Public Policy Brief

Capital Gains Taxes and Economic Growth

Effects of a Capital Gains Tax Cut on the
Investment Behavior of Firms

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Preface

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Tax reduction has been a major policy issue in the United States since the early 1980s. Proponents of reduction usually assert that the purpose of their proposals is to lift the restraining burden of taxation from the shoulders of business and investors (or, in other words, to reduce government interference in the marketplace) and thereby stimulate work, saving, and investment. Much of the debate about tax cuts in the popular press and policy arena rests on the "conventional wisdom" that the nation must increase its rate of saving.

One of the most controversial tax proposals is a reduction in levies against capital gains income. Such a cut was recommended by the Bush administration in the late 1980s, was a major part of the tax plan that emerged from the Republican "Contract with America" in the U.S. House of Representatives in 1995, and has recently been advocated in various forms by both Democratic and Republican leaders. Proposals put forth by the National Commission on Economic Growth and Tax Reform, by the Joint Economic Committee, and in the Nunn-Domenici tax proposal endorse exempting capital gains income or investment income from taxation. These proposals are predicated on the assumption that a reduction in the effective rate of taxation on capital gains income, coupled with a sharp decline in interest rates, will fuel a surge of private investment and economic growth.

There have been many studies about how capital gains taxes affect economic variables and decision making in the private sector. Some studies focus on how a reduction in the capital gains tax—through a cut in rates, an indexation of capital gains income for inflation, or

both—might affect the distribution of income and wealth. Other studies ask how a reduction in the tax might affect government tax revenues. Still others focus on how a change in the structure of the tax might influence the behavior of corporate and individual investors.

In this *Public Policy Brief* Steven M. Fazzari and Benjamin Herzon scrutinize the fundamental assumptions of the saving scenario—that a capital gains tax cut will necessarily produce an increase in national saving and investment—and find it lacking. They assert that business entrepreneurs will not necessarily view the capital gains tax in the same manner as individual investors or use the tax as the criterion on which to base their investment decisions. They then analyze how a cut in the capital gains tax would affect decision making in the corporate sector, that is, how such a reduction would alter a firm's decision to undertake investment.

Fazzari and Herzon find that neither cutting the capital gains tax rate nor indexing capital gains income to inflation will have more than a minimal influence on economic growth. This finding challenges the idea that such policies represent strategies for growth. We hope that this study expands the scope of analysis of economic decision-making processes, widens the inquiry about the effects of changes in the tax structure, and serves as a prudent contribution to the debate about how best to stimulate capital formation and economic growth.

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Effects of a Capital Gains
Tax Cut on the Investment
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Tax cuts have been a prominent issue in the U.S. conservative political uprisings of the early 1980s and mid 1990s. The stated economic objective of proposed cuts is to "get government off the backs" of the private economy to stimulate work, saving, and investment. A cut in taxes on capital gains income is among the most controversial of these proposals. The Bush administration recommended such a cut, and it now is a major part of the tax plan that has emerged from the Republican "Contract with America" in the U.S. House of Representatives. Because much of the reward to entrepreneurial activity accrues in the form of capital gains, proponents of tax cuts argue that lower capital gains rates will be an especially potent stimulus to productive economic activity. Critics, however, assert that most capital gains income goes to relatively wealthy taxpayers; therefore, cutting capital gains taxes would disproportionately benefit the wealthy at a time when deficit reduction plans are squeezing many federal programs that benefit the poor and middle classes.

In this *Brief* we assess the economic benefits of a capital gains tax cut. We consider a variety of channels through which capital gains taxes might affect economic decisions and find that there is little theoretical or empirical basis for the view that lower capital gains tax rates would have a substantial effect on economic growth or level of economic activity. The reasons for this conclusion can be divided into two broad classes. First, some faulty theoretical assumptions in much of the popular discussion about the capital gains tax result in misleading conclusions about its economic impact. For example, most journalistic accounts of the debate about this topic assume that when the tax on rewards from entrepreneurial activity falls, more investment projects will be undertaken. We show,

however, that, as a first approximation, changes in taxes on profits, such as the capital gains tax, do not affect decisions by firms to undertake investment projects. Second, although, in theory, capital gains tax rates do affect investment activity—in particular, when the capital gains tax rate is different from the tax rate on the returns from other kinds of investment—we find that the empirical significance of these effects is small and possibly negligible. We estimate that the current proposal to lower the highest capital gains tax rate from 28.0 to 19.8 percent would reduce the effective cost of capital between 1.0 and 2.0 percent; using assumptions that represent *average* values in the U.S. economy, we estimate a decline of only 1.1 percent. Proposals to index capital gains income for inflation would have a somewhat larger, but still small, effect. Using the average assumptions, the indexation provision would reduce the effective cost of capital by 1.6 percent.

The economic effect of such tax rate or indexation changes is minimal. Theoretically, a one-time change in the cost of capital does not affect the long-run growth rate of the economy; it affects only the level of output. Using assumptions that are generous to the capital gains tax cut and indexation provisions, we find that their long-term effect on output amounts to about one-third of one percent of U.S. gross domestic product (GDP). In other words, the long-term economic impact of such a policy would be no greater than the impact of roughly two months of normal economic growth, and it would take years to realize even this small benefit.

These results lead us to the conclusion that proponents of a tax cut overstate the stimulus to investment that could be expected from the cut. It is likely that most future investment activity that would benefit from a lower capital gains tax rate would be undertaken at the current capital gains rate, which is already effectively much lower than the highest marginal tax rate on ordinary income. We dispute the claim that a lower capital gains tax rate would have large beneficial effects on output, growth, or entrepreneurial activity in the U.S. economy. The debate over the appropriate capital gains tax rate should focus on other considerations. These include the distribution of tax burdens across individuals and time periods.

It is clear that most capital gains income accrues to relatively wealthy taxpayers and that cutting the capital gains tax rate would benefit these

individuals most. Feenberg and Summers (1990), for example, show that over half of capital gains income goes to individuals in the top 1 percent of the income distribution.[1] Equity considerations might therefore suggest that lower capital gains rates are undesirable. Indeed, since aspects of the current tax law already create preferences for capital gains income, one might argue that capital gains rates should be increased to achieve a more progressive tax system. The fact that nominal (rather than "real") capital gains are taxed, however, implies that effective capital gains tax rates vary arbitrarily across time with inflation rates. Some proposals attempt to eliminate this problem by indexing capital gains taxes to inflation.

Another point of contention in the debate over a capital gains tax cut is whether it will increase or decrease tax revenue. Some analysts argue that "realizations" of capital gains may increase so much following a tax cut that the government may collect more revenue at lower capital gains tax rates. Such conclusions are controversial, however, and other studies find that a lower capital gains tax rate will reduce revenues and increase the deficit (Auten and Cordes 1991, Minarik 1992). The effect of capital gains tax rate changes on the government's fiscal position will likely dominate the small, even negligible effect we find of lower capital gains taxes on investment and growth.

We do not dispute the fact that individual investors will benefit from a decline in the capital gains tax rate. In this *Brief*, however, we focus on the extent to which such a cut will motivate firms to undertake investment projects and the possible effect of such projects on economic growth and investment.

What Is the Effective Capital Gains Tax Rate?

There have been many modifications in the tax treatment of capital gains since the inception of the federal income tax in 1913.[2] From 1913 to 1921 capital gains income was treated the same as income from any other source. In 1922 capital gains were distinguished from ordinary income for the first time. Since then policymakers have tinkered with capital gains taxes by altering the deductibility of capital losses, the length of time an asset must be held for income from it to be considered

a long-term capital gain, the fraction of long-term capital gains income that may be excluded from taxable income, and the statutory tax rate on capital gains income.

One way to track the tax treatment of capital gains income from year to year is to consider the maximum marginal tax rate on long-term capital gains income under successive tax regimes. Although this rate varies with the situation of the taxpayer, the general trend from 1922 through 1978 has been for the maximum marginal rate to rise. Under fairly typical conditions, the maximum marginal rate rose from 12.5 percent in 1922 to 49.1 percent in 1978. With passage of the Revenue Act of 1978, the maximum marginal tax rate on capital gains income dropped to 28.0 percent. This figure was derived by combining the maximum personal tax rate on ordinary income (70.0 percent) with the exclusion rate for capital gains income (60.0 percent). Thus, for someone in the top tax bracket, a $1 increase in capital gains income would create a 40¢ increase in taxable income; taxing the increase at a rate of 70.0 percent yields 28¢ in additional tax.[3] The Economic Recovery Tax Act of 1981 lowered the highest personal tax rate to 50.0 percent and thus lowered the maximum marginal tax rate on capital gains income to 20.0 percent. With passage of the Tax Reform Act of 1986, the highest rate on personal income was lowered to 28.0 percent, but the capital gains exclusion was eliminated, thereby raising the maximum marginal tax rate on capital gains to 28.0 percent. One of the provisions of the 1986 act was that even if marginal personal tax rates were to increase in the future, the maximum marginal tax rate on capital gains would remain at 28.0 percent; a separate act would be required to increase this rate. Since the passage of the 1986 act, the highest marginal personal tax rate has, in fact, increased (from 28.0 percent to 39.6 percent), but the maximum marginal tax rate on capital gains has not been raised.

Although the current maximum marginal tax rate on capital gains is 28.0 percent, in many cases the statutory rate does not accurately represent the year-to-year tax burden associated with capital gains income; the actual burden is usually lower. Unlike personal income derived from wages, dividends, and interest, capital gains may accrue over time, but tax assessments are deferred until the gain is realized. To illustrate the

advantage derived from tax deferral, suppose an asset grows in value at a rate of 20.0 percent per year for 12 years. The owner of the asset will have the same after-tax wealth whether the capital gain is taxed once at the end of the 12-year period at a rate of 28.0 percent or once each year at an annual rate of 14.0 percent (for a more detailed treatment, see Auerbach 1983, 919n). Thus, when we compare the tax rate on capital gains with the tax rates on other types of income that are assessed every year, we also need to consider the advantage of tax deferral associated with capital gains income.

It is also the case that many realizations of capital gains are not subject to any taxation. For example, an asset received as inheritance is not subject to capital gains tax assessment on its past appreciation. If the new owner (the heir) sells the asset immediately, this income is not subject to capital gains tax assessment. Further, even if the new owner holds the asset, its base value for purposes of computing future taxes is adjusted to its value at the time of inheritance, and the new owner pays capital gains taxes at the time the asset is sold only on new appreciation.

For all of these reasons the "effective," year-to-year tax rate on capital gains (sometimes called the accrual-equivalent tax rate) is actually lower than the statutory rate. The size of the difference varies with the taxpayer. For any given class of taxpayer the effective capital gains tax rate declines with the holding period of the capital asset, the growth rate in the value of the asset, and the proportion of assets acquired through inheritance. To account for the deferral advantage of capital gains income, many studies halve the statutory rate. To account for the inheritance advantage of capital gains income, they often halve the rate again (King and Fullerton 1984; Feldstein and Summers 1979; Fullerton et al. 1981; and Feldstein, Poterba, and Dicks-Mireaux 1983). In the current tax environment this approach leads to an effective capital gains tax rate of only 7.0 percent! Also, the size of the adjustments made for deferral and inheritance effects is important for evaluating the impact of changes in the capital gains tax on investment and growth. For example, the impact of a 50 percent cut in the capital gains rate will be much greater if the initial rate is 28.0 percent than if it is assumed to be 7.0 percent. We have considered several possibilities for the effective initial rate to assess how they affect policy conclusions.

Economic Theory and the Capital Gains Tax

There appears to be wide agreement in the popular press that capital gains taxes discourage entrepreneurial activity and that a capital gains tax cut would, therefore, be a stimulus to investment and technology. For example, Steve Forbes (1993) attributes the high-technology "boom of the 1980s" to capital gains tax cuts in the late 1970s. In a *USA Today* article, Tony Snow (1994) reports that "the 1986 increase in the [capital gains] tax proved a disaster for capital-hungry businesses." Senator Connie Mack (1995) writes "in effect we threw away the key to investment and economic growth in 1987 when the capital gains tax rate was increased." Views such as these seem to be based on the rather intuitive notion that lowering the tax bite on gains accruing to firms that make profitable investments will enhance the incentive to undertake investment. From this notion flow the claims of higher growth, faster technological progress, and an overall more robust economy following a capital gains tax cut.

But things are not always what they seem on the surface, and this intuitive view deserves scrutiny. A deeper analysis reveals a somewhat surprising result: As a first approximation, a cut in capital gains tax rates, or in any tax on the profits from investment activities, may have no *effect* on investment incentives for firms. We call this result "tax rate independence." We lay out the logic and assumptions behind this result, which will serve as a kind of benchmark for analysis. Then we will consider how the way that the U.S. tax system operates might modify the result.

Tax Rate Independence

To understand why capital gains tax rates might not affect a firm's investment decisions, consider a hypothetical firm with managers who maximize the value of the firm for its owners. Suppose that the firm's managers are contemplating an investment project that they know will increase firm value by $1,000,000. If the capital gains from this activity were to accrue to the firm's shareholders free of tax, their wealth would rise by $1,000,000. If the capital gains are taxed at 28.0 percent, shareholder wealth would rise by only $720,000.

Clearly, the shareholders would prefer to be free of the capital gains tax. But how would the presence or absence of the tax affect the decision of the firm's managers to undertake the investment project? The answer in this simple case is: not at all. The project increases shareholder wealth even if the gains are taxed, and the firm would sacrifice value for its shareholders if it did not invest in the project. That is, while $1,000,000 is better than $720,000, $720,000 is better than nothing! This is a case of tax rate independence.

Tax rate independence, however, relies on a strong and, in practice, unrealistic assumption. Our example assumes that the market value of the project is unaffected by the imposition of capital gains taxes. There are many situations in which this assumption may fail and the capital gains tax rate could matter for actual investment decisions. For example, capital gains taxes are levied on nominal rather than real gains. In addition, returns from some investments, such as gains on the sale of corporate equity, are taxed at capital gains rates, while returns from other assets, such as interest and dividend income, are taxed at different rates. If capital gains tax rates are cut while tax rates on other assets are unchanged, some projects that generate capital gains may be favored over investments in interest-bearing assets that would have been undertaken had the capital gains rate remained unchanged. In the following discussion, we shall consider these and other conditions that may cause tax rate independence to fail. Still, tax rate independence is a useful benchmark, and it is an effective counterargument to the simple view that cutting capital gains tax rates will automatically stimulate investment because of the reduced tax bite on the gains from successful investment projects accruing to shareholders. Although asset owners obviously prefer lower tax rates on their capital gains, it is not so obvious that lower tax rates change a firm's decisions about whether to undertake investment projects. To determine the effect of capital gains taxes on investment decisions, we must move beyond simple intuition.

Uncertainty and Risk Aversion

The simple case of tax rate independence ignores two aspects of investment decisions that many analysts consider crucial to the debate over cutting capital gains taxes: uncertainty and risk aversion. Uncertainty

alone will not change tax rate independence, but uncertainty combined with a desire of entrepreneurs to avoid risk may make a difference.

Suppose a firm has a potential investment project with an uncertain, rather than a sure, return. The firm's managers believe the project has a 50 percent chance of increasing the firm's value by $2,000,000, but there is also a 50 percent chance that the project will fail and the firm's value will fall by the amount of the project's start-up cost, which we assume to be $100,000. If the firm's owners do not care about the project's risk (that is, if they are risk neutral), standard economic theory predicts that the firm will undertake the project if the weighted average of possible project returns is positive. The weights in this average are the probabilities associated with each return.[4] In our example, this calculation, called the "expected value" of the project, would be

$$(0.50 \times \$2,000,000) + (0.50 \times -\$100,000) = \$950,000$$

By these calculations, a firm with risk-neutral owners would undertake the project because it would raise the firm's expected value. If the government imposes a tax on the owner's capital gain if the project is successful, but allows them to write off their capital loss against other income if the project fails, the project's expected value will fall, but will remain positive for any capital gains tax rate less than 100 percent. The firm would still undertake the project to increase the expected wealth of its owners.[5] In this situation, a cut in the capital gains tax rate would not affect the firm's decision to undertake investment projects, and tax rate independence holds.

It may seem restrictive to assume that the firm's owners do not care about the risk of the firm's projects, but there are good reasons to believe that a large portion of U.S. capital investment is undertaken in just this kind of situation. Most empirical research on individual attitudes toward risk finds that individuals are risk averse (for example, Zeldes 1989). However, owners who can diversify their investments may still want the managers of a firm to make investment decisions without concern about risk.[6] An investor cares about the risk of her total portfolio, and that risk is negligibly affected by the risk of any single firm when her investments are diversified. The best thing a firm's managers can do for a diversified

owner is to maximize the firm's expected value. As we have seen above, this kind of attitude on the part of managers and owners leads to tax rate independence.

How much investment in the economy is carried out by firms with diversified ownership? There is no way to obtain a precise figure, but it is suggestive that the publicly traded companies tracked by the Compustat data service accounted for roughly half of aggregate U.S. plant and equipment spending and that it is reasonable to assume that most owners of public firms, especially large public firms, are well diversified. Moreover, a substantial portion of private firms are owned by institutional investors such as pension funds, mutual funds, life insurance companies, or even venture capital funds, in which we may also assume diversification.

There are important situations, however, in which owners' personal attitudes toward risk may play a role in the decision to undertake an investment project with uncertain outcomes. Substantial evidence has been compiled showing that a firm's investment may be restricted by the availability of credit or the ability to sell new equity on the open market.[7] In such an environment a firm will rely more heavily on internal funds to finance investment, that is, on funds generated from firm profits or money put up from the personal wealth of firm "insiders" who have detailed knowledge about the firm's operations and opportunities. The insider group may be small, possibly consisting of a single entrepreneur or a small venture capital group. If the funds invested in the firm constitute a substantial portion of the insiders' wealth, their portfolios will not be diversified.[8] Investors with undiversified portfolios will tend to be risk averse.

Investment undertaken under these circumstances is likely to be important for economic growth. Venture capital, for example, is concentrated in high-technology activities (Al-Suwailem 1995).[9] Much of the rhetoric in support of cutting capital gains tax rates argues that this is the kind of activity that lower capital gains taxes will encourage. We will now evaluate this claim.

Tax rate independence will generally not hold for investment projects undertaken by firms with undiversified (and therefore risk-averse) ownership. Capital gains tax cuts might cause a firm in this situation to

invest in a project it would have rejected when its owners faced a higher tax rate. But what is usually not recognized is that the opposite result can also occur: lower capital gains tax rates might *discourage* investment for a firm with undiversified owners.

Recall our example above—the project with a $950,000 expected value and 50 percent chance of failure. Because the project has a positive expected value, a risk-neutral investor will undertake it regardless of what the capital gains tax rate is. The project will have less value to a risk-averse investor because the uncertainty associated with the project's returns will reduce, to some extent, the benefits of the average gain. How will a change in the capital gains tax rate affect the investment decision of the risk-averse individual? A lower capital gains tax rate will increase the reward he obtains if the project is successful. But to the extent that capital losses are deductible against other capital gains income, a lower capital gains rate also will reduce the value of his tax deduction should the project fail.[10] It appears that a lower capital gains tax rate could make the project either more valuable or less valuable to a risk-averse investor.

A deeper look at the economic theory underlying this situation shows that if an investor is just slightly risk averse, a lower capital gains tax rate will increase the value she places on an uncertain project. As risk aversion rises beyond some critical level, however, a perverse result is more likely to occur, that is, lower capital gains tax rates will decrease an investor's valuation of the project. This occurs because the benefit of lower taxes obtained when the project is successful is not sufficient to offset the loss incurred from the lower tax deduction when the project fails.[11] (A numerical example of this point is included in the appendix. It shows that with reasonable assumptions about an entrepreneur's risk aversion, a lower capital gains tax rate may actually reduce the desirability of an investment project.)

Theoretically, the perverse result is more likely when investors are risk averse, and greater risk aversion is most likely when a project is undertaken by undiversified investors who put a substantial portion of their personal wealth at risk to undertake the project. This situation is most likely to arise in firms that do not have good access to public securities

markets because of severe information problems, an environment often associated with investments in new, high-technology industries.

The perverse result is also more likely for a project with a low probability of success, but with a high payoff if it is successful. This situation also characterizes much high-technology or venture capital investment. So it appears that a lower capital gains tax rate is more likely to have a perverse effect on investment in the very kinds of projects that proponents of capital gains tax cuts often target for assistance.

The repercussions of tax policy on risk taking are complex phenomena. In some cases lower capital gains tax rates might boost investment, but the aggregate impact seems limited because much investment is undertaken in situations in which this boosting effect is not relevant. Furthermore, even when uncertainty and risk aversion matter for investment decisions, it is not clear that cutting the capital gains tax rate will encourage more investment. We conclude that there is no strong theoretical or empirical evidence that supports the view that a lower capital gains tax rate encourages risk taking to a significant degree.

Lock-In Effect

Research on capital gains taxes has identified another channel through which the capital gains tax rate may affect the level and allocation of investment. The "lock-in" effect is the tendency of holders of old assets with relatively low returns to hold onto those assets rather than sell them and invest in new assets with higher returns. A consequence of the lock-in effect is that more productive ventures remain unexploited because the tax code discourages investors from reallocating their funds into activities with the highest returns. Some have argued that a reduction in the capital gains tax rate would mitigate the lock-in effect, thereby increasing the productivity of investment and enhancing the technical efficiency of the U.S. capital stock. For example, Senator Connie Mack writes that "by reducing the capital gains tax rate . . . $1.5 trillion in locked-up gains can be released to pursue investment opportunities that create jobs and growth in the U.S. economy" (Mack 1995).

To understand how the capital gains tax may create a lock-in friction in the flow of financial capital to its most productive uses, we need to identify the incentives that influence a portfolio holder who is considering reallocating her wealth between assets. An investor will reallocate capital between assets as long as the benefits of doing so exceed the costs. An obvious benefit of reallocation is the potentially higher rate of return achieved by selling lower-return assets and using the proceeds to purchase higher-return assets. Recall, however, that because the capital gains tax is levied upon the realization of capital gains rather than on their year-to-year accrued value, there is also a tax benefit (which increases as an asset's holding period increases) to holding any asset. It may be that the tax benefit of holding onto a lower-return asset exceeds the gain from switching to an asset with higher returns. The lower the capital gains tax rate, the lower the benefits from accrual and the lower the cost of portfolio reallocation. (A numerical example of the lock-in effect is given in the appendix.)

Recall that it is argued that the malady of the lock-in effect is that it creates inefficient allocation of aggregate capital resources. However, in the aggregate, the lock-in effect may not be very important. Not all investors are subject to the capital gains tax. In particular, large institutional investors, such as pension funds, are not subject to the capital gains tax. From 1980 to 1993 the contribution from insurance and pension reserves to total annual increases in financial assets averaged 47.0 percent (Council of Economic Advisers 1995, Table B-30). Minarik writes that "owners of about half of all corporate equity are entities that are unaffected by the capital gains tax because they are either non-taxable U.S. institutions or foreigners not subject to U.S. taxation on capital gains" (1992, 20). Thus, although some investors may experience the lock-in effect, a significant portion of financial investment is undertaken by investors who do not. With the existence of these large uninhibited organizations, it is difficult to argue that there are significant unexploited profit opportunities in capital markets that could be tapped with a reduction in the capital gains tax rate. Put another way, although reducing the capital gains tax rate would mitigate the lock-in effect, doing so would not necessarily increase the productivity of the capital stock.[12]

In addition, even if all investors experienced the consequences of the lock-in effect, the solution would not necessarily be to lower the capital gains tax rate. The lock-in effect exists because capital gains are taxed on realization rather than accrual. A more comprehensive solution would be to convert the capital gains tax to an accrual-based tax. This possibility has been explored in the economics literature (Auerbach 1992). There are, however, problems with such a tax. For some assets, in particular assets traded on well-organized markets, an accrual-based capital gains tax is feasible because, since the value of these assets is set and accessible every day, it is straightforward to determine their value. Moreover, a portion of these assets can be sold to cover the tax liability on the accrued income they generate. (Sales of shares of stock, for example, could be used to pay the tax on their accrued increase in value.) For assets that are traded on thin markets, if they are traded at all (such as Van Gogh paintings), valuation is difficult and there is no way to sell portions of these assets to pay the tax liability on their accrued increase in value.

Capital Gains Tax Rates, Savers, and Investors

Up to this point our analysis has assumed that owners of firms and potential investors evaluate the net present value of investment projects at a fixed interest rate set independently of capital gains taxation. This assumption, however, may not be correct. A change in the capital gains tax rate changes the return savers can obtain on their investments in certain kinds of firms. Lower capital gains taxes may reduce the return savers require to provide investment finance to firms and may also change the allocation of funds to different sectors of the economy. In this section we shall evaluate the logic and quantitative significance of this phenomenon.

Suppose that a potential investor requires a fixed after-tax rate of return, say, 10.0 percent, to make it worthwhile to put money into a firm. If the firm pays out all its income as dividends (and, hence, does not generate capital gains) and the maximum personal tax rate on dividends, as in

current law, is 39.6 percent, then the firm will have to earn a before-tax rate of return (r) that satisfies the equation

$$10 = (1 - .396) \, r$$

Solving for r yields a necessary before-tax rate of return of 16.56 percent; that is, the firm will be able to attract capital from this investor only if it can provide a before-tax return of 16.56 percent. If the investor is representative of the financial community, the firm will undertake an investment project only if its managers believe the project will attain a return at least this high.

Now suppose that a similar firm retains its income rather than paying it out as dividends. The owners of this firm will receive capital gains income by selling the firm's shares, which will have appreciated through the value built up in the company by its historical retained earnings. Our representative investor still requires an after-tax return of 10.0 percent, but in this case the relevant tax rate is the effective capital gains tax rate, which in current law is 28.0 percent, a rate below the rate for dividend income. Solving the same equation for r,

$$10 = (1 - .28) \, r$$

yields a necessary before-tax rate of return of 13.89 percent; that is, this firm would need to realize a return of only 13.89 percent to attract funds and make an investment project worthwhile. If the two firms were identical in all respects, except that one paid dividends and one retained earnings, one would expect that the firm that retains its earnings would undertake more investment projects.[13] A fall in the capital gains rate to 19.8 percent, as is now being considered, would lower the before-tax rate of return the firm must pay to investors even further; solving for r in the equation

$$10 = (1 - .198) \, r$$

yields a necessary before-tax rate of return of 12.47 percent. A capital gains tax rate cut, by favoring capital gains income to an even greater extent than current law, will lower the rate of return firms will have to give their investors and, therefore, encourage them to undertake more projects.

This effect seems rather large, but it ignores many complexities of the cost of capital. For example, the cost of using capital includes depreciation as well as the return that must be provided to owners. We must also recognize that firms finance some investment with debt rather than equity or retained earnings and that some of the return to equity is paid in the form of dividends rather than capital gains. These and other factors are incorporated into the formula for the cost of capital derived in the appendix. When we use this formula to evaluate the proposed drop in the maximum statutory capital gains tax rate from 28.0 to 19.8 percent, the effective cost of capital declines between 0.5 and 1.7 percent. (The exact number depends on other assumptions made in the analysis, as discussed in the appendix.) This change is quite small; it corresponds to what we might expect as a result of a decline in interest rates of roughly 25 basis points, on average. While the direction of the effect on investment through this channel is clear, its quantitative effect may be of little practical importance. (The quantitative effect is evaluated more extensively below.)

Other complicating factors are likely to reduce the positive effects on investment of a cut in capital gains taxes even further. The discussion above applies to the situation immediately following a cut in capital gains tax rates. Moving a step further, suppose that firms undertake more projects because they perceive that they need not provide their investors with such high rates of return. The demand for investment funds would rise throughout the economy, driving interest rates up and offsetting the benefit of lower capital gains rates for investment. Indeed, if aggregate saving is not very sensitive to interest rates, as some empirical studies find (for example, Hall 1988, Skinner and Feenberg 1990), the offset might be nearly complete.[14] In addition, there would probably be some reallocation of investment. The improved after-tax return on investments that generate returns in the form of capital gains would tend to attract capital away from activities that are financed with debt and those that generate dividends, raising the opportunity cost of funds for firms that use these alternative methods. Some might argue that a reallocation toward projects undertaken in anticipation of capital gains income is good because it favors riskier activities. But such a judgment is not easy to assess and, in any case, the lost investment for firms that rely relatively more on debt and dividends than on capital gains must be viewed as an offset to the investment gains arising from lower capital gains taxes.

Capital Gains Taxes and Inflation

Under the present tax law economywide inflation raises the effective
real tax rate on capital gains income above the statutory rate. The
increase occurs because nominal rather than real gains are subject to tax-
ation. The tax reform proposal passed by the House of Representatives
would index capital gains for inflation and tax only real gains. The result
would be a reduction in the capital gains tax rate paid when the econ-
omy experiences positive inflation.

To illustrate the effect inflation has on the effective real capital gains
tax rate, consider a capital asset purchased for $1,000, held for five
years, and then sold for $1,762. This asset generated a nominal return of
$762, or an annual rate of return of 12.0 percent. For a taxpayer in the
28.0 percent tax bracket, the tax liability on this gain is $213 ($762 x
0.28). Suppose that through the five-year period, the annual rate of
inflation is 3.0 percent. For a $1,000 investment to maintain only its
original purchasing power over this period, it must increase in value by
$159 to $1,159. The difference between the nominal gain ($762) and
the gain necessary to compensate for inflation ($159) is the real
increase in the purchasing power of the asset ($603). When the asset
owner pays $213 tax on a real gain of $603, the effective tax rate on the
(real, inflation-adjusted) return is 35.0 percent ($213 ÷ $603). In this
illustration, indexing capital gains for inflation amounts to changing
the basis of the capital asset from $1,000 to $1,159.[15] The reported cap-
ital gain then decreases from $762 to $603, the tax liability from $213
to $169 ($603 x 0.28), and, thus, the tax rate on the real gain declines
from 35.0 percent to 28.0 percent.

Since investors are concerned with their real purchasing power, it is
this effective real tax rate on capital gains that determines the rate of
return firms must yield to attract capital. As we described above, the
lower the tax rate on capital gains income, the lower the cost of capital
for firms that pay owners with capital gains. As long as there is a posi-
tive rate of inflation, indexing capital gains for inflation will decrease
the real tax rate on capital gains and decrease the cost of capital for
these firms.

Effect of a Capital Gains Tax Cut and Indexation on the Economy

In this section we evaluate the extent to which the proposed cut in capital gains tax rates and indexation would affect the U.S. economy. We consider how the tax changes under discussion in Congress during the fall of 1995 would affect the cost of capital and how changes in the cost of capital would translate into investment and growth.

Briefly, reducing the tax rate on capital gains income and indexing capital gains for inflation decrease the cost of capital to firms who pay their owners, at least in part, with capital gains income. We call the two channels through which the cost of capital falls the "saving" and "indexation" channels. At a lower cost of capital, firms invest more, which increases the size of the U.S. capital stock. A larger capital stock in turn produces more output (GDP). We evaluate the size of this increase in output by comparing it to increases that result from normal growth. More specifically, we estimate how many days of normal growth the economy would need without the policy change to produce the increase in output that arises from the capital gains tax cut. (The results are summarized in Table 1.)

Table 1 Summary Effects of Lowering the Statutory Capital Gains Tax Rate and Indexing Capital Gains for Inflation

	Saving Channel	Indexation Channel	Combined Effect
Percent decrease in the cost of capital	1.14	1.61	2.25
Percent increase in the capital stock	0.57	0.81	1.13
Percent increase in output	0.17	0.24	0.34
Equivalent days of normal growth	25	35	50

Note: The saving channel estimates the effect of lowering the statutory capital gains tax rate from 28.0 to 19.8 percent. Normal growth is defined to be 2.5 percent per year. See the appendix for a detailed explanation of these figures and an analysis of alternative scenarios.

These effects are quite small. They imply that eventually, after the capital stock has fully adjusted to the lower capital gains tax rate, the level of output will be only slightly higher than it would have been without the tax cut. The size of the increase in output is what we would expect from normal trend growth in just a month or two. Note that this is an increase in the level of output. The tax cut does not change the long-run rate of growth of the economy. We shall now discuss these results in greater detail.

The Cost of Capital

The capital gains tax cut proposal now under consideration in the U.S. Congress would eliminate the 28.0 percent cap on the taxation of capital gains that was set in the 1986 Act, but would allow an exclusion of 50.0 percent of capital gains income from taxes. Since the highest marginal personal tax rate is currently 39.6 percent, the maximum statutory rate on capital gains income would become 19.8 percent.[16] How would this change affect the cost of capital firms use to evaluate the profitability of investment projects? One effect that we can quantify is how lower tax rates would alter the return firms must provide to their investors to attract funds. This required return would be smaller since investors would pay lower taxes on the capital gains that accrue to their investments.

The formula derived in the appendix allows us to estimate the size of this effect. With the current tax law, we estimate the cost of capital to be 14.04 percent. This figure includes the tax-adjusted real return that firms must provide to compensate their investors for the returns they forgo by investing money in the firms' projects (4.04 percent) and the depreciation rate on new capital (10.0 percent). We estimate that lowering the capital gains tax rate from 28.0 to 19.8 percent, in what we call our "benchmark" scenario, would reduce this figure to 13.88 percent, a decline of 16 basis points or only 1.14 percent. This case is the basis for the saving channel figures in Table 1.

The benchmark scenario employs assumptions that reflect averages across different kinds of firms and investors in the economy. The actual change in the cost of capital, however, will depend on the particular

situations of firms and investors; we therefore consider a number of alternative scenarios. (See the appendix for detailed calculations.) Firms with assets that depreciate faster than the assets in a typical firm would experience an even smaller proportionate decline in the cost of capital as a result of a decline in the capital gains tax rate because depreciation costs are not affected by changes in these tax rates. Firms that do not pay dividends would enjoy a larger proportionate decline in the cost of capital. Since the owners of these firms take their income entirely in the form of capital gains, they are more sensitive to changes in the tax treatment of capital gains income. Shareholder behavior is also important in determining the magnitude of the effects. The longer shareholders wait to sell their shares and realize their capital gains, the lower is the effective capital gains tax rate; the longer this holding period, the smaller is the effect of a given cut in the statutory capital gains tax rate.

One must keep in mind that the estimates presented in the first column of Table 1 probably overstate the effect of the saving channel. These estimates do not account for the fact that if the demand for funds increases after the initial decline in the cost of capital, savers will require higher returns to fund additional new investment. The tax cut itself could therefore lead to changes in capital markets that increase interest rates to some extent.

In addition, the estimates of saving channel effects may be overstated as a result of our treatment of the effective capital gains tax rate. There are several ways that researchers studying this issue account for the fact that investor behavior pushes the effective tax rate on capital gains income below the statutory rate. A common practice is to halve the statutory rate to account for deferral benefits and to halve the resulting rate again to account for the step-up of the cost basis of a capital gain upon inheritance. The estimates in Table 1 are based on an approach that does not reduce the effective capital gains tax rate to this degree. As shown in the appendix, the cost of capital declines by only 0.48 percent with the conventional (double-halving) method, compared with the 1.14 percent decline we use for the calculations in Table 1.

The size of the saving channel effects presented in Table 1, moreover, could easily be dominated by changes in interest rates from other causes.

A 100 basis point change in real interest rates, which is not uncommon over a period of a couple of years, has effects on the cost of capital that are more than three times larger than anything that appears in Table 1. Even an interest rate change of just 25 basis points will have an effect on the cost of capital that is larger than the effects reported there. The capital gains tax cut proposal under consideration simply does not do much to effective investment incentives in the U.S. economy.

The estimated effect of the inflation indexation channel on the cost of capital (holding the statutory capital gains tax rate constant at 28.0 percent) appears in the second column of Table 1. Using the same anticipated inflation rate we used in our benchmark calculations (3.0 percent), we find that indexing capital gains income alone would reduce the cost of capital from 14.04 percent to 13.81 percent, a decline of 23 basis points or 1.61 percent. This decline is modestly larger than the decline we obtained for the saving channel (16 basis points). The pattern of results for firms and shareholders in varying situations is similar to the alternative scenarios discussed for the saving channel. (See the appendix for further details.)

The results in the third column of Table 1 combine the effects of the indexation and saving channels. We estimate that these policy changes together would reduce the cost of capital from 14.04 percent to 13.72 percent, a decline of 32 basis points or 2.25 percent. The total effect is a little smaller than the sum of the two channels evaluated individually. This occurs because indexation is less valuable as the capital gains tax rate declines.

How a Capital Gains Tax Cut Affects Investment, Output, and Growth

What effect will the reductions in the cost of capital discussed in the previous section have on the U.S. economy in terms of changes in investment, output, and growth? We address these questions by employing a widely used economic tool, the neoclassical growth model.[17] According to this model, the long-term rate of growth of output is determined by the rate of labor force growth plus the rate of technical

progress. Because changes in the cost of capital and, therefore, in the capital gains tax rate will not affect either of these rates, a capital gains tax cut will not change the long-term rate of growth.[18] A lower cost of capital, however, can increase the demand for capital and raise investment. This effect increases the productive capacity of the economy and causes the level of output to rise. During the transition period to the higher level of output, economic growth will be temporarily higher.

To estimate the size of this effect, we must first consider how much additional investment will result from the change in the cost of capital presented in the first row of Table 1. In spite of the importance of this issue for a variety of important policy questions, economic research has not been able to reach agreement about the sensitivity of investment to the cost of capital. We shall assume, however, that a 1.0 percent drop in the cost of capital leads to a 0.5 percent increase in the long-term level of the capital stock. An effect of this magnitude is relatively large compared to findings in existing research (Chirinko 1993, Fazzari 1993). We also need to know how much extra output can be produced from a given rise in the capital stock. There is wide agreement in research on economic growth that a 1.0 percent increase in the capital stock raises output by about 0.3 percent (Mankiw, Romer, and Weil 1992).

These estimates provide the information necessary to evaluate the amount of growth that can be expected from the proposed cut in capital gains taxes. Consider first the effect of the capital gains tax cut through the saving channel (the first column of Table 1). With our benchmark assumptions, the reduction in the maximum capital gains tax rate lowers the cost of capital by 1.14 percent, which, in turn, raises investment enough to increase the capital stock by 0.57 percent. A 0.57 percent rise in the capital stock can be expected to raise the economy's potential output by 0.17 percent. For an economy that has a trend rate of output growth of about 2.5 percent per year, this change represents a long-term increase in the level of output equal to the growth the economy would experience in about 25 days! If we add the inflation indexation provision, we would experience an increase from the combined effects equivalent to almost 50 days of growth (as shown in the third column of Table 1). These changes are very small. They imply that after all the adjustments to the lower capital gains tax rate take place (which could take a

decade or more), output and living standards might reach a level in early January that they would have attained some time in late February without the capital gains tax cut and inflation indexation. This magnitude pales by comparison to the output losses due to recessions and slow growth that the U.S. economy has experienced, even during the relatively good economic performance of the postwar period.

Additional effects that we have not quantified (effects due to uncertainty and the lock-in effect, for example) might increase to some extent the effect of a cut in the capital gains tax rate, but as noted above, these effects are likely to be small, even negligible. Furthermore, the analysis summarized in Table 1 does not account for some factors, such as the increase in interest rates that might arise from higher investment demand, that could reduce even further the effect of a capital gains tax cut.

Policy Implications

The view that lower capital gains taxes will somehow stimulate considerable investment and growth has little support. The effects estimated here show that the likely benefits for the aggregate U.S. economy from this controversial tax cut are almost negligible. The distributional implications of a capital gains tax cut are also troubling in the absence of a large effect on aggregate living standards. The benefits of a capital gains tax cut will accrue disproportionately to the wealthy, and there is little evidence that the economy will experience much of a gain in output, employment, or living standards that might justify such a regressive tax policy.

We have a somewhat different view on the proposal to index capital gains income for inflation. Our analysis shows that we should not expect any substantial increase in investment or economic growth as a result of capital gains indexation. Yet, it seems arbitrary that the level of effective capital gains taxation varies with inflation rates. Indexing capital gains to inflation for tax purposes, however, does not justify cutting the already low capital gains tax rate. At current inflation rates, implementation of capital gains indexing, as it is now proposed,

would reduce the capital gains tax rate. However, it may be better to index capital gains for inflation and at the same time increase the statutory capital gains tax rate by an appropriate amount. Such a change would eliminate the arbitrary link between the capital gains tax rate and the inflation rate and at the same time hold the effective real capital gains tax rate constant.

One important assumption that drives these results is that a cut in the capital gains tax rate does not affect the rate of technical progress. The assumption that technical change is exogenous, although it is a standard part of neoclassical growth theory, has been questioned in recent research on endogenous sources of economic growth (Romer 1994, Grossman and Helpman 1994, Solow 1994, Pack 1994). Yet, even if the growth process is more complex than the standard neoclassical model implies, cutting the capital gains tax rate seems like an inefficient way to stimulate technical change. Such a policy is completely unfocused as it benefits old as well as new capital, stagnant as well as growing industries, and assets such as real estate that have little to do with technical progress.[19] Poterba writes that "less than one-third of reported [capital] gains are the result of the appreciation of corporate equity" (1989, 48). Feenberg and Summers argue that "only a small fraction of the benefits [from capital gains tax cuts] goes to venture capital or small businesses" and "between 75 and 80 percent of the first five years' tax relief will be a windfall to assets that are already in place" (1990, 3–4). Finally, Minarik states that "a capital gains tax cut would divert resources into low-value commercial real estate just as the 1986 tax reform brought those resources back into equipment" (1992, 22). Policymakers are more likely to be successful at boosting technical change through policies such as research and development tax credits. Even the much-maligned investment tax credit focuses more sharply on the progressive sectors of the economy than a capital gains tax cut does.[20]

The channels through which a change in the rate of taxation of capital gains income might influence investment activity and economic growth are complex, at least more complex than one who follows the debate on this issue might think. Sound, measured policy can be set only with an understanding of the nature and efficacy of these channels. The considerations explored in this paper do not offer much encouragement for the

view that a lower capital gains tax rate will have substantial beneficial effects on investment or growth.

This conclusion does not settle the issue of what the capital gains rate should be. Other issues, primarily distributional in nature, which we do not consider in detail here, enter into such a decision. Yet, as Minarik writes, "The real issue is whether taxing some people at a different rate than others having the same income level is appropriate. Under the principles of comprehensive income taxation, a burden of proof rests with anyone who argues that one taxpayer should be charged a lower rate than everyone else at his income level. Thus, those who advocate an exclusion for capital gains incur this burden of proof" (1992, 16).

Our findings call into question one of the major arguments invoked to provide this "burden of proof." Our analysis, therefore, weakens the case for a capital gains tax cut.

Appendix. The Impact of Changes in the Capital Gains Tax Rate

Impact on Investors' Valuation of a Project

Consider an entrepreneur with $500,000 in initial wealth who is contemplating an investment project that costs $100,000. The project is quite risky: it has only a 20 percent probability of succeeding. But the estimated payoff of the project is high: it will generate a gain of $1,000,000 (in present value) if it is successful. If it is unsuccessful, the project has zero residual value.

This project has a positive before-tax net expected value of $120,000. To compute this figure, note that the project generates a profit of $1,000,000 if it is successful and a loss of $100,000 if it fails. The expected value of the project is equal to the project's value should it succeed times the probability of success less its loss should it fail times the probability of failure. Because the project's assumed probability of success is 20 percent, its expected value is

$$(0.20 \times \$1,000,000) - (0.80 \times \$100,000) = \$120,000$$

If the capital gains tax rate is 28.0 percent, the entrepreneur's expected after-tax wealth would rise by $86,400 if the project is undertaken, so if the entrepreneur is risk neutral, she would make the investment. If, however, the entrepreneur is sufficiently risk averse that she will not undertake the project at the tax rate of 28.0 percent, will her decision change if the tax rate falls to 19.8 percent? If the tax rate is cut, the entrepreneur's after-tax wealth would be higher if the project is successful because she will pay less tax on her $1,000,000 gain, but she would lose more if the project fails because the tax benefit from her $100,000 loss is less. With a reasonable specification of the entrepreneur's risk aversion, the lower tax rate actually *reduces* the expected utility derived from the project.[21]

Impact on the Lock-in Effect

Suppose that an investor purchased an asset nine years ago for $1,000 and the asset has since grown in value at an annual rate of 10.0 percent so that today it is worth $2,357.95. Suppose further that this investor has one more year in his planning horizon and has the opportunity to purchase, during the final year, any asset that returns 11.5 percent. The investor can sell his position in the old asset and use the proceeds to invest in the higher-return asset, but must pay capital gains taxes on the value of his proceeds. With a capital gains tax rate of 28.0 percent the investor is better off holding the old asset for one more year; he is locked into the lower-return asset.

If he were to sell the lower-return asset now, he would have, after paying capital gains taxes, $1,977.72 remaining to invest in the higher-return asset:

$$\$1,000 + [0.72 \times (\$2,357.95 - \$1,000)]$$

After one year of earning 11.5 percent and paying capital gains tax on those earnings, his wealth would be $2,141.48:

$$\$1,977.72 + (0.72 \times 0.115 \times \$1,977.72)$$

Alternatively, if he were to hold the asset paying a 10.0 percent return, thereby deferring capital gains taxes for an additional year, he would have $2,147.49:

$1,000 + [0.72 x ($2,593.74 – $1,000)]

The investor receives an additional $6.01 by not selling the lower-return asset to buy a higher-return asset because of the deferral benefit of the capital gains tax. When the capital gains tax rate is 19.8 percent, the advantage of holding the asset disappears and the investor is better off selling the old asset to buy the new asset.

Impact on the Cost of Capital

Indexing capital gains for inflation and reducing the capital gains tax rate is thought to increase aggregate investment because it lowers the cost of capital to firms that pay their owners in part with capital gains. In this section we bring together the elements of the after-tax cost of new capital investment.

The cost of capital is "the price paid for the use of capital resources over a defined period of time" (Auerbach 1983, 905). The real annual after-tax cost of capital consists of annual maintenance and depreciation costs and opportunity costs. If the after-tax purchase price of an asset is P^* and the asset depreciates at a rate δ, the annual cost of maintenance is δP^*. Even if an asset does not depreciate and requires no maintenance, there is still an opportunity cost associated with purchasing the asset rather than putting those funds into interest-bearing assets. The higher the interest rate, the higher is the opportunity cost of capital. Suppose each dollar returns r dollars of interest in real terms; the real opportunity cost of a unit of capital with an after-tax price of P^* is given by rP^*, and the total after-tax cost of a unit of capital is $(r + \delta)P^*$.

The after-tax purchase price of an asset is the price paid for the asset, P_c, less tax benefits derived from the investment tax credit and the capital consumption allowance. If $1 spent on a capital asset generates an investment tax credit of k dollars and a flow of depreciation allowances

(when discounted to present value) of z dollars, the after-tax purchase price of an asset is given by

$$P_c(1 - k - \tau z)$$

where τ is the statutory tax rate on corporate income.

Let c be the nominal opportunity cost of a \$1 capital investment and π be the expected rate of inflation. Then r can be replaced by $c - \pi$. The total after-tax cost of a unit of capital is

$$P_c(1 - k - \tau z)(c - \pi + \delta)$$

For each dollar spent on new capital equipment, $(c - \pi + \delta)$ dollars are spent on maintenance and opportunity costs. The term $(1 - k - \tau z)$ adjusts this cost for the investment tax credit and the capital consumption allowance. The capital gains tax and indexation influence only the opportunity cost of capital, c. Percentage changes in the total after-tax cost of capital due to changes in the capital gains tax rate and indexation, then, equal percentage changes in $(c - \pi + \delta)$. For this reason, we restrict attention in Tables A1 through A3 (see pages 39, 40, and 41) to quantity.

Opportunity Cost of Capital

Suppose that the nominal interest rate is i and that a firm finances a new investment project entirely by issuing debt at this rate. Before corporate taxes, each dollar of capital spending generates i dollars of interest expenses. However, since interest expenses are deductible from corporate income, the after-tax annual cost of \$1 of debt-financed investment is $(1 - \tau)i$, where τ is the statutory tax rate on corporate income. This value can also be considered the opportunity cost of spending \$1 on new capital rather than investing in bonds that return i before corporate taxes.

Suppose a firm finances a new investment project with equity, which involves spending the proceeds from either new share issues or retained earnings. Since new share issues actually finance only a small proportion of new capital spending (approximately 4.9 percent), we ignore them

and focus entirely on retained earnings (Henderson 1986). There is no explicit cost to using retained earnings to finance capital spending, but we show below that this cost can be expressed as a function of observed variables. We refer to the opportunity cost of using $1 of retained earnings to finance new investment as i_{eq}. Since this cost is not deductible from corporate income, the before- and after-tax corporate costs are the same.

The typical firm finances its new capital spending with a mix of both debt and equity. The nominal opportunity cost of capital faced by the typical firm can be expressed as a weighted average of the costs attributable to both these sources. Let the fraction of new investment financed with debt be L. Then the opportunity cost of capital is

$$c = (1 - L)i_{eq} + L(1 - \tau)i \qquad \text{[equation 1]}$$

We next consider the personal tax treatment of capital income and its influence on the opportunity cost of capital. There are two ways to own capital: as an equity holder (a stockholder) and as a debt holder. If stockholders earn an after-tax rate of return in excess of the rate earned by debt holders, the latter will sell debt and buy stock.[22] The price of equity then will rise and the price of debt fall, resulting in a convergence of the two rates of return. We expect the reverse to be true if debt returns more than equity. In equilibrium, we expect that the after-tax rates of return to debt and equity will be equal.

Since interest payments are treated as ordinary personal income, the after-tax rate of return to debt is $i(1 - \tau_p)$, where τ_p is the marginal tax rate on personal income. The after-tax rate of return to equity (investment financed with retained earnings) is not as simple because the returns from equity investment can be paid out as dividends or as capital gains. For purposes of personal taxation, dividends and capital gains are treated differently. The return to equity is a weighted average of the returns from dividend payments and from capital gains. We assume that the weights are the shares of corporate income (net of interest expenses) paid out as dividends, d, and plowed back as retained earnings, $(1 - d)$.

Since dividends are treated as ordinary income, the after-tax rate of return from dividend payments is $i_{eq}(1 - \tau_p)$. The after-tax rate of return from capital gains is

$$i_{eq} - (i_{eq} - \pi\gamma)\tau_{cg}$$

where τ_{cg} is the effective marginal personal tax rate on capital gains income, π is the rate of inflation, and γ is unity if capital gains are indexed for inflation and is zero if otherwise. Note that when capital gains are indexed for inflation, real returns are taxed, and when capital gains are not indexed for inflation, nominal returns are taxed. The weighted sum of these two terms, and hence the after-tax rate of return to equity, simplifies to

$$i_{eq}\left(1 - \overline{\tau}\right) + \left(1 - d\right)\tau_{cg}\pi\gamma$$

where

$$\overline{\tau} = d\tau_p + \left(1 - d\right)\tau_{cg}$$

Equating the after-tax returns to equity and debt and solving for i_{eq} yields

$$i_{eq} = \frac{i(1 - \tau_p) - (1 - d)\tau_{cg}\pi\gamma}{1 - \overline{\tau}}$$

Given that savers can hold wealth as debt or equity, this expression defines the internal rate of return that equity-financed investment must earn to remain competitive with debt.

Substituting this expression into equation 1 gives the nominal opportunity cost of capital faced by the typical firm:

$$c = (1 - L)\left[\frac{i(1 - \tau_p) - (1 - d)\tau_{cg}\pi\gamma}{1 - \overline{\tau}}\right] + L(1 - \tau)i \qquad \text{[equation 2]}$$

Parameter Values

Compustat data were used to estimate d and L. Compustat tracks firm-level data for publicly traded organizations and covers roughly half of the U.S. nonresidential capital stock. For the years 1973 through 1992, the following data were summed across the sample: current debt (CD), long-term debt (LTD), total assets (TA), common dividends (CDIV), preferred dividends (PD), and after-tax, before-extraordinary income (I). For each year

$L^* = (CD + LTD)/TA$ and $d^* = (CDIV + PD)/I$

were calculated. The values of L^* and d^* were then averaged across years to obtain $L \approx 0.3$ and $d \approx 0.5$. Our benchmark firm, therefore, finances 30.0 percent of its investment with debt and the remainder with retained earnings. Half of the return to the benchmark firm's owners is dividends and half accrues as capital gains.

In our benchmark case we assume a real opportunity cost of placing money in a firm's assets of 6.0 percent. Owners are assumed to realize capital gains after 10 years (Feenberg and Summers 1990). Nominal asset values subject to capital gains taxes are assumed to grow at 10.0 percent per year.

Empirical Calculations

With the cost of capital formula and the parameter value assumptions discussed above, we can estimate the impact of changes in the capital gains tax rate on the cost of capital. Table A1 presents the effective, after-tax cost of capital for firms in various circumstances under both a 28.0 percent and a 19.8 percent statutory capital gains tax rate. Under the current tax law and using the benchmark assumptions, we estimate the effective cost of capital to be 14.04 percent. Lowering the capital gains tax rate from 28.0 to 19.8 percent would reduce this figure to 13.88 percent through the saving channel, a decline of 16 basis points or only a little over 1.0 percent. How does this result change if we consider firms in different situations? Table A1 shows that the change is even smaller in percentage terms (under 1.0 percent) for high-depreciation assets, which is relevant for high-technology items such as computers. (The high-depreciation case in Table A1 assumes a 20.0 percent, rather than a 10.0 percent depreciation rate.) The smaller change occurs because a bigger part of the cost of capital arises from depreciation. The lower cost of funds that the firms enjoy due to lower capital gains taxes therefore has a smaller proportionate effect.

The percentage decline in the cost of capital is larger for zero-dividend firms than for the benchmark case. Since the owners of these firms take their returns entirely in the form of capital gains, they are more sensitive to the tax treatment of capital gains. A short holding period reduces the

Table A1 Effect on the Cost of Capital of Lowering the Statutory Capital Gains Tax Rate from 28.0 to 19.8 Percent

| | Cost of Capital | | |
Case	Under a 28 Percent Rate	Under a 19.8 Percent Rate	Percentage Change
Benchmark	14.04	13.88	−1.14
High-depreciation assets	24.04	23.88	−0.67
Zero-dividend firms	13.29	13.06	−1.74
Short holding period	14.24	14.01	−1.61
Low effective capital gains rate	13.74	13.67	−0.48

benefits of deferral and, therefore, increases the effective capital gains tax rate. As a result, a given cut in statutory rates has a larger effect on people who hold assets for a relatively short period. (The short holding period case in Table A1 assumes a 5-year rather than a 10-year horizon.) However, if we take the approach to computing the effective capital gains tax rate followed in much relevant research and cut the statutory rate by half for the deferral benefit and by half again for the elimination of capital gains for inheritance, the percentage fall in the cost of capital is cut by a factor of more than two relative to the benchmark case (as reported in the low effective capital gains rate case in Table A1).[23]

Some analysts would argue that the 6.0 percent real return assumed in the benchmark case is high. Although historically the stock market has managed to generate such returns, real returns on low-risk assets are typically much lower. If we use a real rate of return of 3.0 percent, the benefits of a capital gains tax cut are reduced.

The results reported in Table A1 are based on the simplifying assumption that firms do not change their financial policies (dividend payout and debt leverage) in response to a change in the capital gains tax rate. Yet, we would expect that firms might adjust these policies as the relative tax rates on different kinds of corporate source income change (Auerbach 1983). A lower capital gains tax rate would probably encourage firms to retain more of their earnings and finance a lower share of their investment with debt. The effects of these two factors on the cost of capital tend to offset one another. A lower dividend payout reduces the cost of

Table A2 Effect on the Cost of Capital of Indexing Capital Gains
Taxes for Inflation

	Cost of Capital		
Case	Without Indexation	With Indexation	Percentage Change
Benchmark	14.04	13.81	−1.61
High-depreciation assets	24.04	23.81	−0.94
Zero-dividend firms	13.29	12.90	−2.92
Short holding period	14.24	13.92	−2.21
Low effective capital gains rate	13.74	13.65	−0.70

capital as firms substitute a less highly taxed form of income payment
(capital gains) for a more highly taxed form (dividends). Lower leverage
increases the cost of capital, for our parameter values, because the
deductibility of interest for corporate tax payments reduces the cost of
debt below the cost of equity finance. Even if these two factors do not
exactly offset one another, it is unlikely that the changes in financial
policy would be large enough to have an important effect on the results
presented in Table A1.

Table A2 reports the effect of holding the statutory capital gains tax rate
at 28.0 percent while indexing capital gains income for inflation. The
indexation effect is slightly larger than the effect of lowering the stat-
utory rate in the benchmark case (−1.61 versus −1.14); results in differ-
ent firm and shareholder situations are similar.

We have also analyzed a high expected inflation scenario in which we
increased the expected inflation rate from 3.0 to 10.0 percent. In this sit-
uation, not surprisingly, the indexation proposal is especially valuable,
lowering the effective cost of capital by 6.02 percent. This scenario,
however, does not represent the current circumstances of the U.S. econ-
omy, and, with a central bank that seems determined to avoid any accel-
eration of inflation, it is not likely that the scenario will be relevant in
the foreseeable future.

Table A3 reports the predicted effects of simultaneously reducing the
statutory rate on capital gains income and indexing capital gains income

Table A3 Effect on the Cost of Capital of Lowering the Statutory
Capital Gains Tax Rate and Indexing for Inflation

	Cost of Capital		
Case	Under Current Law	Under Proposed Law	Percentage Change
Benchmark	14.04	13.72	−2.25
High-depreciation assets	24.04	23.72	−1.31
Zero-dividend firms	13.29	12.80	−3.69
Short holding period	14.24	13.79	−3.10
Low effective capital gains rate	13.74	13.61	−0.96

for inflation. The total effect is a little smaller than the sum of the two
channels evaluated individually. This occurs because the indexation fea-
ture is less valuable as the capital gains tax rate declines.

The figures in Tables A1 through A3 are the basis for the estimates that
appear in the summary Table 1 in the main text.

Acknowledgments

Notes

1. It is often argued that such statistics are misleading because a sizable fraction
   of capital gains goes to people of modest means who sell a home or business
   and therefore have artificially inflated incomes in the year they receive capi-
   tal gains. Feenberg and Summers (1990), however, consider this fact and find
   that it does not significantly change the conclusions.

2. For a legislative history of the tax treatment of capital gains, see Joint
   Committee on Taxation (1995) and Office of the Secretary of the Treasury,
   Office of Tax Analysis (1985).

3. Calculation of previous maximum marginal rates on capital gains income is
   not this simple, partially because capital gains income was not subject to the

same statutory rate schedule as ordinary income between 1922 and 1978. Also, beginning in 1970, the excluded portion of capital gains income was considered an item of "tax preference" and subject to a different "minimum tax." At the same time, a distinction was made between earned income and other income. Earned income was subject to a lower "maximum tax" than other income. Each dollar of excluded capital gains income shifted some of the taxpayer's total income out of favorably treated earned income and into more highly taxed other income. The separate rate schedule had the effect of lowering the maximum marginal rate on capital gains income. The minimum tax and maximum tax provisions had the effect of raising the maximum marginal tax rate on capital gains income. Together, these provisions make the calculation of the maximum marginal tax rate on capital gains income in this period complicated. The 1978 act eliminated these provisions and simplified the calculation of effective capital gains tax rates.

4. The theory used here assumes that the firm's owners wish to maximize their expected utility when they face uncertainty. This approach is the dominant form of analysis used in economic theory to explain the behavior of agents who make decisions in an environment of uncertainty.

5. In practice, there are restrictions on the way in which capital losses can be deducted against non-capital gains income. We shall return to this later.

6. Managers, however, may not follow owners' wishes. For example, if it is costly for managers to find new jobs in the case of a business failure, managers' personal risk aversion may be reflected in the investment decisions of the firm even if such behavior is not in the best interest of shareholders. This kind of phenomenon is called an "agency problem" in the economics research literature.

7. The restrictions on external funds that firms face may take the form of an increased cost of credit or they may result from rationing (or, firms' inability to obtain external finance no matter what price they pay). The extensive empirical literature linking external finance restrictions to investment is surveyed by Hubbard (1995).

8. See Fazzari and Variato (1994) for further discussion of how restrictions on firms' access to external finance may lead firm insiders to take undiversified positions.

9. One should not exaggerate the importance of venture capital for aggregate investment. Al-Suwailem shows that total U.S. venture capital disbursements never exceeded $4 billion in any single year from 1984 to 1993. During this period nonresidential fixed investment averaged over $500 billion annually.

10. One might criticize the assumption that capital losses are fully deductible against other capital gains income. If the potential investment projects are part of a firm's ongoing operations, the costs of unsuccessful ventures, such as the costs of unsuccessful R&D projects, can be written off against profits from other parts of the business. In mutual funds, losses incurred on some securities will reduce the taxable gains from other successful activities undertaken by the firms in the fund. Also, even if the restriction on deducting capital losses does bind in a given year, losses can be carried forward to offset future capital gains.

11. This result occurs because the concept of risk aversion implies that as individuals acquire more wealth, they value incremental additions to wealth less. Therefore, for an individual who is sufficiently risk averse, the incremental value of the return from a project when the project is successful and the investor is wealthy means less to the investor than the incremental loss due to a lower tax deduction when the project fails and the investor's wealth is lower.

12. Some analysts argue that the lock-in effect actually enhances efficiency because it reduces the incentive for excessive trading of financial assets for short-term gain and causes investors to focus on long-term productivity.

13. This analysis does not consider why firms pay dividends at all given their tax consequences. One likely reason is that dividends provide signals of management's assessment of long-term earning potential. These signals may be valuable enough to investors to offset the tax disadvantages.

14. In a Keynesian context, when resources are not fully employed, an increase in investment demand will stimulate the saving necessary to finance it in equilibrium. Interest rates might still rise in this environment, however, because of a rise in money demand or an increase in the rate of interest charged by financial intermediaries.

15. The House bill prescribes multiplying the basis of the capital asset by the ratio of the GDP deflator for the quarter in which the asset was sold to the GDP deflator for the quarter in which the asset was purchased.

16. During the budget debate between Congress and the White House in 1995, a 21.0 percent tax rate on capital gains income for individuals subject to the alternative minimum tax was considered.

17. This model was pioneered by Robert Solow (1956) and is often referred to as the Solow growth model. This discussion focuses only on "supply-side" effects. To the extent that Keynesian demand insufficiency prevents the economy from reaching the full employment level of output, the effects discussed here will overstate actual results.

18. Some recent theoretical models of "endogenous" economic growth allow for the possibility that changes in capital investment will affect the rate of technical change (Romer 1994, Grossman and Helpman 1994, Solow 1994, Pack 1994). The empirical relevance of these models has yet to be determined. We discuss some of the possible implications of endogenous growth in the next section.

19. While it may be possible to focus a capital gains tax cut on the returns from particular activities, this does not seem to be the intention of current proposals. Moreover, differentiating the capital gains tax treatment across assets could create incentives to create unproductive tax shelters.

20. The investment tax credit as implemented in the past, however, suffers from similar problems as the capital gains tax cut: it benefits many activities that would have been undertaken in the absence of the credit. An investment tax credit policy might be more effective per dollar of federal revenue lost if it could be designed to apply to net or incremental investment only. See Meyer, Prakken, and Varvares (1993) for further discussion.

21. Specifically, we assume that the entrepreneur's utility function displays constant relative risk aversion with a coefficient of 2.0. This specification has some support in the literature on decision making under uncertainty (for example, Friend and Blume 1975 and Zeldes 1989).

22. We are ignoring issues of risk. Normally, we expect that equity holders will require some risk premium that will keep rates on equity higher than rates on debt. This issue will not significantly affect the analysis.

23. This approach was derived originally by Bailey (1969). Also see King and Fullerton (1984).

References

Al-Suwailem, Sami. 1995. "Does Venture Capital Financing Make a Difference?" Ph.D. dissertation, Department of Economics, Washington University, St. Louis.

Auerbach, Alan J. 1983. "Taxation, Corporate Financial Policy, and the Cost of Capital." *Journal of Economic Literature* 21: 905–940.

———. 1992. "On the Design and Reform of Capital-Gains Taxation." *American Economic Review* 80: 263–267.

Auten, Gerald E., and Joseph J. Cordes. 1991. "Cutting Capital Gains Taxes." *Journal of Economic Perspectives* 5: 181–192.

Bailey, Martin J. 1969. "Capital Gains and Income Taxation." In Arnold C. Harberger and Martin J. Bailey, eds., *The Taxation of Income from Capital*. Washington, D.C.: Brookings Institution.

Chirinko, Robert S. 1993. "Business Fixed Investment Spending: A Critical Survey of Modeling Strategies, Empirical Results, and Policy Implications." *Journal of Economic Literature* 31: 1875–1911.

Council of Economic Advisers. 1995. *Economic Report of the President*. Washington, D.C.: U.S. Government Printing Office.

Fazzari, Steven M. 1993. *The Investment-Finance Link. Public Policy Brief* No. 9. The Jerome Levy Economics Institute of Bard College.

Fazzari, Steven M., and Anna Maria Variato. 1994. "Asymmetric Information and Keynesian Theories of Investment." *Journal of Post Keynesian Economics* 16: 351–369.

Feenberg, Daniel, and Lawrence H. Summers. 1990. "Who Benefits from Capital Gains Tax Reductions?" In Lawrence H. Summers, ed., *Tax Policy and the Economy*, vol. 4. Cambridge, Mass.: MIT Press.

Feldstein, Martin, James Poterba, and Louis Dicks-Mireaux. 1983. "The Effective Tax Rate and the Pretax Rate of Return." *Journal of Public Economics* 21: 129–158.

Feldstein, Martin, and Lawrence H. Summers. 1979. "Inflation and the Taxation of Capital Income in the Corporate Sector." *National Tax Journal* 32: 129–158.

Forbes, Steve. 1993. Interview, on *MacNeil-Lehrer NewsHour*. Reprinted as "Clinton and Kennedy." *Forbes*, January 18, 26.

Friend, Irwin, and Marshall E. Blume. 1975. "The Demand for Risky Assets." *American Economic Review* 65: 900–922.

Fullerton, Don A., Thomas King, John B. Shoven, and John Whalley. 1981. "Corporate Tax Integration in the United States: A General Equilibrium Approach." *American Economic Review* 71: 677–691.

Grossman, Gene M., and Elhanan Helpman. 1994. "Endogenous Innovation in the Theory of Growth." *Journal of Economic Perspectives* 8 (Winter): 23–44.

Hall, Robert E. 1988. "Intertemporal Substitution in Consumption." *Journal of Political Economy* 96: 339–357.

Henderson, Yolanda K. 1986. "Lessons from Federal Reform of Business Taxes." *New England Economic Review*, November-December, 9–25.

Hubbard, R. Glenn. 1995. "Capital Market Imperfections and Investment." Manuscript, Columbia University.

Joint Committee on Taxation. 1995. "Tax Treatment of Capital Gains and Losses." JCS-4-95, February 13.

King, Mervyn A., and Don Fullerton. 1984. *The Taxation of Income from Capital: A Comparative Study of the United States, the United Kingdom, Sweden, and West Germany*. Chicago: University of Chicago Press.

Mack, Connie. 1995. "Capital Gains Taxes—A $1.5 Trillion Opportunity." *Wall Street Journal*, August 29, A14.

Mankiw, N. Gregory, David Romer, and David N. Weil. 1992. "A Contribution to the Empirics of Economic Growth." *Quarterly Journal of Economics* 107: 407–437.

Meyer, Laurence H., Joel Prakken, and Chris Varvares. 1993. "Designing an Effective Investment Tax Credit." *Journal of Economic Perspectives* 7: 189–196.

Minarik, Joseph J. 1992. "Capital Gains Taxation, Growth, and Fairness." *Contemporary Policy Issues* 10: 16–25.

Office of the Secretary of the Treasury, Office of Tax Analysis. 1985. "Report to Congress on the Capital Gains Tax Reductions of 1978." September.

Pack, Howard. 1994. "Endogenous Growth Theory: Intellectual Appeal and Empirical Shortcomings." *Journal of Economic Perspectives* 8 (Winter): 55–72.

Poterba, James M. 1989. "Venture Capital and Capital Gains Taxation." In Lawrence H. Summers, ed., *Tax Policy and the Economy*, vol. 3. Cambridge, Mass.: MIT Press.

Romer, Paul M. 1994. "The Origins of Endogenous Growth." *Journal of Economic Perspectives* 8 (Winter): 3–22.

Skinner, Jonathan, and Daniel Feenberg. 1990. "The Impact of the 1986 Tax Reform on Personal Saving." In Joel Slemrod, ed., *Do Taxes Matter? The Impact of the Tax Reform Act of 1986*. Cambridge, Mass.: MIT Press.

Snow, Tony. 1994. "Capital Gains Tax Cut: It's for You, Not Just the Rich." *USA Today*, November 18, 17A.

Solow, Robert. 1956. "A Contribution to the Theory of Economic Growth." *Quarterly Journal of Economics* 71: 65–94.

———. 1994. "Perspectives on Growth Theory." *Journal of Economic Perspectives* 8 (Winter): 45–54.

Zeldes, Stephen P. 1989. "Consumption and Liquidity Constraints: An Empirical Investigation." *Journal of Political Economy* 97: 303–346.

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