tax effects of deferral. The more assets that qualify for the preferential capital gains tax rate, the greater the possibility for interest-related tax arbitrage (borrowing with fully deductible interest to purchase an asset whose yield is only partially taxed).⁷

A capital gains tax preference might create incentives to churn depreciable assets--that is, sell assets purely for tax purposes. Prior to passage of TRA, investors in real estate and certain other long-lived assets had an incentive to sell the assets after a relatively short period to other investors who could take full advantage of the interest arbitrage described above as well as accelerated depreciation deductions. A 1987 Treasury Department study found that, under plausible assumptions, churning of residential rental real estate could have been virtually eliminated by the repeal of the partial exclusion of capital gains alone, even if the other reforms enacted in 1986 had not taken place.⁸

It is possible that the web of current restrictions in the tax code as well as low marginal tax rates might effectively limit the incentives for tax shelters even if capital gains tax rates were cut. Even if this were the case, a capital gains exclusion might conflict with the widely asserted objective of tax simplification. As long as capital gains are taxed at preferential rates, complicated recapture rules, rules on original issue discount obligations, installment sales, and limitations on the deductibility of passive losses and interest expense are necessary to curtail tax shelters and other kinds of unproductive tax-motivated activities. These limitations raise the cost of complying with and administering the tax system. Moreover, if a lower tax rate on capital gains led to an unraveling of tax reform, which offered low marginal tax rates on all income in exchange for broadening of the base, including full taxation of

6. Recapture provisions were retained in the tax code after TRA, possibly in anticipation of the restoration of a capital gains tax preference in the future.

7. These possibilities exist to a lesser extent under present law because capital gains benefit from deferral, whereas interest expense is deductible on an accrual basis. Some limitations on interest deductibility enacted under TRA reduce the possibility for arbitrage.

8. Leonard E. Burman, Thomas S. Neubig, and D. Gordon Wilson, "The Use and Abuse of Rental Project Models," in Department of the Treasury, Office of Tax Analysis, *Compendium of Tax Research 1987* (Washington, DC: 1987), p. 319.

gains, higher future marginal tax rates might create larger incentives for tax shelters and more pressures to complicate the tax system. Higher marginal tax rates would also reduce incentives to work and to save, which would adversely affect productivity and economic growth.

APPENDIX A

REVENUE EFFECTS OF THE PROPOSED

30 PERCENT CAPITAL GAINS EXCLUSION

Cuts in capital gains taxes, such as the proposed 30 percent exclusion, would increase the federal deficit unless lower taxes on capital gains were either offset by other tax increases or spending cuts, or encouraged investors to realize more capital gains so that at least the same amount of revenue was raised at a lower tax rate. None of the recent proposals for cutting taxes on capital gains has proposed that such cuts be financed by offsetting deficit reductions. Instead, proponents of lower capital gains taxes have argued that lower taxes on capital gains would provide enough encouragement to investors to realize more gains so that more, rather than less, tax revenue would be collected at lower tax rates. For example, the Bush Administration maintains that its proposal to lower taxes on capital gains would raise \$12.5 billion in additional revenue in 1990 through 1995.

The effect of cutting capital gains taxes on revenues is a controversial subject. Both the Congressional Budget Office and the Joint Committee on Taxation (JCT) agree with the Administration that lower tax rates on capital gains would encourage investors to realize more capital gains; but CBO and the JCT do not agree with the Administration that the response would be strong enough to prevent a loss of federal revenue.

There are two bodies of conflicting evidence on the responsiveness of individuals to changes in capital gains tax rates. The time-series evidence suggests strongly that capital gains tax cuts would lose revenue relative to current law.¹ The evidence based on micro-data on individuals seems to suggest that capital gains tax reductions could raise revenue.² However,

1. See, for example, Congressional Budget Office, "How Capital Gains Tax Rates Affect Revenues: The Historical Evidence," March 1988.

2. See, for example, Robert Gillingham, John Greenlees, and Kimberly Zieschang, "New Estimates of Capital Gains Realization Behavior: Evidence from Pooled Cross-Section Data," OTA Paper 66, May 1989, for a recent study based on cross-section data; or Gerald Auten, Leonard Burman, and William Randolph, "Estimation and Interpretation of Capital Gains Realization Behavior: Evidence From Panel Data," *National Tax Journal*, vol. 42, September 1989, pp. 353-374, for a recent study based on panel data (that is, data on individuals traced over a number of years).

recent analysis has cast doubt on the relevance of those micro-data studies to revenue estimation.³

The possibility that time-series and cross-section data will yield divergent estimates of economic behavior is a well-known econometric problem. In 1959, Edwin Kuh advised that "cross-sections cannot be used successfully to make time-series predictions unless a systematic relationship between the cross-section and time-series estimates has been firmly established."⁴ In other words, since the objective is to predict aggregate revenues, rather than individual responses, the time-series estimates are appropriate.

Unfortunately, time-series estimates are subject to a host of serious econometric problems. As a result, time-series parameter estimates vary widely, as was noted in the CBO paper of 1988. All that can be inferred from the time-series estimates is that the capital gains realization elasticity is probably less than one, and even that inference depends on the assumption that the sources of bias in time-series estimates do not result in a consistent understatement of elasticities, an assumption that cannot be validated empirically.

Joseph Minarik pursued this issue another way by looking at the implications of the relatively high cross-section elasticities reported by Larry Lindsey in support of the idea of a self-financing capital gains tax cut. Minarik showed that Lindsey's estimates of the effect of the Tax Reform Act of 1986 (TRA) on capital gains realizations were too high by between 40 percent and 125 percent. While part of these large overestimates may have resulted from errors in the assumed baseline level of capital gains realizations (there is no way to know with certainty what the realizations would have been in the absence of TRA), Minarik's calculations strongly suggest that the level of responsiveness implied by most cross-section studies is inconsistent with individuals' actual response to a capital gains tax increase.⁵

Lacking convincing counterevidence from empirical analysis, the operating hypothesis should be that capital gains tax cuts lose revenue. To see this, assume for the moment that the converse holds--that taxpayers would

3. See, for example, Joseph Minarik, "One More Round of Data on Capital Gains Tax Revenues," *Tax Notes*, vol. 47, April 9, 1990; Leonard Burman, "Why Capital Gains Tax Cuts (Probably) Don't Pay for Themselves," *Tax Notes*, vol. 47, April 3, 1990, pp. 109-110; and Jane Gravelle, "Can a Capital Gains Tax Cut Pay for Itself," CRS Report 90-161, March 23, 1990.

4. Edwin Kuh, "The Validity of Cross-Sectionally Estimated Behavior Equations in Time-Series Applications," *Econometrica*, vol. 27, April 1959, p. 211.

5. Minarik, "One More Round."

pay more tax in total over the long run at lower tax rates. When tax rates are cut by 30 percent, someone who would have paid \$1 million in capital gains taxes over his or her life can save \$300,000 by doing nothing different. Would many taxpayers alter their behavior so that they would voluntarily pay back all of the tax savings? Jane Gravelle⁶ and Alan Auerbach⁷ have pointed out that the only significant long-run source of additional revenues from capital gains is from sales of assets that would otherwise have been held until death or donated to charity and thus would have escaped tax entirely. Any other realization response simply represents a timing change--the government collects revenues now rather than later.⁸

But why would someone sell an asset that he or she would otherwise hold until death or donate to charity, even at a 20 percent tax rate? If market prices reasonably reflect future earnings (a hypothesis that is generally accepted in the finance literature), any portfolio asset should have the same earnings prospects as any alternative investment after adjusting for risk. Thus, selling an asset, paying capital gains tax now, and reinvesting the remainder would result in a smaller bequest or gift. As long as capital gains can escape tax entirely, the penalties for selling assets that would otherwise be held until death or donated to charity are likely to be prohibitive in most cases.⁹

Another possibility is that assets that would have been held until death could be sold for current consumption. A lower capital gains tax rate would encourage such behavior since the cost of realizing gains for consumption is directly related to the tax rate. However, those who count on a burst in consumption in place of bequests have cause for concern, since this is equivalent to assuming that a lower capital gains tax rate would reduce saving in the long run.

Thus, a long-run elasticity of capital gains realizations of greater than one seems very unlikely. A reduction in the tax rate on capital gains is most likely to lose revenue in the long run. This inference is consistent with the Joint Committee on Taxation's estimate of the response of individuals to the

6. Jane Gravelle, "A Proposal for Raising Revenue by Reducing Capital Gains Taxes," CRS Report 87-562E, June 1987.

7. Alan Auerbach, "Capital Gains Taxation and Tax Reform," *National Tax Journal*, vol. 42, September 1989, pp. 391-401.

8. Timing does affect the present value of government receipts. However, at moderate rates of inflation this is a relatively minor effect.

9. See Charles Holt and John Shelton, "The Lock-In Effect of the Capital Gains Tax," *National Tax Journal*, vol. 15, December 1962, pp. 337-352, for an analysis of the lock-in effect caused by the non-taxation of capital gains at death.

30 percent reduction in capital gains tax rates proposed in the President's 1991 budget. The committee estimates that the proposal would raise \$0.7 billion in fiscal year 1990, \$3.2 billion in 1991, and lose between \$3 billion and \$4 billion per year from 1992 through 1995. The cumulative loss by 1995 would be \$11.4 billion, and the Joint Committee estimates that losses would continue in later years.

APPENDIX B

IMPACT OF A 30 PERCENT EXCLUSION ON SAVING

The proposal to exclude 30 percent of capital income from taxation would affect saving in two ways: through a higher real after-tax rate of return and through an increased federal deficit. This appendix quantifies these two influences to estimate the effects of the exclusion on national saving. National saving, the sum of private saving and government surpluses, is the amount of domestic saving available for business investment.

The effect of the exclusion on the real after-tax return is estimated by calculating its effect on that return for several representative investments, and then extrapolating from these examples to all investments made by households. In this approach it is assumed that the full effect of the exclusion would be reflected in a higher after-tax return. As explained in the body of this report, such an outcome would occur if business demand for saving was highly responsive to the rate of return.

The estimated effects of the exclusion on the real after-tax rate of return are combined with existing econometric estimates of household responsiveness to changes in rates of return to estimate changes in private saving. These changes in private saving are combined with the Joint Committee on Taxation's estimates of the revenue loss from the 30 percent exclusion to calculate the net effect on national saving.

EFFECT OF THE EXCLUSION ON THE RATE OF RETURN

The 30 percent exclusion would directly affect the rate of return on appreciating assets. This effect would spread to other assets through the interrelated financial markets, raising the rate of return by smaller amounts on all assets.

Effect on Assets Subject to Capital Gains Taxation

Most taxable capital gains received by households are accounted for by corporate stock and assets held by unincorporated businesses. Examples of the latter are farms, commercial real estate, assets of small businesses, and individually owned timber.

How much the Administration's proposal would raise the return from investing in these assets would depend on the particular attributes of each investment. It would depend on the investment's appreciation, on its dividends or other investment income, on the inflation rate, on the length of time the asset was owned, and on its tax and economic depreciation rates.

CBO has calculated the proposal's effect on representative investments in the major categories of assets that yield taxable gains. These are a typical dividend-paying corporate stock, a pure growth stock, and four unincorporated business investments: in land, in rental residential structures, in non-residential structures, and in equipment. The calculations are extensions of an analysis reported by the Treasury Department in its 1985 report on capital gains.¹

The investment in a dividend-paying corporate stock is assumed to perform in a pattern consistent with the CBO macroeconomic forecast in *The Economic and Budget Outlook, Fiscal Years 1991-1995* (January 1990). The investment has a total annual return of 8 percent, price inflation is 4 percent, and the dividend payout rate is 2 percent of price. Under current law, an individual holding such a stock for seven years would earn the equivalent of an after-tax, inflation-adjusted, annual return of 2.20 percent. A 30 percent exclusion on capital gains would raise this return to 2.59 percent, an increase of almost 18 percent.

All other investments in capital gains assets are standardized to the case of corporate stock by assuming they must provide the same after-tax, inflation-adjusted, annual return. The pure growth stock pays no dividends and grows both from retained earnings and from inflation. Land is assumed to pay its current earnings as rent and to appreciate with the rate of inflation. As investments, structures and equipment perform similarly to land except that these depreciate and the tax code specifies rates at which these assets can be depreciated.

As shown in Table B-1, the proposed capital gains exclusion would have its greatest effect on growth stocks, raising the rate of return on these investments by 24 percent. The effect on corporate stock would be next in size. The rate of return on land would rise by 11.8 percent and the rate of return on residential and nonresidential structures would rise by 4.1 percent. The rate of return on investment in equipment would be unchanged because equipment is assumed not to rise in nominal value (depreciation being greater than inflation), and because the Administration's proposal would recapture

1. Office of the Secretary of the Treasury, *Report to Congress on the Capital Gains Tax Reductions of 1978* (September 1985), pp. 99-103.

TABLE B-1
Percentage Increase in Rate of Return
from 30 Percent Capital Gains Exclusion

Asset Type	Assets Sold	All Assets
Corporate Stock		
Dividend-paying	17.7	6.9
Growth	24.1	8.7
Noncorporate Assets		
Land	11.8	5.0
Residential Structures	4.1	1.9
Other Structures	4.1	1.9
Equipment	0.0	0.0

Source: CBO calculations. See text for details.

depreciation deductions as ordinary income.

The above examples refer to investments in assets that are eventually sold and subject to capital gains taxes. Half or more of accrued capital gains are earned on assets that are not sold in the investor's lifetime. These investments are not subject to capital gains taxation because the basis of these assets is stepped up to current market value when the owner dies. As a result, the proposed capital gains exclusion would not increase the expected rate of return for investments held until death.

Because of the step-up in basis at death, the increased rate of return for all investments in corporate stocks and unincorporated business assets would be smaller than that for assets sold during the investor's lifetime. CBO has estimated the effect of assets being held until death by assuming that half of the assets in each class pay no capital gains tax. Otherwise, these assets are assumed to have the same investment experience as the assets sold before death.

The increased rates of return for all assets in a class, those held until death as well as those sold, are also shown in Table B-1. The effect of the proposed exclusion on the real after-tax return falls by more than half for the

examples of corporate stock and land, and by just one-half for investments in structures.²

Effect on All Assets

The aggregate rate of return on saving is the average of the returns on each of the separate investments individuals make with their marginal investment dollars, where the importance of each separate investment is determined by its share of the marginal investment dollar.

When a capital gains exclusion is first enacted, the rate of return on capital gains assets increases while the return on other assets is unaffected. At this time, the new aggregate rate of return is the average of the higher rates of return on capital gains assets and the unchanged return on other assets, all weighted by their share of the marginal investments chosen by individuals.

Over time the increased returns on capital gains assets would spread more evenly among all assets. This would happen as individuals responded to the new exclusion by trying to shift their portfolios of assets to hold more capital gains assets and fewer of the other assets. The result would be a bidding up of the price on capital gains assets and a decline in the price of other assets, which would reduce the before-tax return on capital gains assets and raise it on other assets. In this manner, the higher after-tax return resulting from introduction of a capital gains exclusion would be spread among all assets. Even though the resulting increase in return on capital gains assets would be less than the initial impact, the higher rates on other assets would mean that the new aggregate return would still be approximately the same as it was on its initial impact.

Data on the marginal investments of households are not readily available, but they can be approximated from two sources. One is the

2. The increase in the rate of return can fall by more than half because assets held until death earn a higher after-tax return than those sold before death. Assets held until death earn the same before-tax rate of return as those sold before death, and because these assets escape capital gains taxation, they earn higher after-tax returns. The effect of the capital gains exclusion on the rate of return for assets sold and assets held until death is obtained by averaging the after-tax returns for these assets under current law and then comparing this average with the corresponding average for assets sold and held under the proposed exclusion. For dividend-paying corporate stock under current law, the after-tax rate of return for assets sold is 2.2 percent and for assets held it is 3.5 percent. The average of these two rates (before rounding) is 2.8 percent. Under the proposed 30 percent exclusion, the rate of return on stock sold would rise to 2.6 percent while that on stock held until death remained at 3.5. The average of these two rates is 3.0 percent. The percentage increase in the average rate, from 2.8 to 3.0, is 6.9 percent as shown in Table B-1.

composition of assets held by households, and the second is the importance of capital gains in income from capital. The composition of assets held by households is reported in the flow of funds data compiled by the Federal Reserve Board. The share of capital income from capital gains can be inferred from appreciation reported in the flow of funds data and other capital income reported from the National Income and Product Accounts (NIPA). CBO has used both of these methods to estimate how much the increased return on capital gains assets would raise the return to all saving. These two methods will tend to give different results in part because of limitations in the measurement of household asset values and capital income.

The Asset Shares Method. Individuals hold a wide range of assets, of which capital gains assets comprise only about one-third. The single most important asset individuals own is their home, accounting for 25.7 percent of all assets held by individuals (see Table B-2). Homes generally escape capital gains taxation because of special income tax provisions. Bank deposits account for 17.6 percent of household assets and earn no capital gains. Pension funds and related assets account for another 16.1 percent of household assets, and although pension funds accrue capital gains on some investments, these earnings are taxed as ordinary income to the individual when received as a pension fund distribution. Credit market instruments (for example, bonds) and financial assets and inventories of unincorporated businesses bring to 67.3 percent the total of household assets that generally accrue no capital gains.

The 32.7 percent of household assets subject to capital gains taxation is made up of corporate stocks (10.5 percent), noncorporate residential structures (6.8 percent), noncorporate land (10.7 percent), and noncorporate plant and equipment (4.7 percent).³

When the shares of household assets shown in Table B-2 are used in averaging the rates of return in the investment examples underlying Table B-1, the aggregate rate of return under current law comes to 2.577 percent. This is the real after-tax annual return. When the rates of return on capital gains assets are increased because of an exclusion, the average rate of return increases to 2.615 percent. Thus, a capital gains exclusion is estimated to raise the aggregate rate of return by a little less than 1.5 percent relative to

3. Consumer durables are excluded from Table B-2 because the results of Table B-2 are combined with projections of the National Income and Product Accounts measure of private saving. This measure treats the purchase of consumer durables as consumption. If consumer durables were included in household assets, they would account for 9.4 percent of the total, and the share accruing to taxable capital gains would fall to 29.7 percent of all assets held by individuals.

TABLE B-2
Distribution of Assets Held by Households
(1981-1988 averages, in percent)

Owned homes	25.7
Deposits	17.6
Credit market instruments	4.6
Pensions and life insurance	16.1
Noncorporate inventories	0.8
Noncorporate financial assets	2.5
Subtotal	67.3
Corporate equities	10.5
Noncorporate	
Residential structures	6.8
Plant and equipment	4.7
Land	10.7
Subtotal	32.7

SOURCE: CBO Calculations based on Board of Governors of the Federal Reserve System, "Balance Sheets for the U.S. Economy 1945-89," April 1990.

Percentages were from 1981-1988 averages for each category. Assets of nonprofit institutions and corporate farms were estimated and excluded.

the current law rate.⁴ This aggregate increase is smaller than most of the increases for typical capital gains assets shown in Table B-1 largely because these assets together account for just one-third of all assets held by households.

In its 1985 report, the Treasury Department applied the same methodology to calculate the change in the return to saving from the capital gains tax changes in the Revenue Act of 1978. That act increased the exclusion from 50 percent to 60 percent, and shielded capital gains income from other minimum and maximum tax calculations. As a result, the top rate on capital gains fell from over 35 percent to a flat 28 percent, similar in magnitude to the drop from 28 to 19.6 percent under the current proposal. Using economic assumptions similar to those underlying the investment

4. The increase in the after-tax, inflation-adjusted rate of return is 1.48 percent when durables are not considered one of the household investment options, and 1.34 percent when durables are included.

options in Table B-1, the Treasury found that the 1978 act raised the after-tax, inflation-adjusted rate of return by 2 percent to 3 percent.

The Income Shares Method. The importance of a capital gains tax exclusion to the aggregate rate of return can also be calculated using capital income shares rather than asset shares. Capital income comes primarily as interest, dividends, rents, and proprietors' income, in addition to capital gains.⁵ Between 1980 and 1988, capital gains on assets subject to capital gains taxes accounted for 30 percent of all capital income. This is a larger share than that implicit in the data on household assets, which showed 33 percent of assets yielded capital gains because only a portion of the income from these assets comes in the form of capital gains.

A 30 percent exclusion is calculated to raise the rate of return on an investment that pays all of its return through appreciation by 8.7 percent (see the growth asset in Table B-1). Assuming this increase applies to all capital gains, that capital gains account for 30 percent of all capital income, and that all other assets earn the same net return as capital gains assets, then the 8.7 percent increase for capital gains assets would lead to a 2.6 percent increase in the aggregate rate of return for all capital income.

The income shares approach has also been applied by Alan Auerbach in testimony presented to the Senate Finance Committee on March 28, 1990. Using optimistic assumptions about a capital gains tax cut, he concluded that the proposed exclusion would raise the after-tax, inflation-adjusted rate of return by 3.3 percent.

The 2.6 percent increase in the after-tax inflation-adjusted return suggested by CBO's application of the income-shares method is similar to the 1.5 percent increase suggested by CBO's application of the asset-shares method. Although the actual weights applied to capital gains differ between the two methods, the large fraction of assets without any capital gains has a leveling effect on these differences. Other analyses have found effects similar to CBO's for the same or similar capital gains tax change.

RESPONSE OF SAVING TO A CHANGE IN THE RATE OF RETURN

The responsiveness of saving to changes in the real after-tax rate of return is summarized by the savings elasticity--the percentage change in saving induced

5. Proprietors' income in the NIPA includes the return both to labor and to capital. Based on data supplied by the Bureau of Labor Statistics, 30 percent of proprietors' income was assumed to come from capital.

by a 1 percent change in the rate of return. Estimates of this elasticity are combined with the above changes in the real after-tax rate of return to estimate the increase in private saving resulting from the exclusion. This estimate is combined with the change in the deficit to estimate the change in national saving.

Estimates of Saving Responsiveness

How saving would change in response to a higher return would depend on two offsetting effects. On the one hand, the higher return would increase the payoff per dollar saved in terms of higher consumption in the future. This might induce some people to save more. On the other hand, the higher return would also mean that previous levels of saving would allow an increase in future spending without further sacrifice of current spending. Some might prefer to divert part of that potential increase in future spending to current uses by saving less. Thus, the increase in the return to saving might prompt people either to increase or to decrease their saving. The outcome would depend on how strongly they valued additional consumption in the future relative to the present. Of course, an outcome of no change in saving would also be possible.

Numerous studies have tried to estimate the net effect of these two offsetting effects on saving. The results of this research are typically summarized in terms of the estimated elasticity of private saving to the rate of return. If the elasticity is estimated to be positive, then an increased rate of return induces people to save more; if the elasticity is negative, an increased rate of return reduces saving.

Most empirical estimates of the savings elasticity have found little or no response to higher rates of return, although some negative and some large positive elasticities have been found. The most commonly cited large elasticity is the 0.4 percent estimated by Michael Boskin.⁶ This elasticity implies that if the after-tax inflation-adjusted rate of return increased by 1 percent, say from a rate of 2.00 percent per year to a rate of 2.02 percent per year, personal saving would increase by 0.4 percent. If personal saving were running at an annual rate of \$200 billion before the rate of return increased by 1 percent, the 0.4 elasticity implies that saving after the rate increase would rise by \$1.6 billion to an annual rate of \$201.6 billion.

6. For a review of savings elasticity estimates see Barry Bosworth, *Tax Incentives and Economic Growth* (Washington, D.C.: Brookings Institution), 1984

Instead of estimating the saving elasticity referred to above, a new line of research has tried to estimate how sensitive the desired mix of current and future consumption is to changes in the rate of return. This approach is appealing to economists because it is more directly related to peoples' preferences for present and future consumption and less sensitive to economic conditions at any point in time. The most recent of these studies finds relatively little substitutability between current and future consumption, which implies zero or negative net savings elasticities.⁷ In other words, when the after-tax rate of return on savings increases, individuals realize that they can meet their future consumption needs with a smaller amount of savings. While future consumption goes up a little in response to the higher after-tax rate of return, current consumption also increases. The result is that savings would decrease if rates of return increased.

The research to date, therefore, leaves considerable uncertainty about the savings response to an increased rate of return. Most estimates fall within the range from no response to an increase of 0.4 percent for each 1 percent increase in the rate of return. Larger or smaller responses cannot be ruled out, however.

Estimated Change in Saving

If saving does not respond to the rate of return, which is the lower end of the most likely range of responses, then clearly the Administration's proposal would not raise private saving. If saving increased by 0.4 percent for each 1 percent increase in the rate of return, the upper end of the most likely range, then the increase in personal saving would depend both on the proposal's effect on the rate of return and on the level of private saving. CBO calculates that the Administration's proposal would raise the real after-tax rate of return to private saving by 1.5 percent or 2.6 percent, depending on whether the asset-shares or income-shares method is used. The larger increase in return, coupled with the 0.4 percent saving response, implies that the 30 percent exclusion would raise private saving by 1.04 percent.

Private saving is projected by CBO to be \$1,411.8 billion over the fiscal years 1990 through 1995. An increase of 1.04 percent would be \$14.7 billion. Thus, the effect of the Administration's proposal on private saving would be likely to fall between no change and an increase of \$14.7 billion through 1995. Because the Administration's proposal is estimated to reduce revenue by \$11.4 billion over the same period, the net effect of the proposal on national saving

7. Robert Hall, "Intertemporal Substitution in Consumption," *Journal of Political Economy*, vol. 96, April 1988, pp. 339-357.

would be likely to fall between an \$11.4 billion decrease and a \$3.3 billion increase.

APPENDIX C

SIMULATION OF A 30 PERCENT

CAPITAL GAINS EXCLUSION IN WUMM

Additional details from CBO's simulations with the Washington University Macroeconomic Model (WUMM) are provided in this appendix. After a brief discussion of the choice of the WUMM model, the changes CBO made in WUMM are described. Then additional details of the economy's simulated response to the exclusion are described.

CHOICE OF MODEL

CBO chose to simulate the growth effects of the proposed exclusion with a macroeconomic model because it provides a relatively complete description of economic activity, and because it allows the major indicators of economic activity, such as output, prices, and interest rates, to determine each other jointly. In addition, the parameters of these models are estimated directly from aggregate time-series data and the models are tested against the historical experience of the U.S. economy.

CBO selected WUMM for three primary reasons. First, WUMM embodies mainstream views about the two key determinants of the impact of the proposed cut in the capital gains tax rate. One key determinant, the responsiveness of private saving to a change in the real, after-tax rate of interest, is small in WUMM, consistent with the evidence referenced in Appendix B. The other key determinant, the responsiveness of business fixed investment to a change in the cost of capital, is small in the short run and larger in the long run, consistent with the mainstream view that the degree of substitutability between capital and labor is close to zero in the short run but one in the long run. With these mainstream characterizations of the two key determinants, WUMM views short-run fluctuations in real output as arising primarily from changes in aggregate demand, and long-run fluctuations as arising primarily from changes in aggregate supply.

A second reason why CBO uses WUMM is that WUMM has an explicit representation of how capital gains taxes affect the cost of capital. The linkages between the capital gains exclusion rate and the cost of equity financing, and between the cost of equity financing and the cost of capital, are explicitly incorporated in WUMM.

A third reason CBO uses WUMM is that WUMM imposes the long-run neoclassical growth properties on its growth path. These are similar to the conditions in the Gravelle and in the Kotlikoff models also examined in the text.

CBO's use of WUMM does not necessarily reflect an opinion that WUMM is superior to other macroeconomic models in other respects. Although WUMM embodies the mainstream view, it is important to stress that WUMM's estimates of the proposed reduction in the capital gains tax rate will differ from those of other macroeconomic models that embody the same mainstream view. Macroeconomic models tend to be large and sophisticated constructs, composed of many relationships depicting the important aspects and interactions of economic activity. Because no two models employ exactly the same relationships, no two will produce exactly the same estimates of the impact of the proposed capital gains tax cut.

CBO'S MODIFICATIONS OF WUMM

Four inputs to WUMM needed to be changed to estimate the impact of the 30 percent exclusion. These inputs are: (1) the capital gains exclusion variable; (2) the income effect of the tax cut on consumption; (3) the dividend-to-price ratio; and (4) the excluded federal tax revenue effects of the capital gains tax cut.

The Capital Gains Exclusion Variable

The capital gains exclusion variable UCGEXCL was increased from zero to 30 percent in the first quarter of fiscal year 1991 and was kept at 30 percent through 1999. No changes were made to account for the lower capital gains taxes on assets held less than three years or for the three-year phase-in period included in the President's proposal.

The Income Effect of the Tax Cut on Consumption

An adjustment was made for the estimated income effect of the tax cut on consumption. Given its income and expenditure orientation, WUMM does not explain the increment to household wealth, and hence to consumption, resulting from a capital gains tax reduction. The income effect was incorporated into WUMM by adding to consumption the amount of extra consumption implied by the revenue loss from the tax cut as estimated by the Joint Committee on Taxation. These additions boost real personal

consumption expenditures by about \$4 billion (annual rate) per quarter in fiscal years 1994 through 1999, and by lesser amounts in fiscal years 1991 to 1993.

The Dividend-to-Price Ratio

The dividend-to-price ratio was adjusted to reflect the changed dividend payout behavior of the corporate sector. WUMM assumes that corporations retain relatively more earnings and pay out fewer dividends when the marginal capital gains tax rate is lowered relative to the marginal tax rate on ordinary income. WUMM, however, does not assume that the dividend-to-price ratio, which affects the value of household wealth and hence consumption, changes to reflect the assumed change in dividend payout behavior. In effect, WUMM assumes that investors ignore capital gains when they value corporate equity. As a result, when corporations lower their dividend payouts and retain more earnings, the value of household equity holdings falls in WUMM because the dividend-to-price ratio does not fall by enough to offset the reduction in dividends.

In order to prevent a large decline in consumption, the dividend-to-price ratio was adjusted down by the percentage decline in dividends created by the capital gains tax cut during the first eight quarters of the simulation, essentially fiscal years 1991 and 1992. These two years were chosen because the dividend-payout equation has an eight-quarter lag.

The Federal Deficit

Given its income and expenditure orientation, WUMM does not explain capital gains accruals or realizations, and hence, capital gains tax revenues. As a result, CBO added the revenue estimate of the Joint Committee on Taxation to the simulated changes in the federal budget deficit resulting from the economic effects of the tax cut.

Three adjustments were made to the revenue estimate by the Joint Committee on Taxation before it was added to the simulated federal deficit. First, the Joint Committee's figures were adjusted to correspond to the WUMM baseline for nominal GNP instead of the CBO baseline used by the Joint Committee. Second, the Joint Committee's figures were adjusted for a different starting date--the beginning of fiscal year 1991--instead of March 15, 1990, as assumed by the committee. Third, the Joint Committee's figures were extrapolated for fiscal years 1996 through 1999 using the baseline nominal output figures in WUMM.

ADDITIONAL SIMULATION RESULTS

The results presented in the body of the report are supplemented here with additional information on the source of the saving response and the path by which the economy adjusts to the exclusion over the nine years simulated. References to numerical amounts are taken from Table 1 in the body of the report.

The Saving Response

The proposed 30 percent capital gains exclusion has little impact on net private saving. Net private saving is saving by households and businesses out of current income, less depreciation. After nine years, net private saving is only 1.3 percent greater than its baseline value. All of the approximately \$53 billion cumulative increase in net private saving over the nine years is due to greater business saving; the cumulative change in personal saving is actually a reduction of about \$9 billion (not shown in the table). The increase in net business saving reflects a change in dividend payouts by businesses; businesses retain relatively more earnings and pay out relatively fewer dividends so that equity holders receive relatively more of their return in the lower-taxed capital gains.

The increase in net saving is less than the increase in net private saving because federal government saving is lowered by the capital gains tax cut. Net saving is net private saving plus saving by federal, state, and local governments. After nine years, net saving is only 0.8 percent greater than its baseline value. All of the difference between net saving and net private saving results from an increase in the federal budget deficit; saving by state and local governments increases very slightly. The federal deficit is 15 percent greater than its baseline value after nine years. Nine years after the capital gains tax reduction, the cumulative change in the deficit is an increase of about \$36 billion--that is, the 30 percent capital gains exclusion does not pay for itself after nine years.

The Economy's Path of Adjustment

Comparing the cumulative changes after five and nine years indicates how the economy responds to the proposed capital gains tax cut. During the first five years, the tax reduction modestly stimulates aggregate demand, particularly consumption and business fixed investment. Net exports fall because part of the increase in aggregate demand is met by greater imports. Total real output

increases as a result, lowering unemployment slightly from its baseline value. This boost to output boosts the inflation rate slightly, because the increase in aggregate demand is greater than the increase in aggregate supply, given the long lag between changes in the cost of capital and the capital stock. The increase in the federal deficit is only \$2.7 billion, because the lower capital gains income tax revenues from the tax cut are partially offset by greater tax revenues from a stronger economy.

The increase in aggregate demand raises real interest rates, however, which helps to choke off the increase in aggregate demand after the first five years. The cumulative increase in real output in the sixth through the ninth years is only about \$3 billion, and the civilian unemployment rate rises above its baseline value after nine years. Real business fixed investment continues to increase, but real consumption spending falls below its baseline level, and real net exports continue to deteriorate as higher real interest rates raise the foreign exchange value of the U.S. dollar relative to its baseline value. The federal deficit increases by a larger amount during the final four years than during the first five years because falling tax revenues due to a weaker economy add to the revenue loss from the capital gains tax reduction.