The Institute for Policy Innovation's report, "ACCOUNTING FOR GROWTH: Incorporating Dynamic Analysis Into Revenue Estimation?" comes at a very ritical time as these innovative estimating techniques are being considered for use by Congressional entities. Through the sound application of dynamic economic modeling, several state governments are already providing clearer and more accurate insight into revenue patterns for fissure years, and it is time for the federal government to apply these techniques into its oven analyses.

The formulas now used to predict the economic impact of changes in taxing and spending don't fully reflect the fact that tax and spending changes spur behavioral and macroeconomic changes. Simply put: If you don't factor in these behavioral changes, you get less accurate predictions. Dynamic economic modeling is designed to return the consideration of real life and real dollars into government projections. It does not assume the world stands still when tax laws or government expenditures change.

At the heart of this discussion is whether we should encourage growth and opportunity in our tax and spending policy. By implementing dynamic economic modeling, one can get a better idea of the revenue effects caused by changes in sensitive tax and spending policy. At the very least, dynamic economic modeling could provide a range of estimates around the numbers produced by the static model. Federal legislators are much better served with more information, not less.

Taking into account the behavioral and macroeconomic effects of changes in tax and fiscal policy is a much needed supplement to cement economic modeling methods. Through the sound and thoroughly researched findings of the Institute for Policy Innovation, our accuracy of prediction at the federal level can improve vastly.

Sincerely,

Tom Campbell
Member of Congress

John Ashcroft
United States Senate

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Executive Summary

If you think weather forecasters are lousy prognosticators, consider the track record of government forecasters:

- Six out of seven multi-year forecasts made between 1986 and 1991 underestimated federal deficits by as much as 500 percent.
- The fiscal year 1991 budget, issued before the 1990 budget summit, contained a five-year forecasting error of $1 trillion.
- Government forecasters expected the 1986 increase in the capital gains tax rate to boost revenues significantly. It never happened. Despite an economy that is almost one-fifth larger today, real capital gains revenues are less than what they were in 1987 and less than half what forecasters expected.

No forecasting method can anticipate all the changes that may occur in the economy. However, government forecasts, against all logic, ignore the reactions of investors, savers and taxpayers to changes in tax policy. Because tax policy has significant effects on aggregate economic activity (and therefore on tax revenues), this *static* analysis is at least partially responsible for the notorious inaccuracy of government forecasts.

Because static analysis is biased against the positive economic impact of tax cuts, agencies such as the Treasury, the Joint Committee on Taxation and the Congressional Budget Office have virtual veto power over pro-growth economic policies. And this comes at a time when the current slow economic growth will cost average families $40,000 in lost income by the end of the decade.

Dynamic analysis, on the other hand, attempts to account for changes in the economy that will occur because of changes in tax policy. We have long called for government forecasters to include elements of dynamic analysis in their estimates, or at least to open their forecasting methods to scrutiny. In this paper, we describe a method for preparing dynamic estimates of federal revenues and demonstrate it by running several tax simulations.

Three hypothetical tax changes were scored using the dynamic model described in this paper:

- a head, or per capita, tax ($5,200 per person),
- the elimination of capital gains and dividend taxes at the individual level, and
- a uniform rate for individual and corporate income taxes of 19 percent.

The simulations were run using a baseline of 2.5 percent annual growth between 1996 and 2010, in line with private and government forecasts. For the head tax, which would remove all the disincentive effects of federal income taxes, real GDP would be 22 percent above baseline by 2010. Removing capital gains and dividend taxes from individuals would increase real GDP by 8.5 percent while a 19%, uniform rate for individuals and corporations would put real GDP 7.5 percent above baseline by 2010.

These results suggest that tax reform aimed at reducing disincentives to saving and investing has the potential to increase annual economic output roughly 10 to 15 percent. Such a boost in growth would lead to more jobs and higher incomes. And the expanded tax base would lead to higher revenues, offsetting most or all of the losses predicted by static analysis.

ACCOUNTING FOR GROWTH: Incorporating Dynamic Analysis Into Revenue Estimation

Introduction

The proponents of the three broad-based tax reform plans—the flat tax, national sales tax and USA tax—all have higher saving and investment as a major goal. The Kemp Commission report lists economic growth first among its six working principles.[1] The assumption is that higher rates of saving and investment will stimulate a long-term, healthy rate of economic growth, an assumption we have demonstrated to be valid in recent work.[2]

Critical to the outcome of the ongoing tax reform debate is the treatment of growth effects. Unfortunately, the official arbiters of the debate—government revenue estimators—do not currently incorporate the economic effects of tax reform into their analysis. As we have detailed in an earlier study, the Treasury Department, the Joint Committee on Taxation and the Congressional Budget Office rely on *static* methods.[3] Their analyses assume that neither raising nor lowering taxes will have any effect on the economy.

"Their analyses assume that neither raising nor lowering taxes will have any effect on the economy."

Successful tax reform, however, will depend upon incorporating growth effects into revenue and distributional analysis. Static analysis, by construction, provides no information to policy makers about which alternative might stimulate the most economic growth, the most important criterion. *Dynamic* analysis requires a model that links taxation to economic activity, such as saving, investment, employment, wages and output. In previous studies, we explored the relationships between taxation and saving and investment. Our findings showed that increases (decreases) in the return to capital after taxes led to increases (decreases) in saving and investment. In other words, tax policy does affect U.S. capital formation.

The next step to dynamic analysis is to incorporate these results into a model of the U.S. economy, which is the subject of this report. The following section describes the need for a dynamic model. The third section describes the distinctive characteristics of a neoclassical, dynamic model while the fourth discusses the model itself. The fifth section explains how the model can be used to assess changes in tax policy and presents results on three hypothetical tax changes. The last sections discuss implications and limitation of the results and conclusions.

The Need for a Dynamic Model

No body of economic analysis argues that fiscal policy does not affect the economy. What is at issue is:

❶ how do those effects come about and,

❷ to what extent do they affect aggregate economic activity.

In Keynesian economics, which has held sway through much of the last 40 years and still determines much of current government policy, fiscal policy influences the economy through what are called *first-order income effects*. Keynesian analysis posits that altering government taxes or spending will produce changes in aggregate demand. For example, an increase in government purchases is assumed to increase aggregate demand and, therefore, income which leads to even higher demand.

Classical economics, which predates Keynes, holds that fiscal policy generates *first-order price effects*. That is, a change in taxes will affect incentives to work,

save, invest or consume. Changing these incentives triggers a change in people's behavior that ultimately affects aggregate consumption, investment, saving, employment and output.

We believe that the neoclassical approach, which is updated classical economics, is the correct one. Changes in government policy cannot produce first-order income effects as Keynesian analysis assumes. For example, it ignores the means by which government finances the initial increase in purchases. However, this financing mechanism, which takes resources out of the private sector through higher taxes or borrowing, would produce price effects before any income effects. What is more, the price effects would be in the opposite direction to the assumed income effect. In other words, price effects come first and generate subsequent income effects.

Similarly, a tax cut in the Keynesian framework is assumed to increase disposable income which leads to an increase in aggregate demand. However, for disposable income to increase, the factors of production (labor and capital) must first earn the income at the lower tax rate. Again, the price effect precedes the income effect.

Using a Dynamic Neoclassical Model to Assess Tax Policy Changes

Government conducts fiscal policy through its decisions on taxes and spending. Although the level of government spending and the design of programs such as welfare have significant effects on the economy, this study focuses on tax policy.

A dynamic, neoclassical model can be used to assess the broader effects of tax policy. In brief, workers supply labor based on the wages they take home after taxes and inflation. In other words, they decide when and how to work based on their aftertax return to labor. Similarly, investors supply capital based upon the *long-run*, normal return paid to owners of capital after inflation, replacement costs and taxes. Workers and investors will supply more (or less) labor and capital as the aftertax returns increase (or decrease).

Businesses demand labor and capital services based on their *total* costs. Total costs are the aftertax payments to workers and investors plus taxes. Businesses demand more (or less) labor and capital as their total costs decrease (or increase). As taxes go up (or down), businesses will want to hire less (or more) labor and capital.

"A change in tax policy that increases GDP by one percent (or $72 billion) would mean an additional $15 billion to the federal government through increased income, payroll, excise and other taxes."

How do taxes affect the economy? Through their effects on the supply of labor and capital (investment and saving). What happens if the tax rate on labor goes up? First, labor is less willing to work because aftertax wage rates have been reduced. To compensate, businesses must increase the pretax wage rate. But because productivity has not changed to warrant the higher pretax wage, businesses will want to hire less labor. Less labor reduces the productiveness of the existing amount of capital, causing businesses to cut back on capital as well. Less labor and capital mean less output. A similar process occurs if the tax rate on capital goes up.

Conversely, if the tax rate on labor goes down, the pretax wage rate that business must pay workers decreases, leading business to hire more labor. More labor makes existing capital more productive than before, leading business to hire more capital services. More labor and capital mean more output. A similar process occurs if the tax rate on capital is cut.

These changes in economic activity have significant implications for government revenues. For example, federal revenues today amount to about 20.6 percent of GDP. A change in tax policy that increases GDP by one percent (or $72 billion)

would mean an additional $15 billion to the federal government through increased income, payroll, excise and other taxes. Conversely, a one percent decrease in GDP means $15 billion less for the Treasury.

The extent to which tax policy affects the economy, and therefore government revenues, depends largely on the answers to the following questions about key economic relationships:

❶ How are labor and capital combined to produce private output?[4]

❷ How does the supply of labor respond to changes in its aftertax wage rate?

❸ How quickly do employment adjustments occur?

❹ How does the supply of capital (investment) respond to changes in its aftertax return?

❺ How quickly do adjustments in the stock of capital occur?

❻ How does private saving behavior change in response to the aftertax return to saving?

Key Elements in a Neoclassical Model

This section describes the major elements in a neoclassical model and summarizes key empirical findings from our estimation. Details on the structure of the estimated model, including mathematical equations and selected regression results, may be found on the Internet at the Institute for Policy Innovation's Internet website [www.ipi.org].

1. Aggregate Production

Standard neoclassical theory pays a good deal of attention to how goods and services, or *output*, get produced. This process begins with the production function.

The *production function* describes how factor inputs—capital and labor—are combined to produce goods and services. For example, operation of a specific lathe may require at least one worker or a worker and an assistant. The particular importance of the production function is that it relates physical units of different types of factor inputs to their relative contribution to output.

The production function exhibits several characteristics. For example, more capital and labor mean more output. But, the additions to output get smaller and smaller as more and more of one factor is used without increasing others.[5] Adding more of one input does makes the others more productive, however. Another characteristic of the production process is known as *constant returns to scale*. This means that increasing (or decreasing) all inputs by the same percentage will increase (or decrease) output by that same percentage. For example, replicating a plant and its workforce should lead to a doubling of output.

Estimating the Production Function

There are many mathematical ways to represent the production process. The simplest, and most widely used, is the *Cobb-Douglas production function*. Besides the characteristics just discussed, another special feature of Cobb-Douglas is that the shares of income going to labor and capital are constant over time. Evidence from the U.S. confirms this result. From 1954 through 1993, labor compensation averaged 66 percent of output, and labor's share was within 1.5 percent of that average more than two-thirds of the time. The other factor, capital, averaged 34 percent of output as its compensation.[6]

Estimating the Effects of Technology

Technology is a critical element of the production function. Because economic models usually calculate technological change as the unexplained, residual growth in output, technology can be thought of as the growth in total factor productivity.

Typically production functions view technology as progressing at a constant rate and, therefore, *exogenous*, or outside the system.[7] However, statistical evidence supports the notion that technology is not totally exogenous but depends on capital formation. Specifically, we find that faster replacement of equipment (machines, computers, etc.) leads to faster application of new technology.[8] This result means that higher rates of investment in equipment will increase output and growth above and beyond the increased availability of capital services.[9]

To sum up the empirical results concerning production:

- The U.S. production process behaves in a manner consistent with a Cobb-Douglas production function. Labor receives about two-thirds of the output as its compensation while capital receives the remaining one-third.
- Faster accumulation of capital, particularly equipment, enhances the rate of technological change.

2. Demand for the Productive Factors, Capital and Labor

The technical relationships embodied in the production process determine the demand for capital and labor by businesses. The supply of each factor of production, interacting with demand, determines how much capital and labor will be hired and at what price.

"…faster replacement of equipment (machines, computers, etc.) leads to faster application of new technology."

Businesses demand labor and capital depending upon their contribution to output, information provided from the production function. Specifically, the demand for any factor depends upon how much additional output can be produced by adding one more unit of a particular factor, say another worker, while keeping other factors, namely capital, unchanged. Economists call this additional output, which is sold at the market price, *the marginal value product* of labor or capital.

Because of diminishing returns, however, adding more and more labor (capital) to the production process while holding capital (labor) the same, results in smaller and smaller additions to output. In other words, the marginal value product, or demand, for any factor declines as the amount of the factor increases.

The Demand for Labor

The demand for labor is taken from the profit-maximizing conditions of production, namely the marginal value of product equals the wage rate. That is, producers are willing to hire labor until its cost equals its return.[10]

The Demand for Capital

Capital demand is determined in a similar way. Businesses attempt to hire capital until its marginal value product equals the cost of hiring the services of capital. However, capital presents added difficulties.

One has to do with measurement problems. Labor costs are fairly easy to measure because workers are paid for services provided at a point in time. In contrast, capital is usually sold as a unit, such as a generator, which provides a flow of services over time. A *service or rental price* translates the up-front cost and multi-period flow of services into a per-period cost comparable to the wage rate for labor. We define the *service price* as an imputed measure of the cost of renting

a specific type of capital for one period. Components of the service price are the normal return paid to the owners of capital, replacement costs and taxes on capital.[11]

Another difficulty arises when it becomes necessary to incorporate more than one kind of capital into the production process. Although we have data on the payments made to all labor and all capital, we have no information on how payments to capital are divided among specific types. We handle this problem by assuming that the rate of return after inflation and taxes at the margin is the same for each type of capital. This assumption allows us to allocate the total income received by capital across all types of capital.[12]

3. Supply of the Productive Factors, Capital and Labor

The supply of productive factors depends upon the returns they receive. Workers and investors will supply more (less) labor and capital as the returns increase (decrease). Estimates of the supply of labor and capital can be obtained from historical data. Because workers and investors are interested in the aftertax return on the next hour worked or the next dollar invested, measuring marginal tax rates on labor and capital is an extremely important, and time-consuming, element of dynamic estimation. The discussion below on estimating labor and capital responsiveness discusses how we have handled this problem.

"…what matters are marginal tax rates, not average [tax rates]."

Estimating the Responsiveness of Labor to Take-home Pay

Workers supply labor based on aftertax wage rates. Specifically, in deciding whether to work one more hour, workers evaluate how much of the additional wages they can take home after taxes and inflation. As such, what matters are *marginal* tax rates, not average.

Taxes on labor income consist of personal income taxes on wages and salaries and payroll taxes at the federal, state and local levels. We use a micro tax model similar to those used by the Treasury Department and the Joint Committee on Taxation to measure the economy-wide marginal tax rate on wages and salaries resulting from the income tax.[13] We add payroll taxes to the marginal tax rate on labor income to the extent that wages and salaries for each income group fall below wage ceilings.[14]

Labor's response to a change in the aftertax wage rate is called the *elasticity of labor supply*. This elasticity is the percentage change in the amount of labor supplied in response to a percentage change in the aftertax wage rate. For example, a three percent increase in labor supplied for a 10 percent increase in the aftertax wage rate would have an elasticity of 0.3.

We have constructed an empirical relationship between total hours worked and prior changes in the real aftertax wage rate.[15] Depending on the mathematical form, our estimates of labor supply elasticity for the U.S. economy range between 0.2 and 0.4, which is consistent with those of other researchers.[16]

Like capital, labor adjusts fairly quickly. The biggest changes occur within three years and almost all are complete by the end of five.[17]

Estimating The Responsiveness of Capital to Its Aftertax Return

Investors supply capital based upon the *long-run*, normal return paid to owners of capital after inflation, replacement costs and taxes. As with workers, what matters are marginal tax rates.

Taxes are levied on assets directly and on the return accruing to the owners. Examples of taxes on assets are property or wealth taxes. Taxes on the returns accruing to the owners of capital are personal income taxes on dividends, net

business income, rental income, and interest; and corporate income taxes (usually imposed on income less tax depreciation). Our model averages the tax treatment for the 19 capital classifications of 5,000 specific assets, weighted by the appropriate capital stocks.[18]

To calculate marginal tax rates, we derive personal federal income tax rates on dividends, interest and other income from capital from our micro tax model. Corporate federal income tax rates are the statutory maximums. State corporate and personal income tax rates are assumed to apply to total private corporate and noncorporate GDP less capital consumption. Property taxes are computed using the value of the appropriate type of capital including land.

Tax depreciation presents an added complication. Depreciation is an artificial construct which specifies in law the rate at which the original cost of an asset can be deducted from income for tax purposes. Allowable tax lives generally differ across industries, and allowable depreciation methods vary among the several tax regimes in place in the U.S. since 1954.[19]

As we documented in an earlier study, the aftertax return paid to owners of capital is extremely stable.[20] Economy-wide, the aftertax return on capital averaged 3.4 percent from 1954 through 1994 with a standard deviation of 0.5%. [See Figure 1.]

"…faced with a lower (higher) aftertax return, investors decreased (increased) the amount of investment in real assets they were willing to undertake in the U.S."

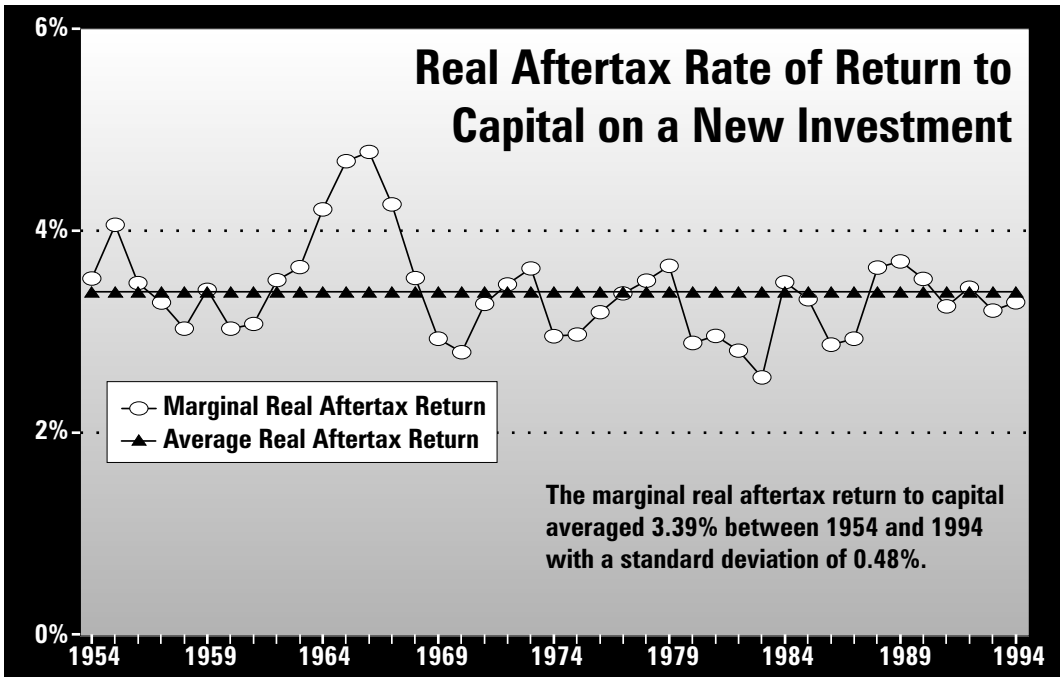


Figure 1

Real Aftertax Rate of Return to Capital on New Investment

More important, this stability remained despite many substantial changes in investment tax rules. Although tax increases (decreases) temporarily caused the real aftertax return on capital to increase (decrease), adjustments in the stock of capital brought the rate of return back to its average level. In other words, faced with a lower (higher) aftertax return, investors decreased (increased) the amount of investment in real assets they were willing to undertake in the U.S. About 60 percent of this adjustment occurs within two years of a shock, and nearly all of it takes place within five years. In short, *the supply of capital is extremely responsive to changes in its aftertax return.*[21]

Adjustments in the Stock of Capital

In the real world, adjustments to the stock of capital do not occur instantaneously. Investors generally have to wait some time before new plant or equipment can be brought on line. Our model incorporates these delays using evidence from the past 35 years. For example, we find that only 20 percent of equipment orders from corporations can be filled within 365 days. Depending upon the type of capital, adjustments can take from two to ten years with an average of three years.[22]

"…because tax depreciation schedules are biased against longer-lived assets, the mix of U.S. capital has moved toward shorter-lived assets."

The model also allows the mix of capital to change over time. Changing tax policy, which affects some capital to a greater degree than others, will result in different responses by type of asset. For example, because tax depreciation schedules are biased against longer-lived assets, the mix of U.S. capital has moved toward shorter-lived assets.[23] While allowing the mix to change, the model does keep the opportunity costs between each type of capital the same. In other words, the real aftertax return earned by investing another dollar in capital is the same across all asset types.

To sum up the empirical results with respect to the responsiveness of labor and capital supply:

- Capital investment in the U.S. economy is very responsive to changes in its aftertax return.
- The stock of capital adjusts fairly quickly to a change in return. Sixty percent of the adjustment occurs within two years and most of the remainder is completed by the fifth year.
- Labor is less responsive than investment to a change in its aftertax return. While responsiveness varies among demographic groups, for the U.S. economy as a whole, a 10 percent increase (decrease) in the aftertax wage rate will cause roughly a 3 percent increase (decrease) in labor supply.
- Most of the labor adjustments occur within five years.

4. Determinants of Aggregate Demand

The previous development determines how much labor and capital services will be hired and, therefore, how much output will be *supplied*. We now turn to the question of how much output will be *demanded* by consumers, investors, government and the rest of the world.

Government demand for private output is determined by the political process and, therefore, is outside the model. Foreign demand for U.S. goods and services (net exports) reduces the output available for domestic use.

"The higher the return on saving, the more willing people are to save."

What remains is private sector demand for output that is made up of personal consumption expenditures and investment. Investment is the change in the stock of capital plus replacement of capital due to wear and tear, obsolescence, and so forth. The demand for investment goods is determined by the supply of capital which has been discussed above. That leaves consumption demand.

For a particular level of income, consumption is jointly determined with savings, one being a complement of the other. Saving is the act of postponing consumption from today to the future. Savers receive a return as compensation for foregoing consumption. The higher the return on saving, the more willing people are to save.

In an earlier study, we found a historical relationship between total private savings and the average, economy-wide return to capital after taxes. Specifically,

experience of the last 45 years shows that a 10 percent increase (decrease) in the average aftertax return will produce a similar increase (decrease) in saving.[24] [See Figure 2.]

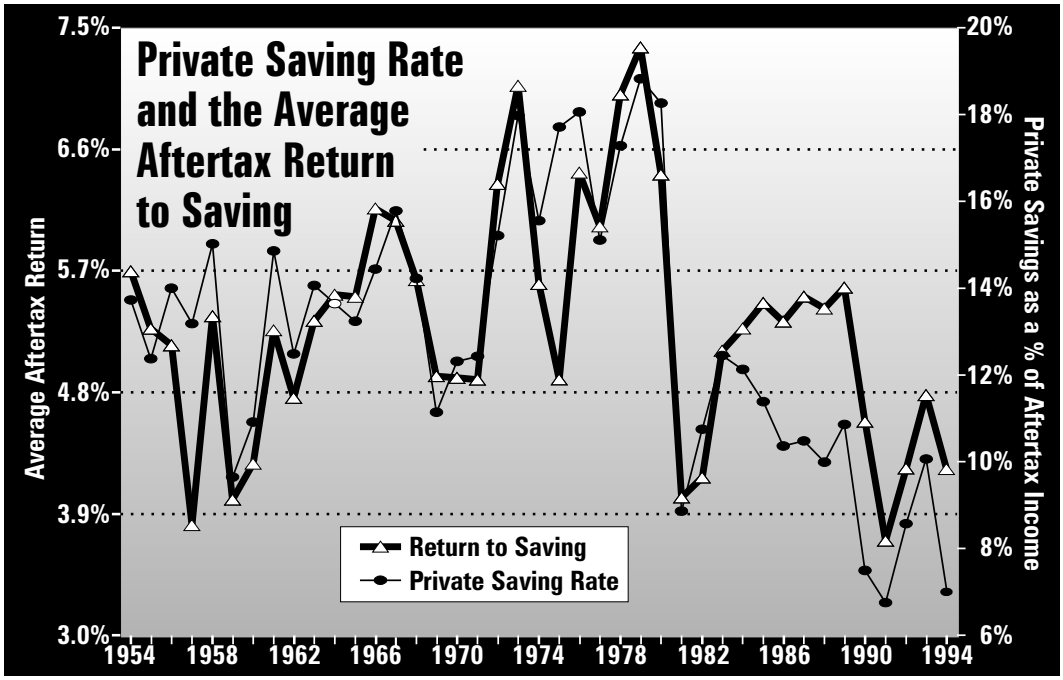


Figure 2

Private Saving Rate and the Average Aftertax Return to Saving

In other words:

- Saving is quite responsive to changes in its aftertax return.
- Equilibrium occurs when demand and supply are equal.

To reiterate, the previous section listed six questions (see p. 4) that were key in deciding how much effect tax policy would have on the economy and tax revenues. Our empirical analysis suggests the following answers to those questions:

❶ The U.S. production process behaves in a manner consistent with a Cobb-Douglas production function. Labor receives about two-thirds of the output as its compensation while capital receives the remaining one-third.

❷ Capital investment in the U.S. economy is very responsive to changes in its aftertax return.

❸ Moreover, the stock of capital adjusts fairly quickly to a change in return. Sixty percent of the adjustment occurs within two years and most of the remainder is completed by the fifth year.

❹ Saving is also quite responsive to changes in its aftertax return.

❺ Labor is less responsive than either saving or investment to a change in its aftertax return. While responsiveness varies among demographic groups, for the U.S. economy as a whole, a 10 percent increase (decrease) in the aftertax wage rate will cause roughly a 3 percent increase (decrease) in labor supply.

❻ Most of the labor adjustments occur within five years.

In other words, tax policy, particularly that which affects marginal tax rates on labor and capital, can have significant effects on aggregate economic activity and, therefore, on tax revenues.

Three Tax Policy Simulations

To illustrate how the neoclassical dynamic model we have estimated works, we have chosen three simulations that would represent a substantial change in existing federal taxes. Results for these simulations are discussed below as well as the first step in any simulation, setting out the baseline.

The Baseline

Simulations must begin with a *baseline*. The baseline is a forecast of the key economic variables contained in the model assuming no policy changes.[25]

Our forecast of the baseline begins with the latest projections from the Congressional Budget Office.[26] We assume that the federal government grows as provided under current law and that other sectors grow sufficiently to yield the total target rate of growth. We project factor incomes using historical share relationships. For example, labor's share of private output is a constant two-thirds. Historical trends also are used to divide labor income into wages and salaries, social insurance payments and fringe benefits. We use a similar procedure for capital income components.

Table 1 shows the baseline forecast of key economic variables for selected years. Over the next fourteen years, the U.S. economy is expected to grow at 2.5 percent a year after inflation. The annual increase in the stock of U.S. capital is assumed to be roughly 4.7 percent, employment about 1.6 percent and the average wage rate about one percent.

Table 1

BASELINE FORECAST FOR KEY ECONOMIC VARIABLES

BASELINE FORECAST FOR KEY ECONOMIC VARIABLES (amounts in $billions)	1996	2000	2005	2010
OUTPUT				
GDP	7,459.2	9,132.7	11,746.5	15,107.5
Price Change[1]	2.6%	2.6%	2.6%	2.6%
GDP ($1987)	5,769.3	6,374.4	7,214.9	8,165.6
Real Growth Rate	2.0%	2.5%	2.5%	2.5%
CAPITAL FORMATION				
Gross Investment	1,205.4	1,478.0	1,848.4	2,335.2
Net investment[2]	981.6	1,143.0	1,400.0	1,745.7
Stock of capital	21,202.4	25,520.6	31,923.7	39,932.1
% change	4.9%	4.7%	4.6%	4.6%
Average aftertax return to capital[3]	4.47%	4.50%	4.66%	4.82%
Real aftertax rate of return to new corporate capital[4]	3.52%	3.56%	3.60%	3.53%
EMPLOYMENT & EARNINGS				
Jobs (Full-time Equivalent in millions)[5]	116.5	123.4	133.2	143.9
% Change	1.2%	1.5%	1.5%	1.6%
Average real wage rate	$16.22	$16.91	$17.77	$18.66
% Change	0.7%	1.0%	1.0%	1.0%
Average aftertax real wage rate	$9.49	$10.24	$10.81	$11.26
% Change	0.7%	1.2%	0.8%	0.9%
CONSUMPTION, SAVING & WEALTH				
Personal consumption	4,943.1	6,080.5	7,927.4	10,303.1
Change in private domestic wealth[6]	899.8	1,077.9	1,327.7	1,657.4
Private domestic income[7]	5,842.9	7,158.4	9,255.1	11,960.5
Real disposable private income	4,341.8	4,816.8	5,541.8	6,357.6
Real private savings	400.9	445.7	533.8	634.7
Private savings rate[8]	9.2%	9.3%	9.6%	10.0%

1 Percent change in the implicit deflator for private output.

2 Gross investment less depreciation.

3 Net aftertax income to capital divided by the stock of U.S. capital.

4 Return to an investor on a new investment in corporate capital less taxes, inflation and depreciation.

5 Hours worked divided by 1,960 hours, or 49, 40-hour weeks a year.

6 Change in the total stock of capital plus the change in net foreign investment.

7 Personal consumption plus the change in private domestic wealth. More comprehensive measure of income than Commerce's because it includes asset revaluation and the foreign sector.

8 Real private savings divided by real disposable private income.

Simulation 1: Head Tax for Federal Taxes

The first simulation assumes that *all* federal taxes—income, payroll and excise—would be replaced with a head, or per capita, tax. For example, the $1,367 billion in revenue collected by the federal government in 1995 would amount to roughly $5,200 per person.

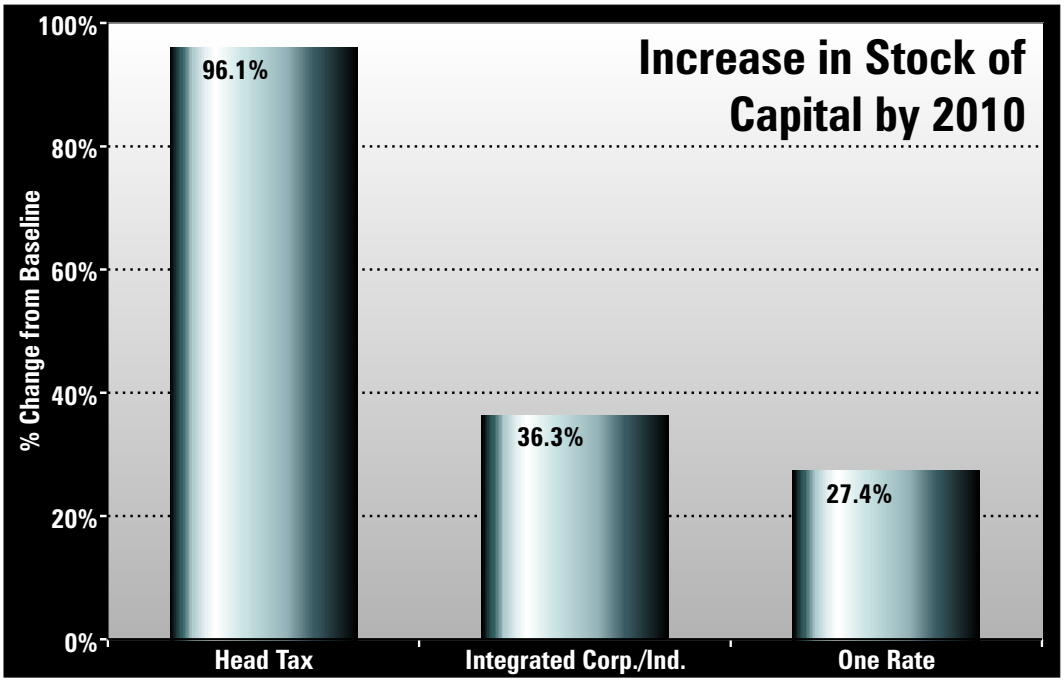


Figure 3
Increase in Stock of Capital by 2010

Although the chance that such a policy change would occur is virtually nil, we have selected this simulation for a different reason. Because a head tax does not depend on how much wages or capital income a person earns, it removes all the incentive or disincentive effects of taxes. In other words, there would be no first-order price effects from federal taxes. The resulting increase in economic activity represents the outer bound possible with federal tax reform.

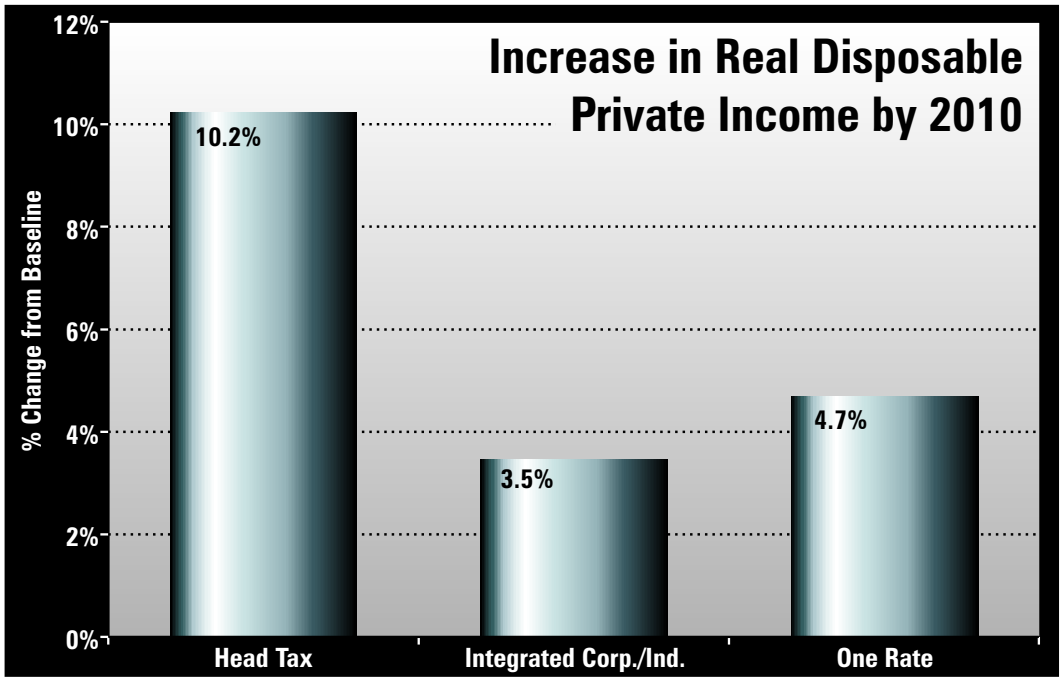
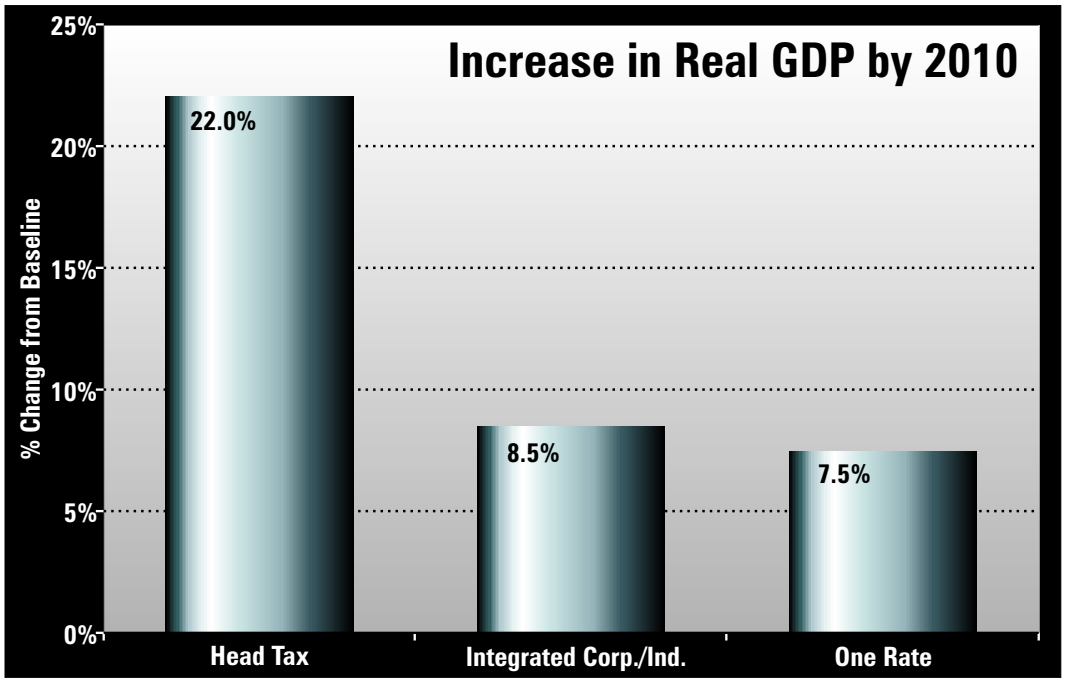


Figure 4
Increase in Real Disposable Private Income by 2010

Removing all the disincentive effects of federal taxes would increase the size of the U.S. economy by over one-fifth. The lion's share of this higher growth stems from the initial doubling in the real aftertax return to capital that would occur by replacing federal taxes with a head tax. Saving and investment would surge in response, gradually driving the return back to its long-run level in about ten years.

Figure 5

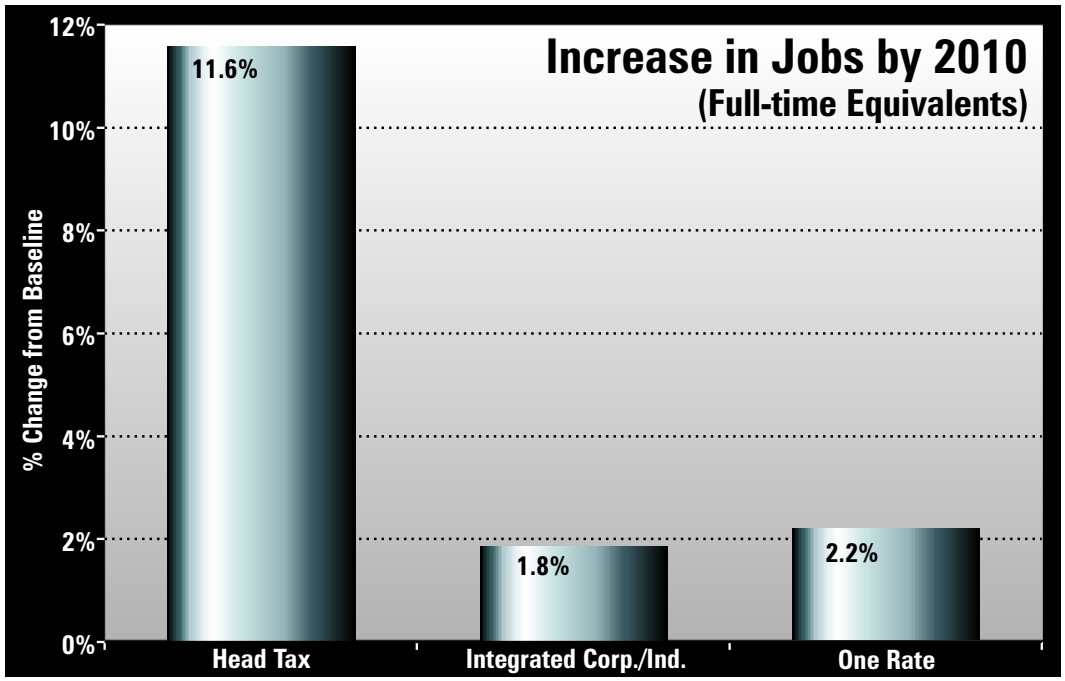
Increase in Real GDP by 2010



By the year 2010, real GDP would be 22 percent higher than the baseline. The stock of U.S. capital would be almost double the baseline and employment would be 11.6 percent higher. Because of higher growth and the elimination of taxes on wages, the take-home pay of workers would be 71 percent higher and disposable income 10.2 percent higher. [See Table 2 and Figures 3 through 7.]

Figure 6

Increase in Jobs by 2010



CHANGE IN KEY ECONOMIC VARIABLES: HEAD TAX - FEDERAL TAXES ONLY (amounts in $billions)	1996	2000	2005	2010
OUTPUT				
GDP ($1987)	6,599.6	7,706.7	8,893.5	9,966.0
Difference from Baseline	830.3	1,332.3	1,678.6	1,800.5
% Change from Baseline	14.4%	20.9%	23.3%	22.0%
Addition to Real Growth Rate	14.4%	3.9%	2.1%	1.3%
CAPITAL FORMATION				
Gross Investment	1,621.8	1,877.7	3,207.9	4,294.0
Difference from Baseline	416.4	399.6	1,359.6	1,958.8
% Change from Baseline	34.5%	27.0%	73.6%	83.9%
Net investment[1]	4,108.1	3,917.2	2,875.7	3,664.9
Difference from Baseline	3,126.5	2,774.3	1,475.6	1,919.2
% Change from Baseline	318.5%	242.7%	105.4%	109.9%
Stock of capital[2]	24,328.9	45,722.8	62,260.7	78,313.8
Difference from Baseline	3,126.5	20,202.2	30,337.0	38,381.8
% Change from Baseline	14.7%	79.2%	95.0%	96.1%
Average aftertax return to capital[3]	12.00%	6.89%	4.12%	4.22%
Difference from Baseline	7.53%	2.39%	-0.55%	-0.59%
% Change from Baseline	168.2%	53.2%	-11.7%	-12.3%
Real aftertax rate of return to new corporate capital[4]	9.12%	4.35%	3.73%	3.67%
Difference from Baseline	5.60%	0.79%	0.12%	0.14%
% Change from Baseline	159.1%	22.1%	3.4%	3.9%
EMPLOYMENT & EARNINGS				
Jobs (Full-time Equivalent in millions)[5]	127.8	136.7	148.9	160.6
Difference from Baseline	11.3	13.3	15.7	16.7
% Change from Baseline	9.7%	10.7%	11.8%	11.6%
Average real wage rate	$16.98	$18.48	$19.66	$20.50
Difference from Baseline	$0.76	$1.57	$1.89	$1.83
% Change from Baseline	4.7%	9.3%	10.6%	9.8%
Average aftertax real wage rate	$15.93	$17.33	$18.46	$19.25
Difference from Baseline	$6.44	$7.09	$7.65	$7.99
% Change from Baseline	67.9%	69.3%	70.7%	70.9%
CONSUMPTION, SAVING & WEALTH				
Personal consumption	5,600.2	7,279.5	8,815.5	11,203.1
Difference from Baseline	657.0	1,199.0	888.1	900.0
% Change from Baseline	13.3%	19.7%	11.2%	8.7%
Change in private domestic wealth[6]	2,396.2	2,605.0	3,021.9	4,197.8
Difference from Baseline	1,496.5	1,527.1	1,694.2	2,540.5
% Change from Baseline	166.3%	141.7%	127.6%	153.3%
Private domestic income[7]	7,996.4	9,884.5	11,837.4	15,400.9
Difference from Baseline	2,153.5	2,726.1	2,582.3	3,440.4
% Change from Baseline	36.9%	38.1%	27.9%	28.8%
Real disposable private income	6,111.3	6,421.7	6,299.0	7,007.6
Difference from Baseline	1,769.5	1,604.9	757.2	650.0
% Change from Baseline	40.8%	33.3%	13.7%	10.2%
Real private savings	1,512.7	909.7	535.5	613.1
Difference from Baseline	1,111.8	463.9	1.7	-21.6
% Change from Baseline	277.4%	104.1%	0.3%	-3.4%
Private savings rate[8]	24.8%	14.2%	8.5%	8.7%
Difference from Baseline	15.5%	4.9%	-1.1%	-1.2%
% Change from Baseline	168.1%	53.1%	-11.7%	-12.4%

Table 2

CHANGE IN KEY ECONOMIC VARIABLES: HEAD TAX - FEDERAL TAXES ONLY

1 Gross investment less depreciation.

2 Includes revaluation of assets.

3 Net aftertax income to capital divided by the stock of U.S. capital.

4 Return to an investor on a new investment in corporate capital less taxes, inflation and depreciation.

5 Hours worked divided by 1,960 hours, or 49, 40-hour weeks a year.

6 Change in the total stock of capital plus the change in net foreign investment.

7 Personal consumption plus the change in private domestic wealth. More comprehensive measure of income than Commerce's because it includes asset revaluation and the foreign sector.

8 Real private savings divided by real disposable private income.

Table 3

CHANGE IN KEY ECONOMIC VARIABLES: INTEGRATE CORPORATE AND INDIVIDUAL INCOME TAXES

1 Gross investment less depreciation.

2 Includes revaluation of assets.

3 Net aftertax income to capital divided by the stock of U.S. capital.

4 Return to an investor on a new investment in corporate capital less taxes, inflation and depreciation.

5 Hours worked divided by 1,960 hours, or 49, 40-hour weeks a year.

6 Change in the total stock of capital plus the change in net foreign investment.

7 Personal consumption plus the change in private domestic wealth. More comprehensive measure of income than Commerce's because it includes asset revaluation and the foreign sector.

8 Real private savings divided by real disposable private income.

CHANGE IN KEY ECONOMIC VARIABLES: INTEGRATE CORPORATE AND INDIVIDUAL INCOME TAXES (amounts in $billions)				
	1996	2000	2005	2010
OUTPUT				
GDP ($1987)	5,936.1	6,845.4	7,862.1	8,858.0
Difference from Baseline	166.8	470.9	647.2	692.4
% Change from Baseline	2.9%	7.4%	9.0%	8.5%
Real Growth Rate	2.9%	1.4%	0.9%	0.5%
CAPITAL FORMATION				
Gross Investment	1,178.9	1,563.4	2,262.1	2,953.3
Difference from Baseline	-26.5	85.4	413.8	618.1
% Change from Baseline	-2.2%	5.8%	22.4%	26.5%
Net investment[1]	2,244.2	2,478.9	2,096.2	2,478.8
Difference from Baseline	1,262.6	1,335.9	696.1	733.2
% Change from Baseline	128.6%	116.9%	49.7%	42.0%
Stock of capital[2]	22,465.0	32,102.6	43,170.5	54,439.1
Difference from Baseline	1,262.6	6,582.0	11,246.8	14,507.0
% Change from Baseline	6.0%	25.8%	35.2%	36.3%
Average aftertax return to capital[3]	7.08%	5.82%	4.20%	4.11%
Difference from Baseline	2.60%	1.32%	-0.46%	-0.71%
% Change from Baseline	58.2%	29.4%	-9.9%	-14.6%
Real aftertax rate of return to new corporate capital[4]	5.69%	4.33%	3.76%	3.64%
Difference from Baseline	2.17%	0.77%	0.16%	0.11%
% Change from Baseline	61.6%	21.5%	4.3%	3.0%
EMPLOYMENT & EARNINGS				
Jobs (Full-time Equivalent in millions)[5]	116.6	126.1	136.1	146.5
Difference from Baseline	0.0	2.7	2.9	2.6
% Change from Baseline	0.0%	2.2%	2.2%	1.8%
Average real wage rate	$16.64	$17.70	$18.87	$19.82
Difference from Baseline	$0.42	$0.78	$1.10	$1.15
% Change from Baseline	2.6%	4.6%	6.2%	6.2%
Average aftertax real wage rate	$9.51	$10.90	$11.85	$12.30
Difference from Baseline	$0.02	$0.66	$1.03	$1.04
% Change from Baseline	0.2%	6.5%	9.5%	9.2%
CONSUMPTION, SAVING & WEALTH				
Personal consumption	5,185.3	6,551.4	8,337.6	10,697.7
Difference from Baseline	242.2	470.8	410.2	394.6
% Change from Baseline	4.9%	7.7%	5.2%	3.8%
Change in private domestic wealth[6]	1,316.3	1,624.9	1,872.9	2,427.2
Difference from Baseline	416.5	547.1	545.2	769.8
% Change from Baseline	46.3%	50.8%	41.1%	46.4%
Private domestic income[7]	6,501.6	8,176.3	10,210.5	13,124.9
Difference from Baseline	658.7	1,017.9	955.4	1,164.4
% Change from Baseline	11.3%	14.2%	10.3%	9.7%
Real disposable private income	4,896.0	5,469.0	5,864.6	6,578.3
Difference from Baseline	554.2	652.2	322.9	220.7
% Change from Baseline	12.8%	13.5%	5.8%	3.5%
Real private savings	714.6	654.7	508.5	560.3
Difference from Baseline	313.8	208.9	-25.3	-74.4
% Change from Baseline	78.3%	46.9%	-4.7%	-11.7%
Private savings rate[8]	14.6%	12.0%	8.7%	8.5%
Difference from Baseline	5.4%	2.7%	-1.0%	-1.5%
% Change from Baseline	58.1%	29.4%	-10.0%	-14.7%

Simulation 2: Integration of Corporate and Individual Income Taxes

An area of longtime concern in tax policy circles is that of integrating corporate and personal income taxes.[27] Under the current system, corporations pay tax on the profits they earn. Aftertax profits are then either paid out in dividends to shareholders or retained and reinvested in the company with the purpose of increasing its value. Aftertax profits are taxed again through the individual income tax because shareholders must pay tax on dividends and any capital gains they realize through the sale of stock. All of the three major proposals—the USA tax, the flat tax and the national sales tax—in the current tax reform debate would eliminate this two-tiered taxation.

The second simulation addresses the corporate integration problem by eliminating the taxation of dividends and capital gains at the individual level. All other aspects of the current income tax system remain the same. Initially, we increase personal income tax rates to offset any static revenue loss. However, as growth picks up the rates are lowered to raise the same amount of individual income tax revenue as under current law. Rates are changed by the same percentage to maintain the existing, graduated structure.

Corporate integration would increase the economy by almost one-tenth. Initially, the real aftertax return to corporate capital would increase by over 60 percent, resulting in considerably more saving and investment. By the year 2010, real GDP would be 8.5 percent higher than the baseline, and the stock of U.S. capital would be one-third greater. Employment would increase by 1.8 percent, worker take-home pay would be 9.2 percent higher and disposable income 3.5 percent higher. [See Table 3 and Figures 3 through 7.]

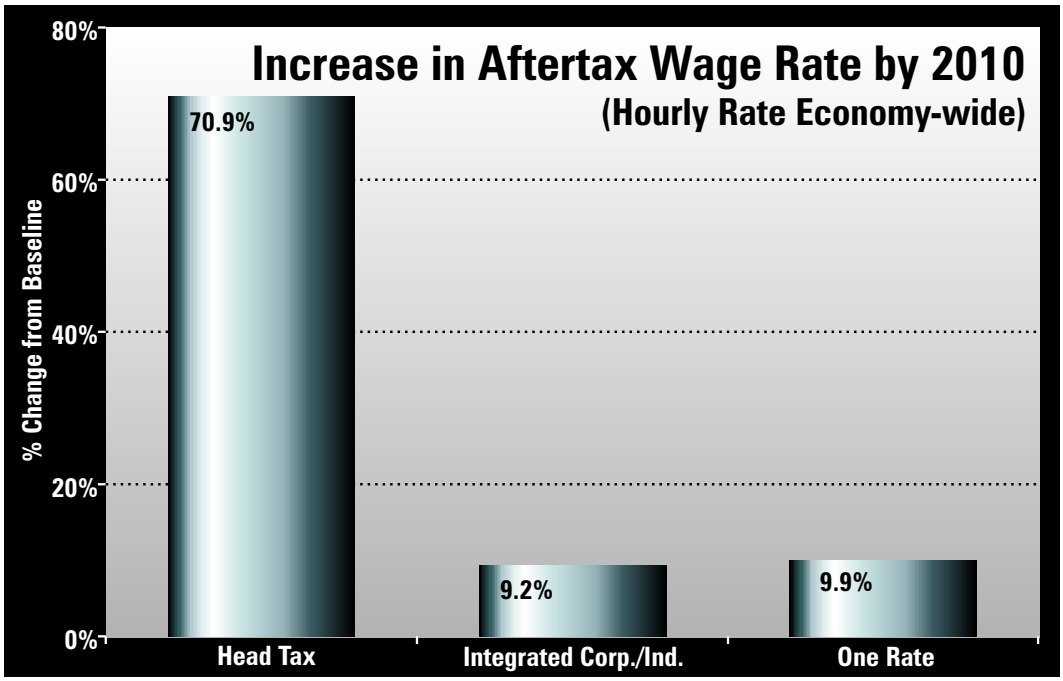


Figure 7
Increase in Aftertax Wage Rate by 2010

Simulation 3: One Rate for Corporate and Individual Income Taxes

Another theme running through the current tax reform debate is the desire to establish a uniform, or flat, rate. Adoption of a single, low tax rate is a core recommendation of the Kemp Commission. Flat tax and national sales tax proposals also contain a single rate. Although the USA tax proposal contains graduated rates, it, too, could be changed to one rate.

Table 4

CHANGE IN KEY ECONOMIC VARIABLES: ONE RATE FOR CORPORATE AND INDIVIDUAL INCOME TAXES

1 Gross investment less depreciation.

2 Includes revaluation of assets.

3 Net aftertax income to capital divided by the stock of U.S. capital.

4 Return to an investor on a new investment in corporate capital less taxes, inflation and depreciation.

5 Hours worked divided by 1,960 hours, or 49, 40-hour weeks a year.

6 Change in the total stock of capital plus the change in net foreign investment.

7 Personal consumption plus the change in private domestic wealth. More comprehensive measure of income than Commerce's because it includes asset revaluation and the foreign sector.

8 Real private savings divided by real disposable private income.

CHANGE IN KEY ECONOMIC VARIABLES: ONE RATE FOR CORPORATE AND INDIVIDUAL INCOME TAXES (amounts in $billions)				
	1996	2000	2005	2010
OUTPUT				
GDP ($1987)	5,915.7	6,667.2	7,726.8	8,776.1
Difference from Baseline	146.4	292.7	511.9	610.5
% Change from Baseline	2.5%	4.6%	7.1%	7.5%
Real Growth Rate	2.5%	0.9%	0.7%	0.5%
CAPITAL FORMATION				
Gross Investment	1,250.4	1,583.9	2,224.3	2,935.7
Difference from Baseline	45.1	105.9	376.0	600.5
% Change from Baseline	3.7%	7.2%	20.3%	25.7%
Net investment1	1,701.0	1,855.1	2,016.3	2,441.3
Difference from Baseline	719.4	712.1	616.2	695.7
% Change from Baseline	73.3%	62.3%	44.0%	39.9%
Stock of capital2	21,921.8	29,818.3	39,801.1	50,882.0
Difference from Baseline	719.4	4,297.8	7,877.4	10,949.9
% Change from Baseline	3.4%	16.8%	24.7%	27.4%
Average aftertax return to capital[3]	6.42%	5.49%	4.84%	4.76%
Difference from Baseline	1.95%	1.00%	0.18%	-0.06%
% Change from Baseline	43.6%	22.1%	3.9%	-1.2%
Real aftertax rate of return to new corporate capital[4]	5.01%	4.02%	3.81%	3.69%
Difference from Baseline	1.49%	0.46%	0.21%	0.16%
% Change from Baseline	42.4%	12.8%	5.8%	4.5%
EMPLOYMENT & EARNINGS				
Jobs (Full-time Equivalent in millions)[5]	117.6	124.2	135.8	147.0
Difference from Baseline	1.0	0.8	2.6	3.1
% Change from Baseline	0.9%	0.6%	2.0%	2.2%
Average real wage rate	$16.46	$17.53	$18.61	$19.57
Difference from Baseline	$0.24	$0.62	$0.84	$0.91
% Change from Baseline	1.5%	3.7%	4.7%	4.9%
Average aftertax real wage rate	$9.97	$10.77	$11.69	$12.38
Difference from Baseline	$0.48	$0.53	$0.87	$1.12
% Change from Baseline	5.0%	5.2%	8.1%	9.9%
CONSUMPTION, SAVING & WEALTH				
Personal consumption	5,087.4	6,323.4	8,249.9	10,674.2
Difference from Baseline	144.2	242.8	322.5	371.0
% Change from Baseline	2.9%	4.0%	4.1%	3.6%
Change in private domestic wealth[6]	1,191.4	1,440.1	1,834.2	2,395.2
Difference from Baseline	291.6	362.3	506.5	737.8
% Change from Baseline	32.4%	33.6%	38.1%	44.5%
Private domestic income[7]	6,278.7	7,763.5	10,084.1	13,069.4
Difference from Baseline	435.8	605.1	829.0	1,108.8
% Change from Baseline	7.5%	8.5%	9.0%	9.3%
Real disposable private income	4,708.9	5,185.9	5,867.4	6,656.0
Difference from Baseline	367.0	369.2	325.7	298.4
% Change from Baseline	8.5%	7.7%	5.9%	4.7%
Real private savings	623.8	585.7	586.7	656.3
Difference from Baseline	222.9	140.0	52.9	21.7
% Change from Baseline	55.6%	31.4%	9.9%	3.4%
Private savings rate[8]	13.2%	11.3%	10.0%	9.9%
Difference from Baseline	4.0%	2.0%	0.4%	-0.1%
% Change from Baseline	43.5%	22.1%	3.8%	-1.2%

The third simulation assumes a uniform rate for both the individual and corporate income taxes. All other aspects of the current income tax system remain the same. Initially, the rate is set to produce the same amount of income tax revenue as current law. However, with growth, the rate is lowered to raise the same amount of individual income tax revenue as under current law and ultimately reaches 19 percent.

Under a single income tax rate real GDP would be 7.5 percent higher than the baseline by the year 2010. The initial 40-percent increase in the real aftertax return to capital would lead to a stock of capital one-fourth greater than the baseline by 2010. Employment would increase by 2.2 percent, worker take-home pay would be 9.9 percent higher and disposable income 4.7 percent higher. [See Table 4 and Figures 3 through 7.]

Implications and Limitations of the Results

The results from our model suggest that tax policy can significantly affect the economy. Specifically, changes in tax policy initially change incentives to work, save and invest. As the price of labor (work) changes, so do the amounts that workers are willing to supply and businesses are willing to hire. As the price of capital (saving and investing) changes, so do the amounts that investors are willing to supply and businesses are willing to hire. Moreover, the resulting adjustments in employment and the stock of capital occur fairly quickly. As the usage and prices of labor and capital change so do aggregate output, incomes and government revenue.

"…tax reform aimed at reducing disincentives to saving and investing has the potential to increase annual economic output roughly 10 to 15 percent."

Dynamic analysis should not be used as a forecast of the future, however. First, model simulations are only as good as the baseline forecast, and economists are lucky if they can forecast GDP one or two quarters out, let alone one or two years. Second, model simulations assume that only one policy measure (taxes) changes while everything else remains the same. In the real world, thousands of variables within and without the U.S. economy are always changing. It would be sheer coincidence if a model-predicted value of GDP would equal the actual value for any year of the forecast period.

Despite these limitations, which also apply to static estimates, dynamic analysis can lead to improved policy making. For example, the simulations contained in this report suggest that tax reform aimed at reducing disincentives to saving and investing has the potential to increase annual economic output roughly 10 to 15 percent. Such a boost in growth would lead to more jobs and higher incomes. And the expanded tax base would lead to higher revenues, offsetting most or all of the losses predicted by static analysis.

Conclusion

Tax policy can have significant effects on the U.S. economy. Dynamic analysis, which attempts to measure the extent of these effects, can provide valuable information to policy makers about which alternative is more likely to reach the desired goals.

Endnotes

1. The National Commission on Economic Growth and Tax Reform, *Unleashing America's Potential: A Pro-Growth, Pro-Family Tax System for the 21st Century*, Washington, DC, January 1996. The other five working principles are: fairness, simplicity, neutrality, visibility and stability.
2. See Gary and Aldona Robbins, *Eating Out Our Substance: How Taxation Affects Saving*; and *Eating Out Our Substance (II): How Taxation Affects Investment*. Institute for Policy Innovation, TaxAction Analysis, Policy Reports No. 131 and 134, September-November 1995.
3. Gary Robbins and Aldona Robbins, *Cooking the Books: Exposing the Tax and Spend Bias of Government Forecasts*, Institute for Policy Innovation, TaxAction Analysis, Policy Report No. 129, February 1995.
4. Government output is simply the amount spent on compensation of government employees.
5. In economic parlance, this is called the law of diminishing returns.
6. The Cobb-Douglas production function yields estimates within plus or minus 1.5 percent of total U.S. output for most years. Mathematically, it is represented as $\mathbf{Q = A * L}^{al} * \mathbf{K}^{(1-al)}$ where **Q** is output, **A** is the technology term, L is labor, K is an index of capital services and ***al*** is labor's share of output. The model calculates a fixed ***al*** at each point in time to be consistent with historical or baseline data. We estimate ***al*** to be 66.8 percent with a standard deviation of 2 percent.
7. We find a simple trend term explains about 98.6 percent of technological change.
8. Adding the rate of investment in equipment to trend significantly enhances the explanatory power of the equation. Investment in structures did not have any significant effect on explaining technical change. Experiments relating technology to all producers' fixed investment yield inferior results.
9. The equation we have estimated is as follows:

   T=0.01139+0.79395×((Ice+Ine)/(Kce+Kne)-(Ice-1+Ine-1)/(Kce-1+Kne-1))+T-1
   (4.904) (5.186)

   where **T** is the technology index, **Ice** and **Ine** are corporate and noncorporate investment in producers' durable equipment, and **Kce** and **Kne** are the stocks of corporate and noncorporate producers' durable equipment. The equation indicates that total factor productivity increases faster during periods of more rapid accumulation of equipment. The t-statistics for the two estimated coefficients are shown in parentheses below. The equation explains over 99 percent of the variation in the technology index.
10. In the Cobb-Douglas production function, wages equal marginal value product when $\mathbf{w = (}^{al}\mathbf{*Q)/L}$ where w is the hourly rate of labor compensation and the remaining terms are as previously defined in endnote 6.
11. For a technical derivation of the service price see Gary Robbins and Aldona Robbins, *Eating Out Our Substance (II): How Taxation Affects Investment*, Institute for Policy Innovation, TaxAction Analysis, Policy Report No. 134, November 1995, Appendix A and B.
12. There are six distinct types of capital in the Fiscal Associates Tax Model: (1) producers' durable equipment, (2) non-residential structures, (3) residential structures, (4) inventories, (5) nonfarm land and (6) farm land. The model assigns each type of capital to three production sectors and further divides each category by form of legal ownership, i.e., corporate, non-corporate and households and institutions. Certain categories of capital are, by definition, zero, such as household producers' durable equipment. Thus, there are a total of 19 major capital classifications in the Fiscal Associates Tax Model. The model computes capital stocks according to estimated economic depreciation schedules for a disaggregated matrix of investment flows over the period 1821-1994. This matrix consists of 51 industries and 72 specific capital assets, e.g., furniture in chemical manufacturing.
13. The Fiscal Associates Tax Model contains historical information on personal income, including its labor component, from the *Statistics of Income* for 72 income classes over the period 1954-92. This data contains information from the Internal Revenue Service on the distribution of income items reported on tax returns for the major components of income by Adjusted Gross Income, marital status, and type of deduction. The Tax Model separates individuals into groups that are homogeneous with respect to the aftertax prices they face and computes effective average and marginal tax rates using the population and income weights of the groups. We extrapolate these data to the year 2010 to be consistent with the latest economic baseline from the Congressional Budget Office. The Tax Model provides measures of effective average and marginal tax rates as well as measures of aggregate tax liability.
14. For example, the Social Security tax rate will apply to wages up to $62,700 in 1996 while the Medicare tax rate will apply to all wages. Both the employer and employee portions of the tax are included because they must ultimately come out of labor compensation.
15. The estimated equation for Labor Hours Worked is as follows:

   ln(Lt)=clt+0.042837×ln(waft)+0.237148×ln(waft(-1))+0.100329×ln(waft(-2))
   +0.108828×ln(waft(-3) +0.079331×ln(waft(-4)

   where **Lt** is total hours worked and **waft** is the real aftertax wage rate. The equation explains 98.8 percent of the variation in hours worked.
16. Most researchers separate the labor market into segments—a primary consisting of working-age males and a secondary worker segment made up of everyone else. The consensus estimate for primary labor market participants is 0.11. The supply elasticity for married women is about 0.9. The rest of the labor force seems to fall somewhere between estimates for working-age men and married women. The weighted average labor responsiveness for the U.S. labor force as a whole is 0.37. See J. Pencavel, "Labor Supply of Men," *Handbook of Labor Economics*, Vol. 1, O. Ashenfelter and R. Layard, eds. (Amsterdam: North Holland, 1986), J. Hausman, "Labor Supply," in *How Taxes Affect Economic*

Behavior, H.J. Aaron and J. Pechman, eds, (Washington, D.C.: Brookings Institution, 1981), pp. 27-72 and J. A. Hausman and J.M. Poterba, "Household Behavior and the Tax Reform Act of 1986," *Journal of Economic Perspectives*, Summer 1987.

17. The equation cited in endnote 15 indicates that a permanent increase in the aftertax wage rate of 10 percent would lead to nearly one-half a percent increase in labor supply over the baseline in the first year, a 2.8 percent increase in the second year, a 3.8 percent increase by the third year, falling to a 2.8 percent increase by the third year, and, finally, a long-run increase of 1.9 percent.
18. See endnote 12 for more detail.
19. These regimes include: (1) Bulletin F Guideline Lives, (2) Class Lives, using Asset Depreciation Range (ADR) write-off methods, (3) ADR, using that life within the given range that minimizes the service price (accounting for different investment tax credit rates according to the chosen depreciable life), (4) Accelerated Cost Recovery System (ACRS) as originally passed in 1981 under the Economic Recovery Tax Act (ERTA), (5) ACRS as amended in 1984 through 1986, and (6) Modified ACRS passed in 1986 to the present.
20. See Robbins and Robbins, *Eating Out Our Substance (II): How Taxation Affects Investment*.
21. The elasticity is said to be infinite. That is, any increase (decrease) in the aftertax return to capital brings forth an infinite increase (decrease) in the amount of capital supplied. Graphically, the supply of capital is a horizontal, straight line at the current aftertax return.
22. On a weighted average basis, 33 percent of the adjustment occurs in the first year and 58 percent by the end of the second year.
23. During the 1950s and early 1960s, structures composed roughly 40 to 50 percent of fixed nonresidential investment. Today, however, structures make up only 28 percent. While some of this decline may be due to technological and other reasons, part of it is tied to the tax depreciation system. See Gary Robbins and Aldona Robbins, *Neutral Cost Recovery: Investing for Growth, Not Planning for Taxes*, Institute for Policy Innovation, Tax Action Analysis, Policy Report No. 126, August 1994.
24. Gary Robbins and Aldona Robbins, *Eating Out Our Substance: How Taxation Affects Saving*.
25. The underlying data in our model are from the Commerce Department's National Income and Product Accounts. These accounts describe the output of the U.S. economy in terms of what was produced, who produced it and at what compensation. Construction of a baseline requires making projections of these accounts over the forecast period, in this case through the year 2010. Our model currently uses the NIPA accounts before the latest major revision. That is, the price deflators are the fixed-weight measures with 1987 as the base year.
26. Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1996-2000*, Washington, DC: U.S. Government Printing Office, January 1995. Changes made in the mid-year update also were incorporated.
27. U.S. Dept. of the Treasury, *Blueprints for Basic Tax Reform*, Washington, DC: U.S. Gov't Printing Office, Jan. 17, 1977; and U.S. Dept. of the Treasury, *Integration of the Individual and Corporate Tax Systems: Taxing Business Income Once*, Washington, DC: U.S. Gov't Printing Office, January 1992.

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