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THE EFFECT OF THE CAPITAL GAINS TAX RATE ON ECONOMIC ACTIVITY AND TOTAL TAX REVENUE*

Introduction and summary

The President and the Congress are hoping to raise substantial revenues to pay for social spending programs, including health care. They are relying in part on scheduled increases in tax rates in 2011, when the Bush tax cuts expire. They would extend the tax cuts for people in the bottom four tax brackets (roughly, for couples with $250,000 or less in adjusted gross income), but would let the tax rates rise in the top two tax brackets on income, capital gains, and dividends.

However, taxpayers react to higher tax rates by earning and reporting less income. Higher taxes on capital retard capital formation and reduce wages across the board. The particular tax increases that the Congress and the Administration are most likely to adopt would damage the economy and reduce the tax base. In fact, they are likely to result in lower federal revenues, and larger budget deficits.

Under current law, most of the tax reductions in the 2001 tax act (the Economic Growth and Tax Relief Reconciliation Act of 2001) and the 2003 tax act (the Jobs and Growth Tax Relief Reconciliation Act of 2003) will expire at the end of 2010. The maximum tax rates on capital gains and dividends were lowered to 15% by the 2003 tax act. In 2011, the capital gains rate will revert to 20%. In 2011, the tax rates on dividends will revert to ordinary income tax rates, with a top rate of 39.6%. (The 2001/2003 acts cut individual marginal tax rates on ordinary income. These cuts will also expire. The top tax rate will rise from 35% to 39.6%, and will apply to dividends.)

* We thank Gary Robbins of Fiscal Associates and the Heritage Center for Data Analysis for modeling assistance. Any remaining errors are, of course, the responsibility of the author.

President Obama has suggested at various times accepting the scheduled increase in the capital gains tax rate to 20%, or raising it further to as much as 28% or to some rate in between. He has been vague on what would happen to dividends. Some action by Congress on these tax rates is expected before 2011. One likely option is to allow some increase in both rates, while maintaining equal treatment for dividends and capital gains, rather than letting the rates diverge again.

This paper examines the economic and revenue consequences of letting tax rates on dividends and capital gains increase in the top two tax brackets to 20%, 24%, or 28%. The analysis finds that higher tax rates on capital income would discourage investment and result in a smaller capital stock than would exist if the rate remained at 15%. At the three higher tax rates, the private business sector capital stock would be 3.8%, 6.8%, and 9.5% lower, respectively. As a result, productivity, wages, and hours worked would be lower than otherwise. Incomes before- and after-tax would be less than otherwise across the board. Pre-tax business sector labor compensation and capital income would be 1.4%, 2.5%, and 3.5% lower, respectively.

The biggest percentage declines in after-tax incomes would be in the top income classes, where the capital gains and dividend tax rates were raised (in the top AGI class, about 2.9%, 5.1%, and 7.1% in the three cases). The next greatest percentage losses would be in the lowest income classes (about 1.3%, 2.4%, and 3.3%). Middle income classes would be partially protected by declines in income taxes as their incomes fell, and would have the smallest drop in after-tax income (about 1.1%, 2.1%, and 3.0%). Allowing for these income changes, everyone would bear some of the actual economic burden of the tax increases, not just people with incomes above $250,000.

The tax rate increases would not raise the anticipated revenues. About 91% to 95% of the revenue gains expected from the imposition of the 20%, 24%, and 28% rates would be lost due to lower incomes. Instead of raising income tax revenue by $30.7 billion, $54.7 billion, or $77.5 billion, respectively, the net income tax increases would be only $2.5 billion, $2.9 billion, and $4.0 billion in the three cases. Lower levels of output, payroll, and consumption would reduce payroll taxes, corporate income taxes, excise taxes, and tariff revenue, resulting in net revenue losses. There would be further revenue reductions due to the decline in the capital stock, which would decrease the amount of capital gains available to be realized. The combined revenue effect would be losses of $24.9 billion, $46.2 billion, and $64.8 billion in the three cases. Lower wage rates would reduce federal budget outlays, but the combined effect would be a significant increases in federal budget deficits (by $17.4 billion, $32.8 billion, and $46.0 billion, respectively). State and local government budgets would be similarly hurt.

Issues in the revenue estimating process

Changes in taxation of capital gains and dividends have many consequences. We discuss them here to make it clear which issues we are addressing and what effects we are estimating later in the paper.

Static versus dynamic forecasts

The Office of Tax Analysis at the Treasury and the staff of the Joint Tax Committee of the Congress estimate revenues for the Federal budget. They also estimate changes in revenue associated with proposed changes in tax policy. They base their revenue forecasts on an assumed underlying state of the economy (the baseline economic forecast).[1] The economic baseline specifies the amounts of total output, employment, capital, and the various types of income associated with them (the macro-economic conditions).

The revenue estimates of a proposed tax change are conducted on the assumption that the macro-economic baseline, with its aggregate levels of income and output, labor and capital, is fundamentally unchanged. This is called static revenue estimation. By contrast, estimation that allows for tax changes or other budget changes to affect macro-economic conditions, such as the size of the economy and the level of income, is called dynamic revenue estimation.

Revenue estimators do attempt to allow for "micro-economic" behavior changes due to a tax change. For example, they will consider how a tax change might impact levels of legal tax avoidance, or open avenues for illegal tax evasion, which would alter the amount of revenue expected from a tax change. They will take into account how an increase in an excise tax rate would depress the consumption and production of the taxed item, which would alter the tax base and the effect on revenues of the tax rate change. However, they assume that the resources no longer employed in the taxed industry find alternative employment and earn a similar income in other occupations, leaving the total output and income in the economy unchanged, and revenues from income and payroll taxes unaffected.

Taxes and the level of dividends

Prior to 2003, capital gains were taxed at a lower rate than ordinary income, while dividends were subject to the higher ordinary income tax rates. In 2003, the top tax rate on dividends was set equal to that on capital gains, and that joint rate cap was reduced from 20% to 15%. The old

[1] The economic and spending forecast numbers for the Administration budget are prepared jointly by staff from the Treasury, the Council of Economic Advisors, and the Office of Management and Budget, with assistance from other Cabinet Departments. The Joint Tax Committee uses the economic forecast of the Congressional Budget Office.

differential between the two tax rates had encouraged firms to retain earnings for reinvestment rather than pay them out as dividends. Ending the tax differential encouraged firms to implement or increase dividend payouts.

The added dividend payments, which were taxed at the corporate and individual levels, reduced the budget cost of the cut in the dividend tax rate. That effect was considered in the revenue estimate for the 2003 tax bill, because it did not increase total GDP or total income, and qualified as a micro-economic behavior change. However, since this was an event not seen before, the estimators had little historical experience to guide them. They appear to have under-estimated the change in dividend payouts. The baselines in subsequent budgets had to be adjusted to bring the income and tax receipts into line with the actual changes in dividends and "non-withheld" income tax revenues. (The revenue estimators also under-estimated the surge in capital gains realizations, and had to revise revenue numbers upward in subsequent years.)

If the tax on dividends is increased, and especially if the tax rate on dividends is allowed to rise above that on capital gains, the process will have to be reversed. Dividends will be cut, and some of the anticipated tax revenues from raising the tax rate will not materialize. If the revenue estimators under-estimate the contraction in dividends as much as they under-estimated the expansion when the tax rate differential was eliminated, they will be overstating the gain from the rate hike.

Short run timing effects in the taxation of capital gains

A change in the capital gains tax rate may alter when a gain is realized without generally changing the total amount taken over time. The revenue estimators at the Treasury, the Joint Tax Committee of the Congress, and researchers at the Congressional Budget Office make some allowance for these short run timing and unlocking effects in their estimates.

For example, if a tax rate increase is announced a year in advance, people may sell assets to realize and report gains in the current year while the tax rate is still low, rather than wait until next year. The next year or two, realizations might drop below normal as a share of accrued capital gains and GDP, and return to more normal levels later.

In the opposite direction, an "unlocking effect" occurs when a rate cut induces people to take a flood of pent-up gains they had built up over time, but had been reluctant to take at the old tax rate. Once people have rearranged their portfolios, the realizations in subsequent periods may return to less elevated levels.

Longer term realization effects

A permanent change in tax rates may also affect the holding period on assets, and alter the percent of accrued gains that are realized each year. In theory, people will hold assets longer at higher rates of tax, because deferring a tax diminishes its present value. These ongoing realization effects of a higher tax rate may reduce capital gains revenue collections for an extended time. Some gains may be delayed until death. If the law permits a step-up in basis at death, these gains will disappear.[2] Conversely, a reduction in the tax rate would reduce the holding period and cause gains to be realized at a faster rate, and fewer gains may be held until death. Revenue estimators at the Treasury and the Joint Committee on Taxation make some allowance for these permanent realization effects in generating revenue estimates following a change in tax rates. The permanent effects are generally acknowledged to be less than the short run timing effects. The magnitudes of the effects selected by the two agencies may differ, and no consensus is available. Studies done by Treasury and the academic community over the last 30 years suggest that, depending on the starting tax rate, the realization effect by itself could offset anywhere from under 20% to over 100% of the revenue change that would otherwise be calculated from a change in the capital gains rate if realizations remained constant and if the dynamic macro-economic effects are ignored. (The revenue estimating agencies do ignore the macro-economic changes.) The permanent realization responses are not included in this study, which looks only at the larger dynamic macro-economic effects of the capital gains rate on GDP and the resulting tax revenues. Including the realizations effects would increase the revenue offsets reported here, and increase the chances that the proposed rate hikes would lose revenue instead of raising it.

Price effects

When one buys an asset, such as a stock or bond, real estate, or a non-corporate business, one is buying something that will yield a net income over time (after taxes). The value of the asset is the present value of that future after-tax income stream. If the tax on the asset or its future income falls, the market value of the asset will rise. This portfolio price effect is not considered by revenue estimators. For example, a cut in the corporate income tax should raise the price of shares and increase the quantity of capital gains. That relationship is not part of revenue estimates for changes in the corporate tax rate. If the tax rate on capital gains or dividends is reduced, share prices should rise, increasing the amount of capital gains available to be taken. That too is ignored in the revenue estimates.

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[2] If the estate tax is allowed to expire in 2010, as provided under current law, the step-up would be eliminated and replaced with a capital gains exempt amount to protect small estates from tax by about as much os the current estate tax credit does. If the estate tax is restored in 2011, also as provided in current law, presumably the step-up will be restored as well.

Saving, investment, and growth effects

In fact, added saving and investment would be undertaken economy-wide if the tax on capital gains and dividends were lower, rather than higher. A tax on capital income increases the "hurdle rate" of return or "service price" that an asset must earn to be worth investing in. At a lower tax rate, more capital could be formed and profitably employed than at a higher tax rate. More workers would be hired to work with the added capital. Worker productivity and wages would be higher. The government would receive additional revenue from taxes on the higher levels of economic activity: higher income and payroll taxes on wages, higher income taxes on corporate and non-corporate business profits, and additional excise taxes and tariffs. Under the graduated income tax rate schedule, the higher incomes would raise tax rates on some taxpayers, slightly offsetting the reduction in the service price of capital and somewhat dampening the work incentive from the higher wage rate. A new equilibrium would be reached in which all these supply and demand conditions are reconciled.

These growth effects or macro-economic effects of cuts in the taxation of capital are not allowed for in the revenue estimating process. These effects are large and certain, and dwarf the micro-economic effects that the tax estimators are willing to consider. Failure to account for them seriously biases the revenue estimates, and encourages bad tax policy.

The price and realization effects can be significant. The surge in tax revenues from "non-withheld" sources since 2003 (but before the 2008-2009 recession) strongly suggests that additional capital gains and dividends were received, reported, and taxed as a result of the 2003 tax bill, and that the reduction in the tax rate to 15% cost less revenue than was forecast.

Estimating growth effects of the tax rates on capital gains and dividends

Scope of the paper

This paper looks primarily at the long term adverse economic growth and income effects of projected increases in the capital gains and dividend tax rates, and the resulting government revenue, outlay, and budget deficit changes. It looks past short run timing effects. It does address some of the price effects in estimating revenue. It does not include the additional damage to revenues that would be expected from reduced rates of realization and longer holding periods. That issue is taken up in another paper in this series by Dr. Paul Evans.

The results of the analysis are presented first. The conceptual framework and information about the tax and simulation models are presented later in the paper.

Three tax changes are tested: increases in the unified tax cap on dividends and capital gains from the current 15% to 20%, 24%, and 28% for taxpayers whose incomes would place them in the top two tax brackets. The current reduced capital gains and dividend tax rates in the 2003 tax bill are assumed to continue for people with lower incomes. This is roughly in line with President Obama's pledge not to raise taxes on carried couples people earning less than $250,000 a year in adjusted gross income (AGI), and single filers earning less than $200,000 in AGI.[3] To isolate the effect of the capital gains and dividend change, we assume that other tax rates are kept unchanged at 2008 levels.

We provide results in three areas: the effects on economic activity (GDP, wages, capital stock, etc.); the effects on the federal and state and local government budgets; and distribution tables of the effects of the tax changes on various income classes. These effects are shown on both a static basis (which ignores any effect on the economy and pre-tax incomes from the tax increase) and a dynamic basis (including the income losses and associated tax changes that follow upon the initial tax increase).

Note that the effects of the tax changes are presented after allowing the economy to respond fully to the altered tax rates. It takes time for the capital stock to adjust to changes in the after-tax return, about five years for equipment, and about a decade for structures. These are not first year budget impacts, nor do we present the annual budget changes during the adjustment period. These numbers represent the eventual percentage and dollar differences in the levels of GDP, income, and revenues between the old and the new baselines. They are calculated using 2008 income levels, and are illustrated as if those changes had been enacted earlier and completed as of 2008.

GDP and income effects of increasing the tax rate

Tables 1 and 2 display the effect on GDP and income from increasing the tax rates on capital gains and dividends for people in the top two tax brackets. For each tax rate examined (15%, 20%, 24%, and 28%), Table 1 shows the levels in dollars of total GDP and of private business sector output (excluding households and institutions, government enterprises, and general government). Private output is split between payments to labor and to capital. Also shown are levels of the private business sector capital stock, split between corporate and non-corporate businesses, and the stock

[3] The second tax bracket covers single filers with AGI a bit below $200,000, but the difference does not affect the conclusion significantly. Most of the dividends and capital gains are reported in incomes above the lower portion of the second bracket.

Table 1

Levels of Macroeconomic Aggregates At Various Tax Rates On Capital Gains, Compared To Current Top Rate Of 15% ($ in billions) Dynamic Analysis (Labor Supply Elasticity Assumed to be 0.2)

	15% Capital Gains Tax Rate (in $)	20% Capital Gains Tax Rate (in $)	24% Capital Gains Tax Rate (in $)	28% Capital Gains Tax Rate (in $)
Gross domestic product	14,265	14,071	13,916	13,775
Private business output	9,936	9,797	9,685	9,584
Compensation of employees	6,680	6,586	6,511	6,443
Gross capital income	3,257	3,211	3,174	3,141
Gross corporate capital income	2,319	2,286	2,260	2,236
Gross non-corporate capital income	938	925	914	905
Private Business Stocks	26,823	25,793	24,990	24,274
Corporate Business Stocks	18,053	17,360	16,820	16,338
Non-corporate Business Stocks	8,770	8,433	8,170	7,936
Residential structures	15,292	14,960	14,696	14,458
Wage rate ($ / hr.)	32.60	32.21	31.89	31.60
Private business hours of work (billion hrs.)	204.9	204.5	204.2	203.9

Table 2

Changes In Macroeconomic Aggregates At Various Tax Rates On Capital Gains, Compared To Current Top Rate Of 15% ($ in billions) Dynamic Analysis (Labor Supply Elasticity Assumed to be 0.2)

	20% Capital Gains Tax Rate		24% Capital Gains Tax Rate		28% Capital Gains Tax Rate	
	$ Change	% Change	$ Change	% Change	$ Change	% Change
Gross domestic product	-194	-1.4%	-349	-2.4%	-489	-3.4%
Private business output	-139	-1.4%	-251	-2.5%	-352	-3.5%
Compensation of employees	-94	-1.4%	-169	-2.5%	-237	-3.5%
Gross capital income	-46	-1.4%	-82	-2.5%	-115	-3.5%
Gross corporate capital	-33	-1.4%	-59	-2.5%	-82	-3.5%
Gross non-corporate capital	-13	-1.4%	-24	-2.5%	-33	-3.5%
Private Business Stocks	-1,029	-3.8%	-1,833	-6.8%	-2,549	-9.5%
Corporate Business Stocks	-693	-3.8%	-1,233	-6.8%	-1,716	-9.5%
Non-corporate Business Stocks	-337	-3.8%	-599	-6.8%	-833	-9.5%
Residential structures	-333	-2.2%	-596	-3.9%	-835	-5.5%
Wage rate ($ / hr.)	-0.40	-1.2%	-0.71	-2.2%	-1.00	-3.1%
Private business hours of work	-0.4	-0.2%	-0.7	-0.4%	-1.0	-0.5%

of residential housing. The two chief components of labor compensation, the wage rate and hours worked, are displayed.[4] Table 2 displays the same results in terms of dollar and percentage changes.

A 20% tax rate. Increasing the tax rate to 20% would reduce GDP from $14.265 trillion dollars to $14.071 trillion dollars, a loss of $194 billion, or 1.4%, in annual output and income. Lower labor income would account for two-thirds of the decline; one-third would be a reduction in capital income. The decline in capital income would be split about 67% to 33% between corporate and non-corporate earnings. The private business capital stock would be reduced by about $1.029 trillion, or 3.8%. The value of housing would fall by about $333 billion, or 2.2%. Labor income would fall 1.4%, split between a reduction in the average wage rate of $0.40 cents an hour, which is a 1.2% drop, and a reduction of 0.2% in private business sector hours worked. Most of the drop in labor income would be due to reduced labor productivity and wages stemming from the smaller capital stock. The income reductions would affect workers and small business owners at all income levels, not just people earning over $250,000.

Higher tax rates. Greater increases in the tax rate would have more severe effects on GDP and income. At 24%, GDP would decline by $349 billion a year, or 2.4%. At 28%, GDP would be lower by $489 billion, or 3.4%. There would be similarly larger decreases in the capital stock, housing values, wages, and hours worked. The percentage reductions in the private sector business output would be slightly larger than the GDP change, while the percentage reductions in the household and government sectors (not shown) would be slightly lower.

Federal, state and local budget effects

The Federal budget. Table 3 displays the effects of the tax changes on federal and state and local budgets. The first line shows the pure static revenue effect on the federal budget. It suggests a rise in personal income tax receipts from capital gains and dividends of $30.7 billion from raising the tax rate to 20%, a gain of $54.7 billion at a rate of 24%, and a gain of $77.5 billion at a rate of 28%. In our static case, we assume no change in capital formation and employment. We also show no permanent change in capital gains realizations and dividend payments due to timing or changes in asset prices in the static estimate. This procedure is in line with official revenue estimation procedures.[5]

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[4] In Tables 1 - 6, we assume a labor supply elasticity of 0.2. The elasticity slightly affects the total change in GDP and how the change in compensation is split between hours worked and the wage rate. Additional discussion of the labor supply elasticity is provided later in the paper. Also, see the Appendix for results assuming elasticities of 0.1 and 0.3.

[5] Insofar as the revenue estimators occasionally assume some slowdown in realizations, they would show a slightly lower static revenue gain from increasing the tax rate. We also assume none of the minor micro-economic changes that the revenue estimators might consider, such as less effort to convert ordinary income into capital gains at higher tax rates.

Table 3

Static Versus Dynamic Government Revenue And Budget Effects Of Changes In The Capital Gains Tax Rate (Labor Supply Elasticity Assumed to be 0.2)

	Capital Gains Tax Rate		
	20%	24%	28%
Federal budget			
Static capital gain tax increase	30.7	54.7	77.5
Loss in personal income tax from weaker economy	-28.3	-51.8	-73.5
Net change in personal income tax	2.5	2.9	4.0
Loss in other taxes from weaker economy	-15.3	-27.7	-39.0
Dynamic change in total federal revenue (before portfolio adjustments)	-12.8	-24.8	-35.0
Change in federal outlays due to lower wages	-7.4	-13.4	-18.8
Change in federal budget surplus (- indicates smaller surplus or larger deficit)	-5.4	-11.4	-16.2
Portfolio Adjustment (federal):			
Further reduction in capital gains tax revenue from reduction in capital stock	-12.0	-21.4	-29.8
Dynamic revenue change with portfolio adjustment	-24.9	-46.2	-64.8
Change in federal surplus with portfolio adjustment	-17.4	-32.8	-46.0
State and local budgets			
Dynamic revenue change	-29.1	-52.1	-72.9
Outlay change due to lower wages	-16.7	-30.0	-42.1
Dynamic change in S&L budget surplus without portfolio adjustment	-12.4	-22.2	-30.8
Portfolio Adjustment (state and local):			
Further reduction in capital gains tax revenue from reduction in capital stock	-5.6	-10.0	-14.0
Dynamic revenue change with portfolio adjustment	-34.7	-62.2	-86.9
Change in S&L surplus with portfolio adjustment	-18.1	-32.2	-44.8

We then factor in the loss of other personal income tax revenue due to the weaker economy, which results in lower wages, non-corporate profits, dividends, interest, rents, royalties, etc. Net of these offsets, the three rate hikes to 20%, 24%, and 28% would bring in only $2.5 billion, $2.9 billion, and $4.0 billion, respectively. Between 91% and 95% of the expected revenues from the capital gains and dividend tax rate increases would be lost.

The smaller GDP would also reduce payroll, corporate income, and excise taxes, and tariff revenue. The lower capital stock would reduce estate tax collections. These effects are shown in

the next line. They would result in a net revenue loss from all three tax rate increases. The net effect on the revenue side of the federal budget would be a loss of $12.8 billion, $24.8 billion, and $35 billion, respectively, from moving to a 20%, 24%, or 28% tax rate.

The federal budget impact of the tax changes would be offset in part by lower wages for federal workers and contractors, which would reduce federal outlays. The outlay savings would reduce the net budget losses to $5.4 billion, $11.4 billion, and $16.2 billion, respectively, for the three rate hikes.

Another adjustment should be made on the revenue side, however. The reduction in the capital stock must result in a reduction in the total amount of capital gains available to be taken.[6] The percentage reduction in outstanding gains is assumed to reduce capital gains revenue by the same proportion. This is shown in the portfolio adjustment line. A further $12 billion, $21.4 billion, or $29.8 billion in revenue would be lost, resulting in a combined increase in the annual federal budget deficit of $17.4 billion, $32.8 billion, or $46 billion at the three higher tax rates. Far from raising revenue to pay for social spending programs, an increase in the top tax rate on capital gains and dividends would reduce total federal revenue and increase the federal budget deficit.

State and local budgets. Table 3 shows that state and local budget problems would worsen by $18.1 billion, $32.2 billion, and $44.8 billion if the top federal capital gains and dividend tax rates rose to 20%, 24%, or 28%. State and local tax collections would fall with the GDP. Their outlays would decline somewhat because the level of wages would fall, reducing the salaries of government workers, but the reduction in outlays would be smaller than the drop in revenues.

Distribution effects

So-called "burden tables" are presented by revenue estimators to show the distribution of taxes or proposed tax changes across people of different income levels. They are shown on a static basis. All that changes is the tax. Such tables are more accurately described as showing the initial incidence of the tax change, not the ultimate burden of the tax change on taxpayers. In the real world, tax changes can induce changes in the economy that affect the level of income as well as the

[6] We assumed an average six year holding period for assets, and a growth rate of about 7% (real). By the end of six years, assets would have appreciated 50% (e.g., from $100 to $150). Selling an asset at that point would result in a gain equal to a third of the sales price. (E.g., a $150 sale price less $100 tax basis = $50 in taxable gains; $50 is one-third of $150.) With gains of about a third the value of the extant capital, each reduction in the value of the capital stock by 1% would reduce the stock of gains by about 3%, and the capital gains revenue would fall by about 3%. (In the example, a 1% or $1.50 drop in the value of the capital to $148.50, less the $100 basis, yields $48.50 in taxable gains; the $1.50 decrease in the gain is 3% of the original $50 gain.) We applied this three-to-one reduction in gains to the percentage reduction in the capital stock shown in each simulation.

tax owed. Including the dynamic effects of the tax changes on pre-tax income and after-tax income provides a truer measure of the changes in the tax burdens.

Three sets of tables below (Tables 4 through 6) show the baseline distribution of the income tax across adjusted gross income classes at 2008 income levels and tax rates (including the 15% top tax rate on capital gains and dividends). The tables then show (separately) the distribution effects of increasing the tax rates on capital gains and dividends for the top two tax brackets to 20%, 24%, and 28%. Part A of each set shows the levels of taxes and before-tax and after-tax incomes in billions of dollars. Part B shows the changes in levels in billions of dollars and in percent.

Static effects. The top half of each table shows the static distributional effect of the tax rate increase, assuming no change in GDP and gross incomes. Pre-tax income in each income class is unchanged. In the static case, taxes on dividends and capital gains rise and after-tax incomes fall only for AGI classes of $250,000 and above for couples filing jointly (couples in the top three AGI classes) and over $150,000 for single filers (individuals in the top five AGI classes).[7] For the 20% capital gains and dividend rate case, the static drop in after-tax incomes in the hardest-hit top three income classes is between .39% and 1.89%. (Table 4B) The declines are about 1.8 times larger in the 24% tax rate case and about 2.5 times larger in the 28% tax rate case. (Tables 5B and 6B.)

Dynamic effects. The second part of each table shows the dynamic distributional effect including the income changes associated with each rate increase, as described earlier in the paper. The total pre-tax income of each AGI class is reduced by its share of the drop in GDP. Lower incomes reduce personal income taxes, so after-tax incomes fall by less than pre-tax incomes. Nonetheless, after-tax incomes fall across the board. The effects differ across incomes.

There is an absolute drop in the total income tax in the lowest AGI classes. In the top AGI classes, total income taxes rise because the decline in ordinary income taxes offsets only a portion of the increase in capital gains and dividend taxes.

The *percent reduction in taxes* is largest in the lowest AGI classes, where taxes are lowest to begin with, and less in the middle and higher AGI classes. However, the amount of income taxes is so low in the bottom AGI classes that the dollar amount of the decrease in the income taxes is small compared to the drop in wages. As a result, the *percentage reduction in after-tax incomes* is greater in the bottom AGI classes than in the middle AGI classes.

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[7] The small tax increases in the $150,000 - $250,000 AGI classes are due to tax hikes on single taxpayers. The percentage reductions appear quite small in part due to the inclusion in all returns of married couples and heads of households not affected by the tax rate increase at these income levels. They would be modestly higher if we examined only single filers' returns.

In the top AGI classes, the reduced taxes on salaries, profits, and interest offset some of the capital gains and dividend tax increases, but their taxes rise and their after-tax incomes fall the most in percentage and dollar terms. The decrease is larger in the dynamic case than the static case.

In the dynamic 20% rate case, income classes under $250,000 have a drop in after-tax income between 1.02% and 1.36%. The 1.36% decrease falls on the lowest income households, who have lower income taxes to begin with and get little decrease in tax liability. Middle income households, who owe more tax than lower income households, get more of an income tax offset to their income loss, and suffer the smallest decline in after-tax income. The top three AGI classes have decreases in after-tax income between 1.32% and 2.87%. (Table 4B.)

As with the static estimates, the dynamic declines in after-tax income are about 1.8 times larger in the 24% rate case and about 2.5 times larger in the 28% rate case than in the 20% rate case. The drop in after-tax income in the AGI classes below $250,000 ranges from 1.84% to 2.46% in the 24% rate case, and from 2.58% to 3.44% in the 28% rate case, with the biggest percentage drops at the lowest incomes. In the top three AGI classes, after-tax income falls between 2.36% and 5.09% in the 24% rate case, and between 3.30% and 7.12% in the 28% rate case. (Tables 5B and 6B.)

A fraction of the decline in after-tax incomes and purchasing power would be offset by lower payroll, corporate, and excise taxes. Nonetheless, one thing is clear. An increase in the tax on capital gains and dividends would be felt by people at all income levels in the form of lower wages and lower incomes from saving. The burden of the tax hike would not be restricted to people with AGI above $250,000.

Table 4A – Distribution Table: Levels at 20% Tax Rate (Labor Supply Elasticity 0.2)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 20%
Levels (dollar amounts in billions), in Returns with AGI Greater Than Zero

STATIC SIMULATION

All Returns AGI Class ($)	Baseline Levels (15% Tax Rate) AGI ($)	Tax After Credits ($)	After-Tax Income ($)	Static Levels (20% Tax Rate) AGI ($)	Tax After Credits ($)	After-Tax Income ($)
0 - 5k	25.8	-1.4	27.2	25.8	-1.4	27.2
5k - 10k	79.0	-6.1	85.1	79.0	-6.1	85.1
10k - 20k	328.2	-14.8	343.1	328.2	-14.8	343.1
20k - 30k	475.7	3.1	472.5	475.7	3.1	472.5
30k - 40k	524.0	26.7	497.3	524.0	26.7	497.3
40k - 50k	540.3	35.3	505.0	540.3	35.3	505.0
50k - 75k	1,311.2	106.0	1,205.2	1,311.2	106.0	1,205.2
75k - 100k	1,048.4	97.2	951.2	1,048.4	97.2	951.2
100k - 150k	1,325.0	154.9	1,170.2	1,325.0	154.9	1,170.1
150k - 200k	634.1	91.5	542.7	634.1	91.5	542.6
200k - 250k	344.7	57.2	287.5	344.7	57.4	287.3
250k - 500k	720.0	145.0	575.0	720.0	147.8	572.2
500k - 1,000k	460.5	105.5	355.0	460.5	109.4	351.1
> 1,000k	1,171.5	267.7	903.9	1,171.5	289.8	881.7
TOTAL	8,988.4	1,067.6	7,920.9	8,988.4	1,096.7	7,891.8

DYNAMIC SIMULATION

All Returns AGI Class ($)	Baseline Levels (15% Tax Rate) AGI ($)	Tax After Credits ($)	After-Tax Income ($)	Dynamic Levels (20% Tax Rate) AGI ($)	Tax After Credits ($)	After-Tax Income ($)
0 - 5k	25.8	-1.4	27.2	25.4	-1.4	26.9
5k - 10k	79.0	-6.1	85.1	77.9	-6.1	84.1
10k - 20k	328.2	-14.8	343.1	323.7	-15.1	338.8
20k - 30k	475.7	3.1	472.5	469.1	2.6	466.6
30k - 40k	524.0	26.7	497.3	516.8	25.9	490.9
40k - 50k	540.3	35.3	505.0	533.0	34.2	498.7
50k - 75k	1,311.2	106.0	1,205.2	1,293.2	102.9	1,190.4
75k - 100k	1,048.4	97.2	951.2	1,034.0	94.4	939.6
100k - 150k	1,325.0	154.9	1,170.2	1,306.9	150.3	1,156.6
150k - 200k	634.1	91.5	542.7	625.4	89.2	536.2
200k - 250k	344.7	57.2	287.5	340.0	56.0	284.0
250k - 500k	720.0	145.0	575.0	710.1	144.6	565.5
500k - 1,000k	460.5	105.5	355.0	454.2	107.4	346.8
> 1,000k	1,171.5	267.7	903.9	1,155.3	285.1	870.2
TOTAL	8,988.4	1,067.6	7,920.9	8,865.1	1,069.9	7,795.2

Table 4B – Distribution Table: Changes at 20% Tax Rate (Labor Supply Elasticity 0.2)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 20%
Changes from Baseline (dollar amounts in billions), in Returns with AGI Greater Than Zero

	STATIC SIMULATION					
	$ Change (20% Tax Rate)			% Change (20% Tax Rate)		
All Returns AGI Class ($)	AGI	Tax After Credits	After-Tax Income	AGI	Tax After Credits	After-Tax Income
0 - 5k	0.0	0.0	0.0	0.00%	0.00%	0.00%
5k - 10k	0.0	0.0	0.0	0.00%	0.00%	0.00%
10k - 20k	0.0	0.0	0.0	0.00%	0.00%	0.00%
20k - 30k	0.0	0.0	0.0	0.00%	0.00%	0.00%
30k - 40k	0.0	0.0	0.0	0.00%	0.00%	0.00%
40k - 50k	0.0	0.0	0.0	0.00%	0.00%	0.00%
50k - 75k	0.0	0.0	0.0	0.00%	0.00%	0.00%
75k - 100k	0.0	0.0	0.0	0.00%	0.00%	0.00%
100k - 150k	0.0	0.0	0.0	0.00%	0.00%	0.00%
150k - 200k	0.0	0.1	-0.1	0.00%	0.06%	-0.01%
200k - 250k	0.0	0.2	-0.2	0.00%	0.32%	-0.05%
250k - 500k	0.0	2.8	-2.8	0.00%	1.93%	-0.39%
500k - 1,000k	0.0	3.9	-3.9	0.00%	3.72%	-0.85%
> 1,000k	0.0	22.1	-22.1	0.00%	8.27%	-1.89%
TOTAL	0.0	29.1	-29.1	0.00%	2.73%	-0.33%

	DYNAMIC SIMULATION					
	$ Change (20% Tax Rate)			% Change (20% Tax Rate)		
All Returns AGI Class ($)	AGI	Tax After Credits	After-Tax Income	AGI	Tax After Credits	After-Tax Income
0 - 5k	-0.4	0.0	-0.4	-1.36%	0.00%	-1.36%
5k - 10k	-1.1	0.0	-1.1	-1.37%	0.43%	-1.34%
10k - 20k	-4.5	-0.3	-4.2	-1.37%	1.83%	-1.29%
20k - 30k	-6.5	-0.6	-6.0	-1.37%	-17.89%	-1.25%
30k - 40k	-7.2	-0.8	-6.4	-1.37%	-3.01%	-1.21%
40k - 50k	-7.4	-1.1	-6.3	-1.37%	-3.15%	-1.16%
50k - 75k	-18.0	-3.1	-14.9	-1.37%	-2.93%	-1.13%
75k - 100k	-14.4	-2.8	-11.6	-1.37%	-2.85%	-1.11%
100k - 150k	-18.2	-4.6	-13.6	-1.37%	-2.96%	-1.02%
150k - 200k	-8.7	-2.2	-6.5	-1.37%	-2.45%	-1.02%
200k - 250k	-4.7	-1.2	-3.5	-1.37%	-2.11%	-1.02%
250k - 500k	-9.9	-0.4	-9.5	-1.38%	-0.26%	-1.32%
500k - 1,000k	-6.3	1.9	-8.3	-1.38%	1.84%	-1.80%
> 1,000k	-16.2	17.4	-33.6	-1.38%	6.51%	-2.87%
TOTAL	-123.4	2.3	-125.7	-1.37%	0.22%	-1.40%

Table 5A – Distribution Table: Levels at 24% Tax Rate (Labor Supply Elasticity 0.2)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 24%
Levels (dollar amounts in billions), in Returns with AGI Greater Than Zero

STATIC SIMULATION

All Returns AGI Class ($)	Baseline Levels (15% Tax Rate) AGI ($)	Tax After Credits ($)	After-Tax Income ($)	Static Levels (24% Tax Rate) AGI ($)	Tax After Credits ($)	After-Tax Income ($)
0 - 5k	25.8	-1.4	27.2	25.8	-1.4	27.2
5k - 10k	79.0	-6.1	85.1	79.0	-6.1	85.1
10k - 20k	328.2	-14.8	343.1	328.2	-14.8	343.1
20k - 30k	475.7	3.1	472.5	475.7	3.1	472.5
30k - 40k	524.0	26.7	497.3	524.0	26.7	497.3
40k - 50k	540.3	35.3	505.0	540.3	35.3	505.0
50k - 75k	1,311.2	106.0	1,205.2	1,311.2	106.0	1,205.2
75k - 100k	1,048.4	97.2	951.2	1,048.4	97.2	951.2
100k - 150k	1,325.0	154.9	1,170.2	1,325.0	154.9	1,170.1
150k - 200k	634.1	91.5	542.7	634.1	91.6	542.6
200k - 250k	344.7	57.2	287.5	344.7	57.5	287.2
250k - 500k	720.0	145.0	575.0	720.0	150.0	570.0
500k - 1,000k	460.5	105.5	355.0	460.5	112.5	348.0
> 1,000k	1,171.5	267.7	903.9	1,171.5	307.0	864.5
TOTAL	8,988.4	1,067.6	7,920.9	8,988.4	1,119.3	7,869.1

DYNAMIC SIMULATION

All Returns AGI Class ($)	Baseline Levels (15% Tax Rate) AGI ($)	Tax After Credits ($)	After-Tax Income ($)	Dynamic Levels (24% Tax Rate) AGI ($)	Tax After Credits ($)	After-Tax Income ($)
0 - 5k	25.8	-1.4	27.2	25.2	-1.4	26.6
5k - 10k	79.0	-6.1	85.1	77.1	-6.1	83.2
10k - 20k	328.2	-14.8	343.1	320.1	-15.3	335.4
20k - 30k	475.7	3.1	472.5	463.9	2.1	461.8
30k - 40k	524.0	26.7	497.3	511.0	25.2	485.8
40k - 50k	540.3	35.3	505.0	527.0	33.4	493.6
50k - 75k	1,311.2	106.0	1,205.2	1,278.8	100.4	1,178.4
75k - 100k	1,048.4	97.2	951.2	1,022.4	92.2	930.2
100k - 150k	1,325.0	154.9	1,170.2	1,292.2	146.6	1,145.6
150k - 200k	634.1	91.5	542.7	618.4	87.4	531.0
200k - 250k	344.7	57.2	287.5	336.1	55.0	281.2
250k - 500k	720.0	145.0	575.0	702.1	144.1	558.0
500k - 1,000k	460.5	105.5	355.0	449.1	108.8	340.3
> 1,000k	1,171.5	267.7	903.9	1,142.3	298.0	844.3
TOTAL	8,988.4	1,067.6	7,920.9	8,765.7	1,070.3	7,695.4

Table 5B – Distribution Table: Changes at 24% Tax Rate (Labor Supply Elasticity 0.2)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 24%
Changes from Baseline (dollar amounts in billions), in Returns with AGI Greater Than Zero

	STATIC SIMULATION					
	$ Change (24% Tax Rate)			% Change (24% Tax Rate)		
All Returns AGI Class ($)	AGI	Tax After Credits	After-Tax Income	AGI	Tax After Credits	After-Tax Income
0 - 5k	0.0	0.0	0.0	0.00%	0.00%	0.00%
5k - 10k	0.0	0.0	0.0	0.00%	0.00%	0.00%
10k - 20k	0.0	0.0	0.0	0.00%	0.00%	0.00%
20k - 30k	0.0	0.0	0.0	0.00%	0.00%	0.00%
30k - 40k	0.0	0.0	0.0	0.00%	0.00%	0.00%
40k - 50k	0.0	0.0	0.0	0.00%	0.00%	0.00%
50k - 75k	0.0	0.0	0.0	0.00%	0.00%	0.00%
75k - 100k	0.0	0.0	0.0	0.00%	0.00%	0.00%
100k - 150k	0.0	0.0	0.0	0.00%	0.00%	0.00%
150k - 200k	0.0	0.1	-0.1	0.00%	0.10%	-0.01%
200k - 250k	0.0	0.3	-0.3	0.00%	0.57%	-0.10%
250k - 500k	0.0	5.0	-5.0	0.00%	3.45%	-0.70%
500k - 1,000k	0.0	7.0	-7.0	0.00%	6.64%	-1.52%
> 1,000k	0.0	39.3	-39.3	0.00%	14.69%	-3.36%
TOTAL	0.0	51.8	-51.8	0.00%	4.48%	-0.58%

	DYNAMIC SIMULATION					
	$ Change (24% Tax Rate)			% Change (24% Tax Rate)		
All Returns AGI Class ($)	AGI	Tax After Credits	After-Tax Income	AGI	Tax After Credits	After-Tax Income
0 - 5k	-0.6	0.0	-0.6	-2.46%	0.00%	-2.46%
5k - 10k	-2.0	0.0	-1.9	-2.48%	0.76%	-2.42%
10k - 20k	-8.1	-0.5	-7.6	-2.48%	3.29%	-2.33%
20k - 30k	-11.8	-1.0	-10.7	-2.47%	-32.19%	-2.26%
30k - 40k	-12.9	-1.4	-11.5	-2.47%	-5.42%	-2.19%
40k - 50k	-13.4	-2.0	-11.4	-2.47%	-5.63%	-2.10%
50k - 75k	-32.4	-5.6	-26.8	-2.47%	-5.27%	-2.05%
75k - 100k	-25.9	-5.0	-21.0	-2.47%	-5.11%	-2.00%
100k - 150k	-32.8	-8.3	-24.5	-2.47%	-5.33%	-1.85%
150k - 200k	-15.7	-4.0	-11.7	-2.48%	-4.42%	-1.84%
200k - 250k	-8.5	-2.2	-6.3	-2.48%	-3.85%	-1.84%
250k - 500k	-17.9	-0.9	-17.0	-2.48%	-0.61%	-2.36%
500k - 1,000k	-11.5	3.3	-14.8	-2.49%	3.14%	-3.21%
> 1,000k	-29.3	30.3	-59.6	-2.50%	11.32%	-5.09%
TOTAL	-222.7	2.7	-225.4	-2.48%	0.26%	-2.51%

Table 6A – Distribution Table: Levels at 28% Tax Rate (Labor Supply Elasticity 0.2)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 28%
Levels (dollar amounts in billions), in Returns with AGI Greater Than Zero

STATIC SIMULATION

All Returns AGI Class ($)	Baseline Levels (15% Tax Rate) AGI ($)	Tax After Credits ($)	After-Tax Income ($)	Static Levels (28% Tax Rate) AGI ($)	Tax After Credits ($)	After-Tax Income ($)
0 - 5k	25.8	-1.4	27.2	25.8	-1.4	27.2
5k - 10k	79.0	-6.1	85.1	79.0	-6.1	85.1
10k - 20k	328.2	-14.8	343.1	328.2	-14.8	343.1
20k - 30k	475.7	3.1	472.5	475.7	3.1	472.5
30k - 40k	524.0	26.7	497.3	524.0	26.7	497.3
40k - 50k	540.3	35.3	505.0	540.3	35.3	505.0
50k - 75k	1,311.2	106.0	1,205.2	1,311.2	106.0	1,205.2
75k - 100k	1,048.4	97.2	951.2	1,048.4	97.2	951.2
100k - 150k	1,325.0	154.9	1,170.2	1,325.0	154.9	1,170.1
150k - 200k	634.1	91.5	542.7	634.1	91.6	542.5
200k - 250k	344.7	57.2	287.5	344.7	57.7	287.0
250k - 500k	720.0	145.0	575.0	720.0	152.2	567.8
500k - 1,000k	460.5	105.5	355.0	460.5	115.5	345.1
> 1,000k	1,171.5	267.7	903.9	1,171.5	323.3	848.2
TOTAL	8,988.4	1,067.6	7,920.9	8,988.4	1,141.0	7,847.5

DYNAMIC SIMULATION

All Returns AGI Class ($)	Baseline Levels (15% Tax Rate) AGI ($)	Tax After Credits ($)	After-Tax Income ($)	Dynamic Levels (28% Tax Rate) AGI ($)	Tax After Credits ($)	After-Tax Income ($)
0 - 5k	25.8	-1.4	27.2	24.9	-1.4	26.4
5k - 10k	79.0	-6.1	85.1	76.3	-6.2	82.4
10k - 20k	328.2	-14.8	343.1	316.8	-15.5	332.3
20k - 30k	475.7	3.1	472.5	459.2	1.7	457.4
30k - 40k	524.0	26.7	497.3	505.8	24.7	481.1
40k - 50k	540.3	35.3	505.0	521.6	32.6	489.0
50k - 75k	1,311.2	106.0	1,205.2	1,265.7	98.1	1,167.6
75k - 100k	1,048.4	97.2	951.2	1,012.0	90.3	921.8
100k - 150k	1,325.0	154.9	1,170.2	1,279.0	143.3	1,135.7
150k - 200k	634.1	91.5	542.7	612.1	85.8	526.3
200k - 250k	344.7	57.2	287.5	332.7	54.1	278.6
250k - 500k	720.0	145.0	575.0	694.9	143.7	551.2
500k - 1,000k	460.5	105.5	355.0	444.4	110.1	334.3
> 1,000k	1,171.5	267.7	903.9	1,130.5	310.0	820.5
TOTAL	8,988.4	1,067.6	7,920.9	8,676.0	1,071.3	7,604.7

Table 6B – Distribution Table: Changes at 28% Tax Rate (Labor Supply Elasticity 0.2)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 28%
Changes from Baseline (dollar amounts in billions), in Returns with AGI Greater Than Zero

All Returns AGI Class ($)	STATIC SIMULATION					
	$ Change (28% Tax Rate)			% Change (28% Tax Rate)		
	AGI	Tax After Credits	After-Tax Income	AGI	Tax After Credits	After-Tax Income
0 - 5k	0.0	0.0	0.0	0.00%	0.00%	0.00%
5k - 10k	0.0	0.0	0.0	0.00%	0.00%	0.00%
10k - 20k	0.0	0.0	0.0	0.00%	0.00%	0.00%
20k - 30k	0.0	0.0	0.0	0.00%	0.00%	0.00%
30k - 40k	0.0	0.0	0.0	0.00%	0.00%	0.00%
40k - 50k	0.0	0.0	0.0	0.00%	0.00%	0.00%
50k - 75k	0.0	0.0	0.0	0.00%	0.00%	0.00%
75k - 100k	0.0	0.0	0.0	0.00%	0.00%	0.00%
100k - 150k	0.0	0.0	0.0	0.00%	0.01%	0.00%
150k - 200k	0.0	0.1	-0.1	0.00%	0.14%	-0.02%
200k - 250k	0.0	0.5	-0.5	0.00%	0.81%	-0.14%
250k - 500k	0.0	7.2	-7.2	0.00%	4.96%	-1.00%
500k - 1,000k	0.0	10.0	-10.0	0.00%	9.47%	-2.17%
> 1,000k	0.0	55.6	-55.6	0.00%	20.79%	-4.75%
TOTAL	0.0	73.4	-73.4	0.00%	6.88%	-0.82%

All Returns AGI Class ($)	DYNAMIC SIMULATION					
	$ Change (28% Tax Rate)			% Change (24% Tax Rate)		
	AGI	Tax After Credits	After-Tax Income	AGI	Tax After Credits	After-Tax Income
0 - 5k	-0.9	0.0	-0.9	-3.44%	0.00%	-3.44%
5k - 10k	-2.7	-0.1	-2.7	-3.47%	1.04%	-3.39%
10k - 20k	-11.4	-0.7	-10.7	-3.47%	4.58%	-3.27%
20k - 30k	-16.5	-1.4	-15.1	-3.47%	-45.01%	-3.17%
30k - 40k	-18.2	-2.0	-16.1	-3.46%	-7.57%	-3.08%
40k - 50k	-18.7	-2.8	-16.0	-3.47%	-7.84%	-2.95%
50k - 75k	-45.5	-7.8	-37.7	-3.47%	-7.38%	-2.87%
75k - 100k	-36.4	-6.9	-29.4	-3.47%	-7.12%	-2.81%
100k - 150k	-46.0	-11.5	-34.4	-3.47%	-7.45%	-2.60%
150k - 200k	-22.0	-5.7	-16.4	-3.47%	-6.20%	-2.58%
200k - 250k	-12.0	-3.1	-8.9	-3.48%	-5.44%	-2.58%
250k - 500k	-25.1	-1.3	-23.8	-3.48%	-0.89%	-3.30%
500k - 1,000k	-16.1	4.7	-20.8	-3.49%	4.43%	-4.51%
> 1,000k	-41.1	42.3	-83.4	-3.51%	15.81%	-7.12%
TOTAL	-312.4	3.7	-316.1	-3.48%	0.35%	-3.52%

Conceptual framework

An added tax on capital formation

The capital gains tax is one of many layers of tax on saving and investment in the U.S. tax system. Income that is saved is taxed more heavily than income that is used for consumption. The income tax raises the cost of saving by more than the cost of consuming, and tilts behavior away from saving. The tax system thereby discriminates against the saving and investment that creates jobs and makes the country grow. There are at least four layers of possible tax on income that is saved.

1) Income is taxed when first earned. If the after-tax income is spent on consumption items, such as food, clothing, health care, cars, or consumer electronics, one can generally enjoy these items with no additional federal tax (except for a few federal excise taxes, chiefly on gasoline, tobacco, and alcohol).

2) However, if the after-tax income is used to buy a bond, stock, or rental property, or to invest in a small business, there is another layer of personal income tax on the stream of interest, dividends, rents, profits, or capital gains received on the saving (which is a tax on the "enjoyment" that one "buys" when one saves).

3) If the saving is in corporate stock, there is also the corporate tax to be paid before any distribution to the shareholder, or any reinvestment of retained after-tax earnings. Reinvested income raises the value of a business and creates a capital gain. Therefore, whether the after-tax corporate income is paid as a dividend, or retained and reinvested by the business, the result is that corporate income is taxed twice.

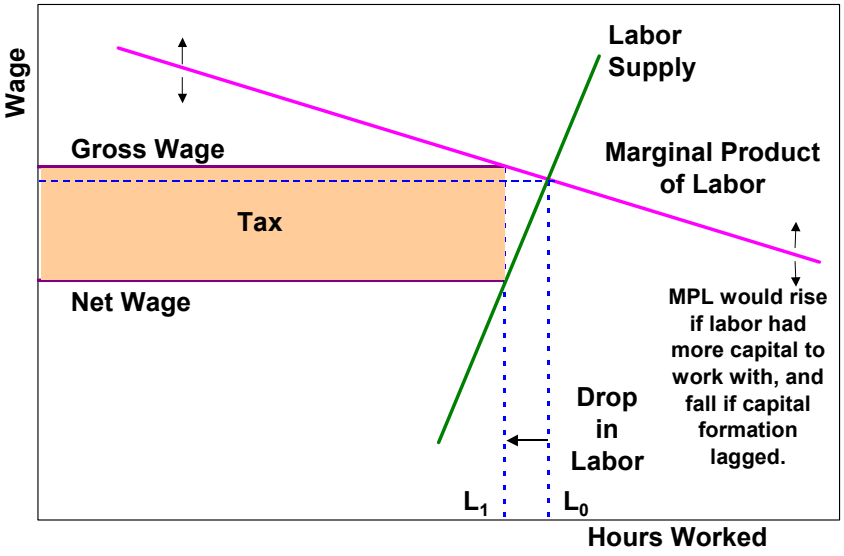
4) If more than a modest amount is left at death, or large sums are given away, the income is taxed again by the estate and gift tax.

Note that the tax on capital gains is a form of double taxation even if it is not part of the double tax on corporate income. The price of an asset, be it a stock, bond, small business, or rental property, is the present value of its expected future earnings after taxes are paid. If the expected future earnings rise, the asset price will rise in the present. If the expected future earnings actually materialize, they will be taxed in the future as they occur. To also tax the rise in the present price is to double tax the future income.

Taxing labor and capital reduces output and income

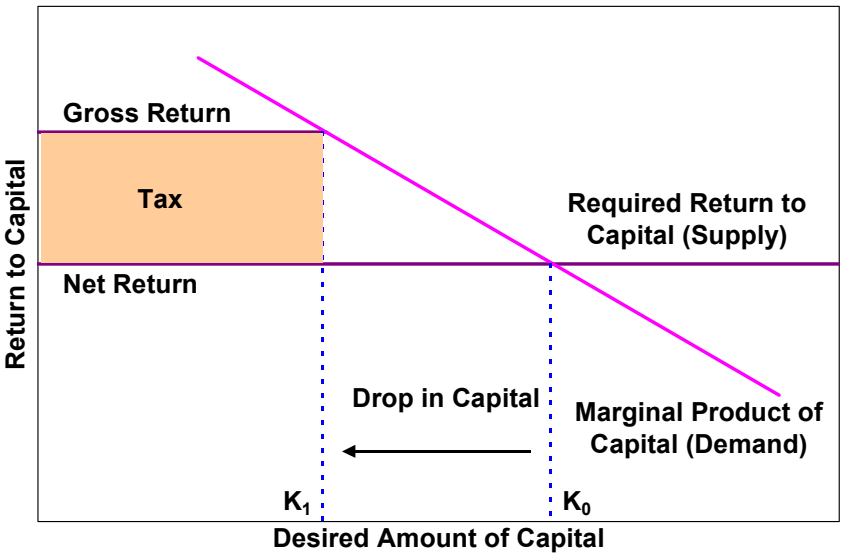
When you tax something, you get less of it. Charts 1 and 2 illustrate that taxes on labor and capital income reduce the quantities of labor and capital furnished by individuals to the production process. Labor and capital combine to produce output. The amount of output that they can generate is described by a production function. Less labor and capital mean less production and less income. The larger the tax wedges on the inputs become, the smaller is the resulting supply of inputs and the smaller is the level of output.

Chart 1 Effect of Tax On Labor



Any tax is borne in part by the supplier and in part by the consumer or employer of the taxed item. The split can vary depending on behavior. Furthermore, taxing one factor of production (such as machinery or land) can hurt other factors (such as labor). The economic impact of a tax is often shifted from the people on whom it is supposedly levied to others in the economy, simply by the normal workings of supply and demand in the marketplace.[8]

Chart 2 Effect of Tax On Desired Capital

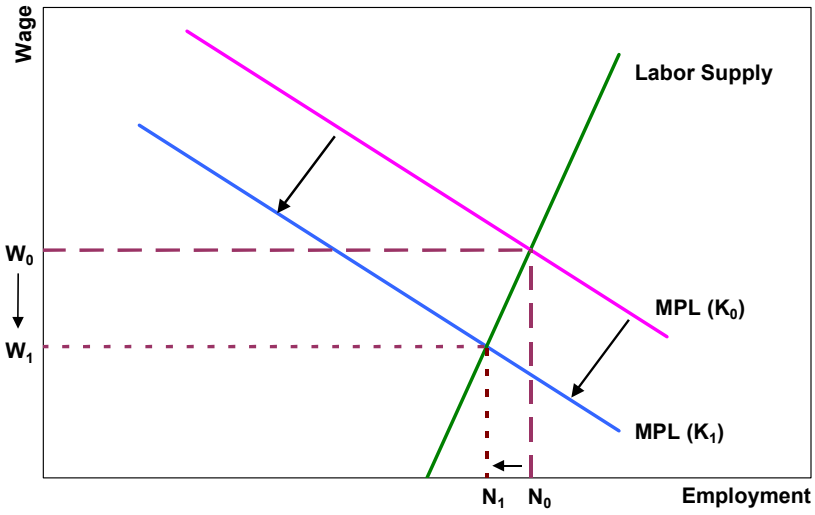


[8] For more on the economic burden of taxation, see Stephen J. Entin, "Tax Incidence, Tax Burden, and Tax Shifting: Who Really Pays the Tax?" *IRET Policy Bulletin*, No. 88, September 10, 2004, available at http://iret.org/pub/BLTN-88.PDF.

The supply of labor is rather inelastic. Many primary workers (the main breadwinners in the households) are employed by others, and have limited ability to vary their hours worked (set by their employers) or the degree to which they participate in the work force (each family needs at least one breadwinner). Their hours worked do not vary a lot as wages rise or fall (so the supply curve in Chart 1 is steeply vertical.) Such workers are assumed to bear most of any taxes imposed on labor, including the income tax and the payroll tax, both the employee and employer shares. Secondary workers in the family, the self-employed, teenagers, and wealthier individuals have somewhat more flexibility in deciding whether or not to work, and how many hours to offer, but even they bear most of the tax on their labor income.

The effect of taxes on capital is quite different. The quantity of capital is far more sensitive to taxes than is the quantity of labor. (Its supply curve is more nearly horizontal.) It is easy and enjoyable to consume instead of save, and quite possible to invest abroad instead of in one's own country. If the after-tax rate of return on saving and investment in the United States is driven down by an increase in the tax rate, U.S. capital formation may be curtailed, or shifted to other countries. The same phenomenon occurs within the country. When there is a tax increase on capital in any one jurisdiction, the amount of plant, equipment, and buildings in that region shrinks. As the capital becomes scarce, the rate of return on the remaining capital rises, until it is again earning a normal rate of return, after tax.

Chart 3 A Smaller Stock Of Capital Reduces Wages



Taxing capital hurts labor, reduces productivity and wages

Capital makes labor more productive, and wages are determined by the level of labor productivity (the marginal product of adding an additional worker). The demand for labor equals the marginal product of labor: employers are willing to pay up to what the added worker adds to the value of output. Chart 3 shows that the shrinkage of the capital stock in the presence of high tax rates reduces the marginal productivity of labor, which reduces the demand for labor, the wage, and

the number of jobs. In fact, workers bear the bulk of the taxes imposed on capital.[9] Modern economists have shown, through numerous studies, that the work force is better off if taxes on capital income are reduced or eliminated.

Our treatment of labor and capital

Labor supply issues. In our numerical work, we assume a labor supply elasticity at the margin of 0.2. That is, a ten percent change in the after-tax wage would result in a two percent change in hours supplied. This is a moderately low elasticity that nonetheless reflects the somewhat flexible response of overtime and of secondary workers in the supply of labor at the margin. Some researchers would prefer to employ a lower elasticity, with more emphasis on the role of the primary worker employed by others, with little opportunity to vary hours worked. Others have noted a higher elasticity at the margin for second workers and teenagers. We have therefore also run the model with labor elasticities of 0.1 and 0.3, and display the results in the Appendix. The resulting economic changes are about 95% to 106% of those of the middle elasticity case, producing quite similar outcomes for revenues and the budget.[10]

Service price of capital. The tax rate at the margin on capital income is part of the "service price" of capital. Changes in the service price alter the level of the supply curve and the "tax wedge" shown in the capital tax chart (Chart 2), and produce changes in the stock of capital (Chart 4).

The service price is the pre-tax return (earnings, expressed as a percent of the purchase price of the asset) that a machine or building must earn to be worth investing in. The service price is the sum of three elements: 1) sufficient income to recover the cost of the asset as it wears out or becomes

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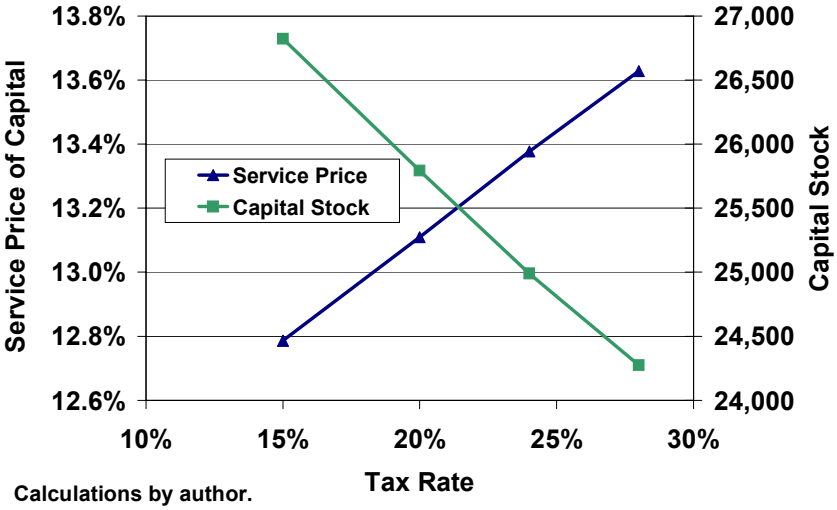
[9] Taxing capital hurts labor a lot. For example, consider a small trucking company with five vehicles. Suppose that the rules for depreciating trucks for tax purposes change, with the government demanding that the trucks be written off over five years instead of three. The owner has had enough business to run four trucks flat out, and a fifth part time. He was barely breaking even on the fifth truck under old law. It is now time to replace one of the trucks. Under the new tax regime, it does not quite pay to maintain the fifth truck. The owner decides not to replace it, and his income is only slightly affected. But what happens to the wages of the fifth truck driver? If he is laid off, who bears the burden of the tax increase on the capital?

[10] A survey of 65 labor economists produced estimates of labor force elasticity for men of 0.1 (mean) and zero (median), and for women of 0.45 (mean) and 0.3 (median). Weighting the mean figures by the shares of men (54%) and women (46%) in the work force suggests an elasticity of a bit over 0.2. Victor R. Fuchs, Alan B. Krueger, and James M. Poterba, "Economists Views About Parameters, Values, and Policies: Survey Results in Labor and Public Economics," *Journal of Economic Literature*, Vol. 36 (September, 1998). It is reasonable to assume a somewhat higher elasticity for teenagers, who constitute a small fraction of the workforce. A range of elasticities from 0.1 to 0.3 would seem to allow for a reasonable range of economic effects.

obsolete over its effective economic life; 2) the real (inflation adjusted) after-tax return that people seem to require over time to induce them to hold capital (a bit under 3%); and 3) whatever taxes are imposed on the revenue flow by government. (If inflation is present, this real service price must be adjusted upward for inflation's effect on cost recovery and taxes.)

Chart 4 Higher Tax Rates On Capital Gains And Dividends Raise The Service Price Of Capital And Depress The Capital Stock



Calculations by author.

The marginal tax on capital is determined by the combined marginal tax rates on capital income imposed on business activity at all levels. These include federal, state, and local marginal tax rates on corporate income, and marginal tax rates on dividends, capital gains, and on non-corporate business income that are taxed on individual tax returns. The tax base (and hence the effective tax rate at the margin) is affected by the tax depreciation rules. Tax rates are further affected by investment tax credits and other tax credits and features that apply to such income.[11]

Debt versus equity. We have assumed that the corporate capital in the model is financed by equity. That is, its earnings are subject to the corporate tax and the personal income tax of the shareholders as it is distributed as dividends or taken as capital gains. There is considerable tax return data that enables us to calculate the combined marginal tax effect of these different layers of tax.

The alternative source of funding for investment is debt finance, where a portion of the return to capital is a deductible interest payment to the lender, and is taxed on the lender's tax return. Many models take a weighted average of the taxes on debt and equity-financed capital, showing a lower level of service price, and less of a swing in the service price from a change in the tax rates on corporate income, dividends, or capital gains. We have chosen not to use this blended financing approach, because it does not give a good representation of the tax burden at the margin, or the service price of capital at the margin.

[11] The service price and tax calculators were furnished by Gary Robbins of the Center for Data Analysis at the Heritage Foundation.

In theory, a business will utilize all forms of financing, pushing each to the point where the marginal cost of adding more, *adjusted for risk,* is equal. Therefore, changes in the service price due to changes in the tax treatment of equity should serve as a proxy for changes in the service price on all assets regardless of the funding process.

Equity financing bears a higher tax rate than debt financing, but is relatively risk-free. Once stock is sold, the firm has the money to keep, with no obligation to pay it back to the shareholders via a dividend or share repurchase. Debt finance has a lower tax rate, but comes with strings attached that make it more risky than equity finance. Debt must be repaid on the maturity date, and there are fixed interest payments due in the interim. Default on a portion of a company's debt often triggers default clauses on the remainder. The risk associated with highly leveraged investments became very apparent in 2008 as major investment banks, commercial banks, mortgage lenders, brokerage firms, and industrial companies fell prey to the credit crisis.

Market interest rate data and interest payments as a share of earnings are available as averages or totals, but (unlike tax rates) are not available as rates "at the margin" on incremental borrowing and investment. When a business adds to its debt, the interest on the incremental debt may be higher than on earlier borrowing, because the increased leverage of the firm is of concern to the lenders. The firm's average interest cost, including old debt, may be less than the marginal cost of new debt. Indeed, as old debt comes due and must be refinanced, the firm will probably have to pay the new higher interest rate it incurred on its more recent debt issue, which the firm must consider as it decides whether or not to take on the new debt. It is the marginal interest cost that one would need to have as the driving variable. It is not directly observable from market data, but should be equal to the cost of equity finance. Therefore, we use the marginal cost of equity-financed capital in our service price calculations.

Conclusion

The tax treatment of capital gains and dividends greatly affects the quantity of capital created and employed. The quantity of capital affects the productivity, wages, and employment of labor. Output and incomes are lower at higher levels of taxation of capital. Raising the tax rate on capital by increasing the tax rate on dividends and capital gains from current levels would shrink national income across the board. People in all income classes would bear the burden of the tax. The lower levels of income and economic activity would reduce the tax base (personal income, corporate income, taxable payroll, goods subject to excises and tariffs, etc.). The reduced tax base would result in a net decrease in federal revenue rather than an increase. State and local government budgets would also be hurt by the weaker economy.

Stephen J. Entin
President and Executive Director

APPENDIX

Results with Labor Supply Elasticity of 0.1

Table 7

Levels of Macroeconomic Aggregates At Various Tax Rates On Capital Gains, Compared To Current Top Rate Of 15% ($ in billions) Dynamic Analysis (Labor Supply Elasticity Assumed To Be 0.1)

	15% Capital Gains Tax Rate (in $)	20% Capital Gains Tax Rate (in $)	24% Capital Gains Tax Rate (in $)	28% Capital Gains Tax Rate (in $)
Gross domestic product	14,265	14,083	13,936	13,806
Private business output	9,936	9,806	9,701	9,609
Compensation of employees	6,680	6,592	6,522	6,459
Gross capital income	3,257	3,214	3,180	3,149
Gross corporate capital income	2,319	2,288	2,264	2,242
Gross non-corporate capital income	938	926	916	907
Private Business Stocks	26,823	25,817	25,025	24,339
Corporate Business Stocks	18,053	17,377	16,843	16,381
Non-corporate Business Stocks	8,770	8,441	8,182	7,958
Residential structures	15,292	14,974	14,719	14,495
Wage rate ($ / hr.)	32.60	32.21	31.89	31.60
Private business hours of work (billion hrs.)	204.9	204.7	204.5	204.4

Table 8

Changes In Macroeconomic Aggregates At Various Tax Rates On Capital Gains, Compared To Current Top Rate Of 15% ($ in billions) Dynamic Analysis (Labor Supply Elasticity Assumed To Be 0.1)

	20% Capital Gains Tax Rate		24% Capital Gains Tax Rate		28% Capital Gains Tax Rate	
	$ Change	% Change	$ Change	% Change	$ Change	% Change
Gross domestic product	-182	-1.3%	-329	-2.3%	-458	-3.2%
Private business output	-130	-1.3%	-235	-2.4%	-328	-3.3%
Compensation of employees	-87	-1.3%	-158	-2.4%	-220	-3.3%
Gross capital income	-43	-1.3%	-77	-2.4%	-107	-3.3%
Gross corporate capital income	-30	-1.3%	-55	-2.4%	-76	-3.3%
Gross non-corporate capital	-12	-1.3%	-22	-2.4%	-31	-3.3%
Private Business Stocks	-1,005	-3.7%	-1,797	-6.7%	-2,484	-9.3%
Corporate Business Stocks	-677	-3.7%	-1,210	-6.7%	-1,672	-9.3%
Non-corporate Business Stocks	-329	-3.7%	-588	-6.7%	-812	-9.3%
Residential structures	-318	-2.1%	-573	-3.7%	-797	-5.2%
Wage rate ($ / hr.)	-0.40	-1.2%	-0.71	-2.2%	-1.00	-3.1%
Private business hours of work	-0.2	-0.1%	-0.4	-0.2%	-0.5	-0.3%

Table 9

Static Versus Dynamic Government Revenue And Budget Effects Of Changes In The Capital Gains Tax Rate (Labor Supply Elasticity Assumed To Be 0.1)

	Capital Gains Tax Rate		
	20%	**24%**	**28%**
Federal budget			
Static capital gain tax increase	30.7	54.7	77.5
Loss in personal income tax from weaker economy	-26.7	-49.0	-69.5
Net change in personal income tax	4.0	5.7	8.0
Loss in other taxes from weaker economy	-14.1	-25.6	-35.9
Dynamic change in total federal revenue (before portfolio adjustments)	-10.1	-19.9	-27.8
Change in federal outlays due to lower wages	-7.3	-13.1	-18.3
Change in federal budget surplus (- indicates smaller surplus or larger deficit)	-2.8	-6.8	-9.5
Portfolio Adjustment (federal):			
Further reduction in capital gains tax revenue from reduction in capital stock	-11.8	-21.0	-29.0
Dynamic revenue change with portfolio adjustment	-21.8	-40.9	-56.9
Change in federal surplus with portfolio adjustment	-14.5	-27.8	-38.5
State and local budgets			
Dynamic revenue change	-27.6	-49.7	-69.2
Outlay change due to lower wages	-16.4	-29.6	-41.2
Dynamic change in S&L budget surplus without portfolio adjustment	-11.3	-20.2	-28.0
Portfolio Adjustment (state and local):			
Further reduction in capital gains tax revenue from reduction in capital stock	-5.5	-9.9	-13.6
Dynamic revenue change with portfolio adjustment	-33.1	-59.6	-82.8
Change in S&L surplus with portfolio adjustment	-16.8	-30.0	-41.6

Table 10A – Distribution Table: Levels at 20% Tax Rate (Labor Supply Elasticity 0.1)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 20%
Levels (dollar amounts in billions), in Returns with AGI Greater Than Zero

	DYNAMIC SIMULATION					
	Baseline Levels (15% Tax Rate)			Dynamic Levels (20% Tax Rate)		
All Returns AGI Class ($)	AGI ($)	Tax After Credits ($)	After-Tax Income ($)	AGI ($)	Tax After Credits ($)	After-Tax Income ($)
0 - 5k	25.8	-1.4	27.2	25.5	-1.4	26.9
5k - 10k	79.0	-6.1	85.1	78.0	-6.1	84.1
10k - 20k	328.2	-14.8	343.1	324.0	-15.1	339.1
20k - 30k	475.7	3.1	472.5	469.5	2.6	466.9
30k - 40k	524.0	26.7	497.3	517.2	25.9	491.3
40k - 50k	540.3	35.3	505.0	533.4	34.3	499.1
50k - 75k	1,311.2	106.0	1,205.2	1,294.2	103.0	1,191.2
75k - 100k	1,048.4	97.2	951.2	1,034.8	94.6	940.2
100k - 150k	1,325.0	154.9	1,170.2	1,307.9	150.5	1,157.3
150k - 200k	634.1	91.5	542.7	625.9	89.3	536.6
200k - 250k	344.7	57.2	287.5	340.2	56.1	284.2
250k - 500k	720.0	145.0	575.0	710.7	144.8	565.9
500k - 1,000k	460.5	105.5	355.0	454.5	107.5	347.0
> 1,000k	1,171.5	267.7	903.9	1,156.3	285.4	870.9
TOTAL	8,988.4	1,067.6	7,920.9	8,872.0	1,071.4	7,800.6

Table 10B – Distribution Table: Changes at 20% Tax Rate (Labor Supply Elasticity 0.1)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 20%
Changes from Baseline (dollar amounts in billions), in Returns with AGI Greater Than Zero

	DYNAMIC SIMULATION					
	$ Change (20% Tax Rate)			% Change (20% Tax Rate)		
All Returns AGI Class ($)	AGI	Tax After Credits	After-Tax Income	AGI	Tax After Credits	After-Tax Income
0 - 5k	-0.3	0.0	-0.3	-1.29%	0.00%	-1.29%
5k - 10k	-1.0	0.0	-1.0	-1.29%	0.41%	-1.26%
10k - 20k	-4.2	-0.3	-4.0	-1.29%	1.73%	-1.22%
20k - 30k	-6.2	-0.5	-5.6	-1.29%	-16.91%	-1.18%
30k - 40k	-6.8	-0.8	-6.0	-1.29%	-2.85%	-1.15%
40k - 50k	-7.0	-1.1	-5.9	-1.29%	-2.98%	-1.10%
50k - 75k	-17.0	-2.9	-14.0	-1.29%	-2.77%	-1.07%
75k - 100k	-13.6	-2.6	-10.9	-1.29%	-2.69%	-1.04%
100k - 150k	-17.1	-4.3	-12.8	-1.29%	-2.80%	-0.97%
150k - 200k	-8.2	-2.1	-6.1	-1.29%	-2.31%	-0.96%
200k - 250k	-4.5	-1.1	-3.3	-1.30%	-1.97%	-0.97%
250k - 500k	-9.3	-0.2	-9.1	-1.30%	-0.14%	-1.27%
500k - 1,000k	-6.0	2.1	-8.0	-1.30%	1.95%	-1.75%
> 1,000k	-15.2	17.7	-32.9	-1.30%	6.61%	-2.81%
TOTAL	-116.4	3.8	-120.3	-1.30%	0.36%	-1.34%

Table 11A – Distribution Table: Levels at 24% Tax Rate (Labor Supply Elasticity 0.1)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 24%
Levels (dollar amounts in billions), in Returns with AGI Greater Than Zero

	DYNAMIC SIMULATION					
	Baseline Levels (15% Tax Rate)			Dynamic Levels (24% Tax Rate)		
All Returns AGI Class ($)	AGI ($)	Tax After Credits ($)	After-Tax Income ($)	AGI ($)	Tax After Credits ($)	After-Tax Income ($)
0 - 5k	25.8	-1.4	27.2	25.2	-1.4	26.6
5k - 10k	79.0	-6.1	85.1	77.2	-6.1	83.3
10k - 20k	328.2	-14.8	343.1	320.5	-15.3	335.8
20k - 30k	475.7	3.1	472.5	464.5	2.2	462.3
30k - 40k	524.0	26.7	497.3	511.7	25.3	486.4
40k - 50k	540.3	35.3	505.0	527.7	33.5	494.2
50k - 75k	1,311.2	106.0	1,205.2	1,280.5	100.7	1,179.8
75k - 100k	1,048.4	97.2	951.2	1,023.8	92.5	931.3
100k - 150k	1,325.0	154.9	1,170.2	1,294.0	147.0	1,146.9
150k - 200k	634.1	91.5	542.7	619.3	87.6	531.6
200k - 250k	344.7	57.2	287.5	336.6	55.1	281.5
250k - 500k	720.0	145.0	575.0	703.1	144.4	558.7
500k - 1,000k	460.5	105.5	355.0	449.7	109.0	340.7
> 1,000k	1,171.5	267.7	903.9	1,144.0	298.5	845.4
TOTAL	8,988.4	1,067.6	7,920.9	8,777.7	1,072.9	7,704.8

Table 11B – Distribution Table: Changes at 24% Tax Rate (Labor Supply Elasticity 0.1)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 24%
Changes from Baseline (dollar amounts in billions), in Returns with AGI Greater Than Zero

	DYNAMIC SIMULATION					
	$ Change (24% Tax Rate)			% Change (24% Tax Rate)		
All Returns AGI Class ($)	AGI	Tax After Credits	After-Tax Income	AGI	Tax After Credits	After-Tax Income
0 - 5k	-0.6	0.0	-0.6	-2.33%	0.00%	-2.33%
5k - 10k	-1.9	0.0	-1.8	-2.34%	0.72%	-2.29%
10k - 20k	-7.7	-0.5	-7.2	-2.34%	3.11%	-2.20%
20k - 30k	-11.1	-1.0	-10.2	-2.34%	-30.51%	-2.14%
30k - 40k	-12.3	-1.4	-10.9	-2.34%	-5.14%	-2.08%
40k - 50k	-12.6	-1.9	-10.8	-2.34%	-5.34%	-1.99%
50k - 75k	-30.7	-5.3	-25.4	-2.34%	-4.99%	-1.94%
75k - 100k	-24.5	-4.7	-19.8	-2.34%	-4.84%	-1.89%
100k - 150k	-31.0	-7.8	-23.2	-2.34%	-5.05%	-1.75%
150k - 200k	-14.9	-3.8	-11.0	-2.34%	-4.18%	-1.74%
200k - 250k	-8.1	-2.1	-6.0	-2.35%	-3.62%	-1.75%
250k - 500k	-16.9	-0.6	-16.3	-2.35%	-0.39%	-2.27%
500k - 1,000k	-10.8	3.5	-14.3	-2.35%	3.34%	-3.11%
> 1,000k	-27.6	30.8	-58.4	-2.36%	11.51%	-4.99%
TOTAL	-210.7	5.4	-216.1	-2.34%	0.50%	-2.40%

Table 12A – Distribution Table: Levels at 28% Tax Rate (Labor Supply Elasticity 0.1)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 28%
Levels (dollar amounts in billions), in Returns with AGI Greater Than Zero

	DYNAMIC SIMULATION					
	Baseline (15% Tax Rate)			Dynamic Simulation (28% Tax Rate)		
All Returns AGI Class ($)	AGI ($)	Tax After Credits ($)	After-Tax Income ($)	AGI ($)	Tax After Credits ($)	After-Tax Income ($)
0 - 5k	25.8	-1.4	27.2	25.0	-1.4	26.4
5k - 10k	79.0	-6.1	85.1	76.4	-6.2	82.6
10k - 20k	328.2	-14.8	343.1	317.4	-15.5	332.9
20k - 30k	475.7	3.1	472.5	460.1	1.8	458.3
30k - 40k	524.0	26.7	497.3	506.8	24.8	482.0
40k - 50k	540.3	35.3	505.0	522.6	32.7	489.9
50k - 75k	1,311.2	106.0	1,205.2	1,268.2	98.6	1,169.6
75k - 100k	1,048.4	97.2	951.2	1,014.0	90.6	923.4
100k - 150k	1,325.0	154.9	1,170.2	1,281.5	143.9	1,137.6
150k - 200k	634.1	91.5	542.7	613.3	86.1	527.2
200k - 250k	344.7	57.2	287.5	333.4	54.3	279.1
250k - 500k	720.0	145.0	575.0	696.3	144.1	552.2
500k - 1,000k	460.5	105.5	355.0	445.4	110.4	334.9
> 1,000k	1,171.5	267.7	903.9	1,132.9	310.8	822.1
TOTAL	8,988.4	1,067.6	7,920.9	8,693.3	1,075.1	7,618.1

Table 10B – Distribution Table: Changes at 20% Tax Rate (Labor Supply Elasticity 0.1)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 28%
Changes from Baseline (dollar amounts in billions), in Returns with AGI Greater Than Zero

	DYNAMIC SIMULATION					
	$ Change (28% Tax Rate)			% Change (28% Tax Rate)		
All Returns AGI Class ($)	AGI	Tax After Credits	After-Tax Income	AGI	Tax After Credits	After-Tax Income
0 - 5k	-0.8	0.0	-0.8	-3.27%	0.00%	-3.27%
5k - 10k	-2.6	-0.1	-2.5	-3.28%	0.99%	-3.21%
10k - 20k	-10.8	-0.6	-10.1	-3.28%	4.34%	-3.09%
20k - 30k	-15.6	-1.3	-14.3	-3.28%	-42.61%	-3.00%
30k - 40k	-17.2	-1.9	-15.3	-3.28%	-7.17%	-2.91%
40k - 50k	-17.7	-2.6	-15.1	-3.28%	-7.43%	-2.79%
50k - 75k	-43.0	-7.4	-35.6	-3.28%	-6.98%	-2.72%
75k - 100k	-34.4	-6.5	-27.8	-3.28%	-6.74%	-2.66%
100k - 150k	-43.5	-10.9	-32.5	-3.28%	-7.05%	-2.46%
150k - 200k	-20.8	-5.4	-15.5	-3.28%	-5.86%	-2.44%
200k - 250k	-11.3	-2.9	-8.4	-3.29%	-5.10%	-2.44%
250k - 500k	-23.7	-0.8	-22.9	-3.29%	-0.56%	-3.17%
500k - 1,000k	-15.2	5.0	-20.1	-3.29%	4.72%	-4.37%
> 1,000k	-38.7	43.1	-81.8	-3.30%	16.11%	-6.98%
TOTAL	-295.2	7.6	-302.7	-3.28%	0.71%	-3.37%

Results with Labor Supply Elasticity of 0.3

Table 13

Levels of Macroeconomic Aggregates At Various Tax Rates On Capital Gains, Compared To Current Top Rate Of 15% ($ in billions) Dynamic Analysis (Labor Supply Elasticity Assumed To Be 0.3)

	15% Capital Gains Tax Rate (in $)	20% Capital Gains Tax Rate (in $)	24% Capital Gains Tax Rate (in $)	28% Capital Gains Tax Rate (in $)
Gross domestic product	14,265	14,061	13,895	13,749
Private business output	9,936	9,789	9,669	9,563
Compensation of employees	6,680	6,581	6,500	6,429
Gross capital income	3,257	3,208	3,169	3,134
Gross corporate capital income	2,319	2,284	2,256	2,231
Gross non-corporate capital income	938	924	913	903
Private Business Stocks	26,823	25,776	24,943	24,226
Corporate Business Stocks	18,053	17,349	16,788	16,305
Non-corporate Business Stocks	8,770	8,427	8,155	7,921
Residential structures	15,292	14,948	14,670	14,427
Wage rate ($ / hr.)	32.60	32.21	31.89	31.61
Private business hours of work (billion hrs.)	204.9	204.3	203.8	203.4

Table 14

Changes In Macroeconomic Aggregates At Various Tax Rates On Capital Gains, Compared To Current Top Rate Of 15% ($ in billions) Dynamic Analysis (Labor Supply Elasticity Assumed To Be 0.3)

	20% Capital Gains Tax Rate		24% Capital Gains Tax Rate		28% Capital Gains Tax Rate	
	$ Change	% Change	$ Change	% Change	$ Change	% Change
Gross domestic product	-204	-1.4%	-370	-2.6%	-516	-3.6%
Private business output	-147	-1.5%	-268	-2.7%	-373	-3.8%
Compensation of employees	-99	-1.5%	-180	-2.7%	-251	-3.8%
Gross capital income	-48	-1.5%	-88	-2.7%	-122	-3.8%
Gross corporate capital income	-34	-1.5%	-62	-2.7%	-87	-3.8%
Gross non-corporate capital	-14	-1.5%	-25	-2.7%	-35	-3.8%
Private Business Stocks	-1,046	-3.9%	-1,879	-7.0%	-2,597	-9.7%
Corporate Business Stocks	-704	-3.9%	-1,265	-7.0%	-1,748	-9.7%
Non-corporate Business Stocks	-342	-3.9%	-614	-7.0%	-849	-9.7%
Residential structures	-344	-2.3%	-622	-4.1%	-866	-5.7%
Wage rate ($ / hr.)	-0.39	-1.2%	-0.71	-2.2%	-0.99	-3.1%
Private business hours of work	-0.6	-0.3%	-1.1	-0.5%	-1.5	-0.7%

Table 15

Static Versus Dynamic Government Revenue And Budget Effects Of Changes In The Capital Gains Tax Rate (Labor Supply Elasticity Assumed To Bo 0.3)

	Capital Gains Tax Rate		
	20%	**24%**	**28%**
Federal budget			
Static capital gain tax increase	30.7	54.7	77.5
Loss in personal income tax from weaker economy	-29.8	-55.2	-77.6
Net change in personal income tax	0.9	-0.6	-0.1
Loss in other taxes from weaker economy	-16.4	-29.8	-41.8
Dynamic change in total federal revenue (before portfolio adjustments)	-15.5	-30.4	-41.9
Change in federal outlays due to lower wages	-7.6	-13.7	-19.1
Change in federal budget surplus (- indicates smaller surplus or larger deficit)	-7.9	-16.7	-22.7
Portfolio Adjustment (federal):			
Further reduction in capital gains tax revenue from reduction in capital stock	-12.2	-22.0	-30.3
Dynamic revenue change with portfolio adjustment	-27.7	-52.3	-72.2
Change in federal surplus with portfolio adjustment	-20.1	-38.6	-53.1
State and local budgets			
Dynamic revenue change	-30.3	-54.9	-76.2
Outlay change due to lower wages	-16.8	-30.6	-42.6
Dynamic change in S&L budget surplus without portfolio adjustment	-13.5	-24.3	-33.6
Portfolio Adjustment (state and local):			
Further reduction in capital gains tax revenue from reduction in capital stock	-5.7	-10.3	-14.2
Dynamic revenue change with portfolio adjustment	-36.0	-65.2	-90.5
Change in S&L surplus with portfolio adjustment	-19.2	-34.7	-47.8

Table 16A – Distribution Table: Levels at 20% Tax Rate (Labor Supply Elasticity 0.3)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 20%
Levels (dollar amounts in billions), in Returns with AGI Greater Than Zero

	DYNAMIC SIMULATION					
	Baseline Levels (15% Tax Rate)			Dynamic Levels (20% Tax Rate)		
All Returns AGI Class ($)	AGI ($)	Tax After Credits ($)	After-Tax Income ($)	AGI ($)	Tax After Credits ($)	After-Tax Income ($)
0 - 5k	25.8	-1.4	27.2	25.4	-1.4	26.9
5k - 10k	79.0	-6.1	85.1	77.9	-6.1	84.0
10k - 20k	328.2	-14.8	343.1	323.5	-15.1	338.6
20k - 30k	475.7	3.1	472.5	468.8	2.5	466.3
30k - 40k	524.0	26.7	497.3	516.4	25.8	490.6
40k - 50k	540.3	35.3	505.0	532.6	34.2	498.4
50k - 75k	1,311.2	106.0	1,205.2	1,292.3	102.7	1,189.6
75k - 100k	1,048.4	97.2	951.2	1,033.2	94.3	939.0
100k - 150k	1,325.0	154.9	1,170.2	1,305.9	150.0	1,155.8
150k - 200k	634.1	91.5	542.7	624.9	89.1	535.9
200k - 250k	344.7	57.2	287.5	339.7	55.9	283.8
250k - 500k	720.0	145.0	575.0	709.5	144.4	565.1
500k - 1,000k	460.5	105.5	355.0	453.8	107.3	346.5
> 1,000k	1,171.5	267.7	903.9	1,154.4	284.8	869.5
TOTAL	8,988.4	1,067.6	7,920.9	8,858.2	1,068.4	7,789.9

Table 16B – Distribution Table: Changes at 20% Tax Rate (Labor Supply Elasticity 0.3)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 20%
Changes from Baseline (dollar amounts in billions), in Returns with AGI Greater Than Zero

	DYNAMIC SIMULATION					
	$ Change (20% Tax Rate)			% Change (20% Tax Rate)		
All Returns AGI Class ($)	AGI	Tax After Credits	After-Tax Income	AGI	Tax After Credits	After-Tax Income
0 - 5k	-0.4	0.0	-0.4	-1.43%	0.00%	-1.43%
5k - 10k	-1.1	0.0	-1.1	-1.45%	0.45%	-1.41%
10k - 20k	-4.7	-0.3	-4.5	-1.45%	1.93%	-1.36%
20k - 30k	-6.9	-0.6	-6.3	-1.44%	-18.86%	-1.32%
30k - 40k	-7.6	-0.8	-6.7	-1.44%	-3.17%	-1.28%
40k - 50k	-7.8	-1.2	-6.6	-1.44%	-3.32%	-1.23%
50k - 75k	-18.9	-3.3	-15.7	-1.44%	-3.09%	-1.19%
75k - 100k	-15.1	-2.9	-12.2	-1.44%	-3.00%	-1.17%
100k - 150k	-19.1	-4.8	-14.3	-1.44%	-3.12%	-1.08%
150k - 200k	-9.2	-2.4	-6.8	-1.45%	-2.59%	-1.07%
200k - 250k	-5.0	-1.3	-3.7	-1.45%	-2.24%	-1.08%
250k - 500k	-10.5	-0.6	-9.9	-1.45%	-0.38%	-1.38%
500k - 1,000k	-6.7	1.8	-8.5	-1.46%	1.73%	-1.85%
> 1,000k	-17.2	17.1	-34.3	-1.47%	6.40%	-2.93%
TOTAL	-130.2	0.8	-131.0	-1.45%	0.08%	-1.46%

Table 17A – Distribution Table: Levels at 24% Tax Rate (Labor Supply Elasticity 0.3)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 24%
Levels (dollar amounts in billions), in Returns with AGI Greater Than Zero

	DYNAMIC SIMULATION					
	Baseline Levels (15% Tax Rate)			Dynamic Levels (20% Tax Rate)		
All Returns AGI Class ($)	AGI ($)	Tax After Credits ($)	After-Tax Income ($)	AGI ($)	Tax After Credits ($)	After-Tax Income ($)
0 - 5k	25.8	-1.4	27.2	25.1	-1.4	26.6
5k - 10k	79.0	-6.1	85.1	76.9	-6.1	83.1
10k - 20k	328.2	-14.8	343.1	319.6	-15.4	334.9
20k - 30k	475.7	3.1	472.5	463.1	2.1	461.1
30k - 40k	524.0	26.7	497.3	510.2	25.1	485.0
40k - 50k	540.3	35.3	505.0	526.1	33.2	492.9
50k - 75k	1,311.2	106.0	1,205.2	1,276.6	100.0	1,176.6
75k - 100k	1,048.4	97.2	951.2	1,020.7	91.9	928.8
100k - 150k	1,325.0	154.9	1,170.2	1,290.1	146.1	1,144.0
150k - 200k	634.1	91.5	542.7	617.4	87.1	530.2
200k - 250k	344.7	57.2	287.5	335.6	54.8	280.7
250k - 500k	720.0	145.0	575.0	700.9	143.7	557.2
500k - 1,000k	460.5	105.5	355.0	448.3	108.5	339.7
> 1,000k	1,171.5	267.7	903.9	1,140.2	297.4	842.8
TOTAL	8,988.4	1,067.6	7,920.9	8,750.8	1,067.0	7,683.8

Table 17B – Distribution Table: Changes at 24% Tax Rate (Labor Supply Elasticity 0.3)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 24%
Changes from Baseline (dollar amounts in billions), in Returns with AGI Greater Than Zero

	DYNAMIC SIMULATION					
	$ Change (24% Tax Rate)			% Change (24% Tax Rate)		
All Returns AGI Class ($)	AGI	Tax After Credits	After-Tax Income	AGI	Tax After Credits	After-Tax Income
0 - 5k	-0.7	0.0	-0.7	-2.61%	0.00%	-2.61%
5k - 10k	-2.1	0.0	-2.0	-2.64%	0.81%	-2.58%
10k - 20k	-8.7	-0.5	-8.1	-2.64%	3.50%	-2.48%
20k - 30k	-12.5	-1.1	-11.5	-2.63%	-34.30%	-2.41%
30k - 40k	-13.8	-1.5	-12.3	-2.63%	-5.77%	-2.34%
40k - 50k	-14.2	-2.1	-12.1	-2.63%	-5.99%	-2.24%
50k - 75k	-34.6	-6.0	-28.6	-2.64%	-5.62%	-2.18%
75k - 100k	-27.6	-5.3	-22.3	-2.64%	-5.44%	-2.13%
100k - 150k	-34.9	-8.8	-26.1	-2.64%	-5.68%	-1.97%
150k - 200k	-16.8	-4.3	-12.4	-2.64%	-4.72%	-1.96%
200k - 250k	-9.1	-2.4	-6.8	-2.65%	-4.15%	-1.96%
250k - 500k	-19.1	-1.3	-17.8	-2.65%	-0.89%	-2.47%
500k - 1,000k	-12.3	3.1	-15.3	-2.66%	2.90%	-3.33%
> 1,000k	-31.4	27.9	-61.0	-2.68%	11.80%	-5.21%
TOTAL	-237.7	-0.6	-237.1	-2.64%	-0.05%	-2.64%

Table 18A – Distribution Table: Levels at 28% Tax Rate (Labor Supply Elasticity 0.3)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 20%
Levels (dollar amounts in billions), in Returns with AGI Greater Than Zero

	DYNAMIC SIMULATION					
	Baseline Levels (15% Tax Rate)			Dynamic Levels (28% Tax Rate)		
All Returns AGI Class ($)	AGI ($)	Tax After Credits ($)	After-Tax Income ($)	AGI ($)	Tax After Credits ($)	After-Tax Income ($)
0 - 5k	25.8	-1.4	27.2	24.6	-1.4	26.3
5k - 10k	79.0	-6.1	85.1	76.1	-6.2	82.3
10k - 20k	328.2	-14.8	343.1	316.2	-15.6	331.7
20k - 30k	475.7	3.1	472.5	458.3	1.6	456.6
30k - 40k	524.0	26.7	497.3	504.8	24.6	480.3
40k - 50k	540.3	35.3	505.0	520.6	32.4	488.2
50k - 75k	1,311.2	106.0	1,205.2	1,263.2	97.7	1,165.5
75k - 100k	1,048.4	97.2	951.2	1,010.0	89.9	920.1
100k - 150k	1,325.0	154.9	1,170.2	1,276.5	142.7	1,133.8
150k - 200k	634.1	91.5	542.7	610.9	85.5	525.4
200k - 250k	344.7	57.2	287.5	332.0	53.9	278.1
250k - 500k	720.0	145.0	575.0	693.5	143.2	550.3
500k - 1,000k	460.5	105.5	355.0	453.5	109.8	333.7
> 1,000k	1,171.5	267.7	903.9	1,128.0	309.2	818.8
TOTAL	8,988.4	1,067.6	7,920.9	8,658.6	1,067.4	7,591.2

Table 18B – Distribution Table: Changes at 28% Tax Rate (Labor Supply Elasticity 0.3)

Effect of Raising Top Tax Rates on Capital Gains and Dividends from 15% To 28%
Changes from Baseline (dollar amounts in billions), in Returns with AGI Greater Than Zero

	DYNAMIC SIMULATION					
	$ Change (28% Tax Rate)			% Change (28% Tax Rate)		
All Returns AGI Class ($)	AGI	Tax After Credits	After-Tax Income	AGI	Tax After Credits	After-Tax Income
0 - 5k	-0.9	0.0	-0.9	-3.62%	0.00%	-3.62%
5k - 10k	-2.9	-0.1	-2.8	-3.66%	1.09%	-3.58%
10k - 20k	-12.0	-0.7	-11.3	-3.66%	4.82%	-3.45%
20k - 30k	-17.4	-1.5	-15.9	-3.66%	-47.44%	-3.34%
30k - 40k	-19.1	-2.1	-17.0	-3.65%	-7.98%	-3.25%
40k - 50k	-19.8	-2.9	-16.8	-3.66%	-8.25%	-3.12%
50k - 75k	-48.0	-8.2	-39.7	-3.66%	-7.78%	-3.03%
75k - 100k	-38.4	-7.3	-31.1	-3.66%	-7.50%	-2.96%
100k - 150k	-48.5	-12.2	-36.3	-3.66%	-7.86%	-2.74%
150k - 200k	-23.3	-6.0	-17.3	-3.67%	-6.55%	-2.72%
200k - 250k	-12.7	-3.3	-9.4	-3.67%	-5.78%	-2.71%
250k - 500k	-26.5	-1.8	-24.7	-3.68%	-1.22%	-3.43%
500k - 1,000k	-17.0	4.4	-21.4	-3.69%	4.14%	-4.64%
> 1,000k	-43.5	41.5	-85.1	-3.71%	15.52%	-7.26%
TOTAL	-329.9	-0.2	-329.7	-3.67%	-0.01%	-3.67%

Description of the model

The Cobb Douglas production function

The Cobb-Douglas production function determines how much output one would get from various levels of labor and capital. In particular, it determines how much additional output one would get by adding an additional unit of labor or capital, which are the marginal products of labor and capital. The marginal products determine what producers are willing to pay for added units — in other words, the wage and the return to capital. These marginal product curves are the demand curves for labor and capital shown in the charts.

One can combine the Cobb-Douglas production function with labor and capital supply equations (the supply curves shown in the charts). One can insert the tax rates currently in force at the margins on additional labor and capital income, and select scale parameters to make the resulting quantities of labor and capital and their output equal to that of the economy in the base case.[12] One can simulate a change in tax policy by varying the tax rates, and solving for the changes in labor and capital inputs, output, and federal revenue that would occur. The changes in income due to the initial tax policy changes will result in further changes in the tax rates. These follow-on changes are determined by putting the income changes into a tax calculator (which recalculates the population's tax liabilities and the marginal tax rates they face), and then re-entering the revised tax rates into the model.[13] This dynamic process generates a new equilibrium within a few iterations.

The dynamic approach is important. Static revenue estimation (or "static scoring") fails to adjust for the effects of the tax policy change on national output and income. It gives an unrealistic revenue forecast. Dynamic revenue estimation (or "dynamic scoring") adjusts for the income changes induced by the tax policy shift, giving a more realistic estimate (assuming it is done in a realistic way).

In a standard Cobb-Douglas production function, output (Y) is a function of labor inputs (L) and capital inputs (K), with the exponents (α and β) set equal to the shares of the two factors, which sum to one: $Y = AL^{\alpha}K^{\beta}$. In the U.S. economy, the share of labor, α, has been about 2/3 of GDP for many decades, and the share of capital, β, has been about 1/3. "A" is a scale term reflecting the technology of the time, often referred to as "total factor productivity."

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[12] More specifically, the tax wedge on labor is the income weighted marginal tax rate on labor income; the supply curve and tax wedge on capital are determined by the marginal tax rate, depreciation rate, and normal risk-adjusted rate of return on capital (the service price).

[13] The service price and tax calculators used in this paper were furnished by Gary Robbins of the Center for Data Analysis at the Heritage Foundation.

The marginal product of a factor is the additional output produced by adding one unit of the factor, holding the quantity of the other factor constant. It is what an employer would be willing to pay to obtain the extra unit. The marginal product schedule is the demand schedule for the factor. In equilibrium, the wage is equal to the marginal product of labor, and the return on capital is equal to the marginal product of capital.

In the Cobb-Douglas function, one can derive the marginal product of labor: $MPL = \alpha AL^{\alpha-1}K^{\beta} = \alpha Y/L$. The marginal product of capital can be calculated: $MPK = \beta AL^{\alpha}K^{-\alpha} = \beta Y/K$. The formulas show that as more of either factor is added, its marginal product falls and the marginal product of the other factor rises. A tax on one factor that depresses the quantity offered of that factor reduces the reward to the other factor.

The elasticities of the marginal products as the quantities of the factors change (the percent change in the marginal product of a factor associated with a percent change in the quantity of that factor or the other factor) govern the change in the wage or rate of return as the amount of either factor shifts. The elasticity of the marginal product of labor with respect to the quantity of labor can be shown to be $-\beta$, or -1/3. It takes a three percent reduction in the quantity of labor to boost the marginal product of labor by one percent (a movement along the labor demand curve). The elasticity of the marginal product of capital with respect to the quantity of capital is $-\alpha$, or -2/3 (a movement along the demand curve for capital). It takes a 1.5 percent reduction in the quantity of capital to boost the marginal product of capital by one percent. (With two factors, a simple rule is that the elasticity of the marginal product of one factor is equal to the negative of the share of the other factor in total output.) The demand for the larger factor, labor, is more elastic, and its demand curve is less steeply sloped, than the demand for the smaller factor, capital. This analysis assumes that all labor is homogeneous (of like quality and interchangeable), and all capital is similarly interchangeable.

The elasticity of the marginal product of labor with respect to the quantity of capital is β or 1/3. A one percent drop in the capital stock will lower the wage by 1/3 percent (a shift in the labor demand curve). The elasticity of the marginal product of capital with respect to the quantity of labor is α or 2/3. A one percent drop in the labor force will lower the rate of return to capital by 2/3 percent (a shift in the demand curve for capital). Less of either factor lowers the productivity and return to a given quantity of the other factor. The change in the return to a factor will affect the quantity offered, according to supply conditions.

If there are more than two factors, the function may be expanded, e.g., $Y = AL^{\alpha}K^{\beta}T^{(1-\alpha-\beta)}$. Perhaps T stands for land (terre, in French) or the scarce human capital or talent of entrepreneurs, artists, athletes, or highly trained engineers or surgeons, etc. Assume that ordinary labor is not readily substitutable for the labor of these highly paid individuals. Assume the top talent earns about 10 percent of GDP, with the shares of ordinary labor at 60 percent and of capital at 30 percent. The elasticity of demand for the new, smallest distinct factor will be -0.9; it will take only a 1.1 percent reduction in the quantity of talent to raise the earnings of these individuals by one percent, giving

them the least elastic demand of the three factors. (With three factors, the elasticity of the marginal product of one factor is equal to the negative of the sums of the shares of the other two factors.) If the elasticity of supply of this highly paid factor is about as high, or a bit higher than that of ordinary labor (with higher incomes and wealth, and more control over their businesses and schedules, they may have greater flexibility as to working or not working), the factor would be better able to shift a tax to other factors than would the general labor force.

Solving for a change in output and income

The model was initially set at 2008 levels of GDP, hours worked, levels of the capital stock, and tax parameters that affect the service price of capital. Other parameters were set to equal the long term return to capital (just under 3%), shares of capital and labor of 1/3 and 2/3 of GDP, and the desired labor supply elasticity. Changes in the tax law could than be entered, and the model was solved in several iterations to arrive at a new equilibrium. The general solution for this type of exercise is displayed below.

Solution of IRET Macromodel of U.S. Economy

The model consists of thirteen behavioral equations with thirteen unknowns, fourteen parameters, and four exogenous tax variables. Writing the model in logs we have:

$$ln\ Y = \alpha_{11} + \alpha_{12} \bullet ln\ K_1 + \alpha_{13} \bullet ln\ L_1 \quad (1)$$

$$ln\ s_1 + ln\ K_1 = ln\ \alpha_{12} + ln\ Y \quad (2)$$

$$ln\ w + ln\ L_1 = ln\ \alpha_{13} + ln\ Y \quad (3)$$

$$ln\ PY_2 = \alpha_{21} + \alpha_{22} \bullet ln\ K_2 + \alpha_{23}\ ln\ L_2 \quad (4)$$

$$ln\ s_2 + ln\ K_2 = ln\ \alpha_{22} + ln\ PY_2 \quad (5)$$

$$ln\ w\ + ln\ L_2 = ln\ \alpha_{23} + ln\ PY_2 \quad (6)$$

$$ln\ PY_3 = \alpha_{31} + \alpha_{32} \bullet ln\ K_3 + \alpha_{33} \bullet ln\ L_3 \quad (7)$$

$$ln\ s_3 + ln\ K_3 = ln\ \alpha_{32} + ln\ PY_3 \quad (8)$$

$$ln\ w + ln\ L_3 = ln\ \alpha_{33} + ln\ PY_3 \quad (9)$$

$$ln\ Y - ln\ t_b = ln\ \beta_1 + ln\ PQ \quad (10)$$

$$ln\ PY_2 - ln\ t_h = ln\ \beta_2 + ln\ PQ \quad (11)$$

$$ln\ PY_3 - ln\ t_g = ln\ \beta_3 + ln\ PQ \quad (12)$$

$$ln\ L = ln\ \alpha_4 + \alpha_5 \bullet (ln\ w + ln\ t_w) \quad (13)$$

Rearranging 2 and 3 and substituting into 1 we get:

$ln\ K_1 = ln\ \alpha_{12} + ln\ Y - ln\ s_1$

$ln\ L_1 = ln\ \alpha_{13} + ln\ Y - ln\ w$

$ln\ Y = \alpha_{11} + \alpha_{12} \bullet (ln\ \alpha_{12} + ln\ Y - ln\ s_1) + \alpha_{13} \bullet (ln\ \alpha_{13} + ln\ Y - ln\ w)$

$ln\ Y \bullet (1 - \alpha_{12} - \alpha_{13}) = \alpha_{11} + \alpha_{12} \bullet (ln\ \alpha_{12} - ln\ s_1) + \alpha_{13} \bullet (ln\ \alpha_{13} - ln\ w)$

$0 = \alpha_{11} + \alpha_{12} \bullet (ln\ \alpha_{12} - ln\ s_1) + \alpha_{13} \bullet (ln\ \alpha_{13} - ln\ w)$

Or:

$ln\ w_1 = \beta_4 + \beta_5 \bullet ln\ s_1$

We know w given the service price of capital and parameters in sector l.

Substituting equation 10 into 3, 11 into 6, and 12 into 9, we have:

$ln\ L_1 = ln\ \alpha_{13} + ln\ \beta_1 + ln\ PQ + ln\ t_b - ln\ w$

$ln\ L_2 = ln\ \alpha_{23} + ln\ \beta_2 + ln\ PQ + ln\ t_h - ln\ w$

$ln\ L_3 = ln\ \alpha_{33} + ln\ \beta_3 + ln\ PQ + ln\ t_g - ln\ w$

These are labor demand equations. The supply of labor (L) must equal the demand. Therefore, we can rewrite equation l3 as:

$ln\ (L_1 + L_2 + L_3) = ln\ \alpha_4 + \alpha_5 \bullet (ln\ w + ln\ t_w)$

Or:

$ln\ (\alpha_{13} \bullet \beta_1 \bullet t_b + \alpha_{23} \bullet \beta_2 \bullet t_h + \alpha_{33} \bullet \beta_3 \bullet t_g) + ln\ PQ - ln\ w = ln\ \alpha_4 + \alpha_5 \bullet (ln\ w + ln\ t_w)$

Solving for *ln* PQ, we get:

$ln\ PQ = ln\ \alpha_4 + \alpha_5\ (ln\ w + ln\ t_w) + \beta_6 + ln\ w$

We now can directly calculate PQ (non-government output) and all the rest of the system by substitution following the tree used to derive the expression for PQ.

Parameters are constructed at the baseline economic levels of the Y's, K's, L's, and t' s as:

$\alpha_{13} = w \bullet L_1 / Y$ C-1

$\alpha_{12} = 1 - \alpha_{13}$ C-2

$\alpha_{11} = ln\ Y - \alpha_{12} \bullet ln\ K_1 - \alpha_{13} \bullet ln\ L_1$ C-3

$\alpha_{23} = w \bullet L_2 / PY_2$ C-4

$\alpha_{22} = 1 - \alpha_{23}$ C-5

$\alpha_{21} = ln\ PY_2 - \alpha_{22} \bullet ln\ K_2 - \alpha_{23} \bullet ln\ L_2$ C-6

$\alpha_{33} = w \bullet L_3 / PY_3$ C-7

$\alpha_{32} = 1 - \alpha_{33}$ C-8

$\alpha_{31} = ln\ PY_3 - \alpha_{32} \bullet ln\ K_3 - \alpha_{33} \bullet ln\ L_2$ C-9

$\alpha_5 = 0.3$ C-10

$ln\ \alpha_4 = ln\ L - \alpha_5 \bullet (ln\ w + ln\ t)$ C-11

$ln\ \beta_1 = ln\ Y - ln\ t_b - ln\ PQ$ C-12

$ln\ \beta_2 = ln\ PY_2 - ln\ t_h - ln\ PQ$ C-13

$ln\ \beta_3 = ln\ PY_3 - ln\ PQ$ C-14

$\beta_4 = (\alpha_{11} + \alpha_{12} \bullet ln\ \alpha_{12} + \alpha_{13} \bullet ln\ \alpha_{13}) / \alpha_{13}$ C-15

$\beta_5 = - \alpha_{12} / \alpha_{13}$ C-16

$\beta_6 = ln\ (\alpha_{13} \bullet \beta_1 \bullet t_b + \alpha_{23} \bullet \beta_2 \bullet t_h + \alpha_{33} \bullet \beta_3 \bullet t_g)$ C-17

The exogenously specified variables are s and t's where:

$s_{10} = \alpha_{12} \bullet Y / K_1$ C-18

$s_{20} = \alpha_{22} \bullet PY_2 / K_2$ C-19

$s_{30} = \alpha_{32} \bullet PY_3 / K_3$ C-20

$t_w = (1 - t_l)$ C-21

$t_b = (1 - t_{eb})$ C-22

$t_h = (1 - t_{eh})$ C-23

$t_g = (1 - t_{eg})$ C-24

We also determine PQ, the changes in the service prices for sectors 2 and 3, as well as prices in those sectors and the level of the overall deflator.

Economy-wide GDP and labor compensation is:

$GDP = PQ + L_{gg} \bullet w + CC_{gg}$

$Comp = (L_1 + L_2 + L_3 + L_{gg}) \bullet w$

Where CC_{gg} and L_{gg} are exogenous.