Introduction

In a letter to the *Illinois Gazette* in 1846, Abraham Lincoln wrote: "I believe it is an established maxim in morals that he who makes an assertion without knowing whether it is true or false is guilty of falsehood."

So it is with government forecasting. As Gary and Aldona Robbins ably set forth in *Cooking the Books: Exposing the Tax and Spend Bias of Government Forecasts*, the federal government has seriously flawed methods for developing its economic projections. Even those who hesitate to buy into dynamic forecasting must agree that the track record of current forecasting models is not very good, and must agree that flawed analysis is leading to flawed policy. Even skeptics of dynamic forecasting must acknowledge the deficiencies of the last two decades and the economic havoc they have wrought.

The Robbins have laid out a straightforward approach to resolving the deficiencies of the current forecasting models and improving revenue and expenditure predictions. Particularly important are their proposals for bringing sunshine into the "black boxes" of government forecasting. If forecasting methods are valid, they must stand up to public examination and review.

The current methods encourage neither sunshine nor accuracy. Stricter standards must place greater emphasis on analysis of past data for what the Robbins call "backcasts" based on real data, not approximations of data.

Finally, the Robbins make an important contribution by calling for the symmetrical treatment of tax reductions and tax increases. There are clear negative growth and revenue implications of tax increases which are simply not acknowledged by the government's current forecasting models.

Until these errors are corrected, government forecasts will continue to more closely resemble alchemy than modern economic science. The Lehrman Institute is pleased to have participated with the Institute for Policy Innovation in this worthwhile study, and hopes that its recommendations will lead to better public policy in the future.

Lewis E. Lehrman
Chairman, The Lehrman Institute

Executive Summary

Economic forecasting was once an obscure topic happily left to number crunchers in the basement of the Treasury Department. But government forecasting has become much more important as a result of deficit reduction efforts such as Gramm-Rudman-Hollings (1985) and the Omnibus Budget Reconciliation Act of 1990 (OBRA90) , which ask of every tax and spending bill "How will it affect the deficit?". Today, government forecasters have virtual veto authority over tax and spending issues.

By ignoring the effects of tax and spending policies on economic activity, static forecasts are biased in favor of higher taxes, spending, and deficits.

It is therefore critical that government forecasts be as accurate and reliable as possible. Unfortunately, current government forecasting methods leave much to be desired:

- Six out of seven multi-year deficit forecasts made between 1986-91 underestimated the deficits, some 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 themselves must share some of the blame for higher budget deficits. Current government forecasting does not factor in the possibility that lower (higher) taxes might lead to higher (lower) employment and economic growth. Because such forecasts do not account for the effects that changes in tax policy might have on the economy, such forecasts are called *static*.

By ignoring the effects of tax and spending policies on economic activity, static forecasts are biased in favor of higher taxes, spending, and deficits. Static forecasts give full economic credit to a tax increase, even though that increase may discourage work, savings, and investment. And static forecasts often undercount the costs of new spending initiatives. In other words:

- A static estimate of a tax increase will *overestimate* the actual tax revenue received and lead to a larger than expected budget deficit.
- A static estimate of a spending increase will *underestimate* the actual cost and lead to a larger than expected budget deficit.

These phenomena help explain why every dollar raised in higher taxes has resulted in $1.58 in new spending since 1947.

Government forecasters themselves must share some of the blame for higher budget deficits.

To bring government forecasting more in line with economic reality, government forecasters should incorporate *dynamic* analysis into their evaluation of alternate policies. Dynamic analysis acknowledges that changes in tax policy affect incentives to work, save and invest, and incorporates these effects into economic forecasts.

Critics of dynamic analysis claim that the Reagan-era deficits were a result of forecasts that expected too much growth from the 1981 tax cuts. But the major forecasting error made in the infamous "Rosy Scenario" was *an overly-pessimistic inflation forecast*, rather than an overly-optimistic growth forecast:

- Fully two-thirds of the shortfall in the Reagan administration's 1981-86 forecast was due to prices falling roughly twice as fast as predicted.
- Both CBO and four major private forecasts made around the same time failed to foresee either the rapid decline in inflation or the 1981-82 recession. So a budget based on any of these forecasts would have produced the same results.

Economic forecasts must be as accurate as possible, both for deficit reduction and for economic growth. To remove the inherent bias of current forecasting methods in favor of higher taxes, spending, and deficits, government forecasting agencies should incorporate dynamic analysis into their forecasting models.

Cooking the Books: Exposing the Tax and Spend Bias of Government Forecasts

Introduction

To the average person, economic forecasting and budget estimates conjure up images of "black boxes," computers, and statistics. Most people, including policy makers, have preferred to leave the whole area to the "experts." Although this lack of involvement by policy makers may have sufficed in the past, it no longer does.

Forecasting has become a key to the entire budget process. Before taxes can be cut or raised, the Congress and the administration must make a guess about how the proposed changes will affect government revenues. They need a *revenue estimate*. And before a new program initiative can be put in place, policy makers must have some idea what it will cost. They need a *spending estimate*. Estimates produced by government staffs keenly affect the direction of government tax and spending policy, and thus ultimately, the economic fortunes of American taxpayers.

In the last decade or so, budget forecasting has become even more important. During the Gramm-Rudman-Hollings era, any new tax or spending initiative was subjected to a new criteria—what it would do to the budget deficit. Any initiative that increased the deficit would have a difficult (if not impossible) time becoming law. The Omnibus Budget Reconciliation Act of 1990 (OBRA90)—rules that are still in effect today—placed even further importance on budget forecasting, demanding that no tax cut or spending increase could cause the deficit to rise, and thus must be paid for by higher taxes or spending cuts.

Because of its rising importance, government budget estimation merits closer scrutiny. Like any theory put into practice, an economic forecast is only as good as the methods used. If the methods are flawed, the results will also be flawed.

This report addresses issues surrounding government forecasting methods. The first section describes the current budget estimation process with a particular focus on revenue estimation. The next section examines the forecasting track record of the current system, and the third looks at sources of revenue estimation errors. The fourth section focuses on how the current system assesses proposed policy changes, and the fifth suggests an alternate approach. The last section presents conclusions and steps that could be taken to improve the current system.

I. Budget Estimation Under the Current System

Each February, the President submits a budget to the Congress. This budget document, prepared by the Office of Management and Budget (OMB), contains projections of spending and revenues over the next five fiscal years under current law and under any proposed policy changes. At about the same time, the Congressional Budget Office (CBO) issues a similar budget forecast.

Government budget forecasts are done in two steps. The first is the preparation of an economic *baseline*, which is based upon predictions about key economic variables such as the growth in real gross domestic product, personal income, corporate

profits, inflation, employment, and interest rates.[1] Underlying these forecasts are assumptions about how the Federal Reserve will conduct monetary policy, movements in foreign exchange rates, and so forth.

Preparation of the baseline is as much art as science. Government forecasters rely upon recent behavior of the economy as well as upon what private economists are saying. For the most part, analysts look at how the economy has been performing recently and essentially assume that those trends will continue. For example, if inflation has been 3 percent or interest rates are at 8 percent, the forecast often assumes something close to those values.

Once these economic predictions are in place, government forecasters make estimates of program expenditures and tax revenues against this baseline. For example, the inflation assumptions determine what cost-of-living adjustments will be for entitlement programs. Economic growth and employment assumptions determine what wages and other types of income will be and, therefore, what the Social Security and income tax bases will be.

Government estimators use this same economic baseline to make their budget forecasts for current law or any proposed tax or spending changes. For example, they would use the same level of personal income to estimate the added revenue from an increase in tax rates, or the same level of wages to determine how much an increase in payroll tax rates would raise. *They would not factor in the possibility that higher (lower) tax rates might lead to less (more) employment or growth that would change the baseline predictions.* Because the baseline remains the same, government forecasts are said to be *static* in nature.

Now, let us look in detail at revenue estimation.

Revenue Estimation for the Budget

In the Executive Branch, the Treasury's Office of Tax Analysis (OTA) is responsible for revenue estimation. OTA forecasts budget receipts for inclusion in the administration's budget submissions. It also produces estimates of how proposed or enacted changes in tax law will affect receipts. The Joint Committee on Taxation (JCT) makes similar projections for the Congress. As just discussed, both types of revenue estimates rely on the baseline economic forecast—the administration's in the case of OTA, and CBO's in the case of JCT.

The budget process requires detailed revenue estimates, and both JCT and OTA participate in the development of these estimates. They generally prepare revenue estimates while CBO or OMB are developing the economic assumptions for their January forecasts and midyear updates.

Revenue estimates are prepared for the major categories of receipts such as personal income taxes, corporate income taxes, payroll taxes and so forth. Government forecasters use an estimated *effective tax rate* times an aggregate proxy measure of the various tax bases. For example, the fiscal year 1995 budget projects that personal income tax liability will amount to 9.9 percent of total personal income in 1994, while corporate income tax liability will amount to 28.1 percent of corporate profits before tax.[2] These bases, like personal income, are proxies because the *actual* tax base—adjusted gross income in the case of the individual income tax—is a different measure.

Due to changes in the tax law over time, these effective tax rates also change. Government estimators make *ad hoc* adjustments to reflect these changes. (More about this process and potential problems is discussed later.) Estimates from this method are generally accurate within five percent.

Revenue Estimates for Policy Changes

Government estimators follow a *different* method to assess *specific policy changes*. They generally use models that provide more detail on definite items of the tax code. Estimates continue to be based on the most recent forecast in which major elements of the forecast remain unchanged. The working assumption is that, over the five-year budget horizon, total production of goods and services—and the associated incomes—is determined by baseline variables that do not interact with fiscal policy decisions. The following economic measures are generally assumed constant across all revenue estimates:

- Gross domestic product (GDP);
- Total employee compensation (wages, salaries, and supplements);
- Gross private domestic investment;
- Total state and local tax revenue;
- General price index; and
- Interest rates.

Government forecasts of aggregate output and prices assume that the Federal Reserve will conduct monetary policy in such a way as to maintain the same level of nominal and real output, as well as to assure no change in interest rates. In reality, if a fiscal change diminishes growth, the Fed would have to inflate the money supply to hold nominal growth constant. Higher inflation would push interest rates higher and further diminish growth. Tax changes that affect the tax rates on capital and labor also would inherently alter the mix of pretax labor and capital incomes, leading to a different mix of capital and labor employment. In short, the possibility of the Federal Reserve maintaining nominal and real GDP while holding interest rates constant is remote. Nevertheless, it is a working assumption underlying government economic and budget forecasts.

Government estimators sometimes recognize that although aggregate *levels* may be relatively fixed, the *composition* of underlying variables will change more quickly. To some extent, revenue estimates take these compositional shifts into account. Elements of the economic forecast that may change include:

- The composition and level of nonwage personal income (proprietors' income, rental income, dividend income, and interest income);
- The mix of employee compensation (wages versus non-taxable fringe benefits);
- The mix of state and local tax revenues;
- The mix of gross private domestic investment between equipment and structures; and
- The distribution of income between corporate and noncorporate forms of business.

Adjustments in these items are generally left to the judgment of the individual analyst. Although some rules of thumb have developed over time, the process is highly subjective. Adjustments are generally not divulged to the general public, and their implications are seldom questioned or discussed.

Other economic variables not specifically part of the economic forecast that are occasionally considered in revenue estimates include:

- Changes in holdings of financial assets, although the total level is held constant;
- Changes in activity not includable in the GNP accounts (taxable activities that are not results of the production of goods and services); and
- Accounting changes in the recording of transactions for tax purposes.

Other Assumptions

Several other assumptions underlying revenue estimates should be noted. In general, overall levels of compliance and enforcement are kept at the same levels as those implicit in the baseline receipt estimates. Estimates also assume that the resources necessary to ensure effectiveness will accompany proposed changes in tax law, generally through a reallocation of existing resources. Large reductions in marginal individual tax rates are projected to have a positive net effect on general individual compliance.

Changes in tax law that could affect other revenue sources are ignored. For example, limiting the exclusion for employer-provided health insurance would increase both the income and Social Security payroll tax bases. Revenue estimates, however, would not reflect an increase in payroll tax revenues. The implicit assumption is that the payroll tax rate would be lowered to keep Social Security taxes at current levels. The exception is for proposals that purposely alter the payroll tax rate or base. For example, higher revenues from eliminating the wage ceiling for the Medicare payroll tax were part of the estimates for the 1993 tax bill.

Estimators generally assume that taxpayers maximize their aftertax income. Sometimes, however, estimators do incorporate clear patterns of past taxpayer practice that contradict this assumption. For example, collection data suggest that many taxpayers deliberately have taxes overwithheld, or overpay estimated taxes despite the existence of options that would allow lower payments.

Micro Models and Revenue Estimation

Revenue estimators also use *microsimulation* models that have been developed over many years. The first—Treasury's individual income tax model—dates back to the mid 1960s. Today, micro models also exist for the corporate income tax, estate taxes, and taxes on life insurance and property and casualty insurance.

All these micro tax models share a common structure. They begin with information from a random sample of tax returns filed with the Internal Revenue Service. The sample consists of thousands of *representative* taxpayers, representing broad income and demographic classes.[3] For each selected record, IRS transcribes most lines on the return. This micro dataset is capable of computing tax under a variety of different tax regimes. Weighting each record by the total number of similar taxpayers and adding up all the records yields a national tax estimate.

Micro models share two major shortcomings. First, they are usually several years out of date. For example, individual tax returns for 1994 will be filed during 1995. Filing extensions mean many returns will not be received until after July 1995. Transcription and verification take another nine to twelve months. Thus, the earliest estimators could expect 1994 updated individual income tax data is the summer of 1996. If they can process the new information expeditiously, revised data could make its way into the individual tax model by January 1997—*three years after the start of the filing tax year*.

To get around this problem, estimators have developed methods to extrapolate IRS information to a later year. For example, the Treasury individual tax model currently in use probably contains 1991 or 1992 tax return information projected to look like 1995. The extrapolation process, however, is time-consuming and involves a considerable amount of subjective adjustments.

The second major shortcoming of micro tax models is the static nature of the data itself. Due to the laborious nature of the current extrapolation process, it is not feasible to adjust micro models to reflect either the minor behavioral changes estimators sometimes incorporate or major macroeconomic changes they currently ignore (more discussion of behavioral assumptions follows in a later section). Instead, individual analysts subjectively incorporate micro model data into their estimates. This final step in the estimation process takes place completely outside the micro model structure. Responsibility falls on the particular analyst to assure whatever consistency remains between micro model information and published revenue estimates. In other words, consistency—the major selling point for the development of the micro model—is ultimately sacrificed.[4]

In the final analysis, *all* revenue estimates are the product of a "black box." While estimators may claim to use any number of formal models in their efforts, the final estimate is the product of a particular analyst. Individual estimators generally do not reveal their methods, and there is no systematic accuracy review.

II. Track Record of the Current System

Critics of the current system argue that ignoring the economic effects of policy changes leads to errors. Defenders of the current system claim that changing would cause the deficit to explode. Who is right? Looking back at budget forecasts over the last decade points up weaknesses in the current system.

A Case in Point: Rosy Scenario

Defenders of the current system point to the Reagan's administration "rosy scenario" as evidence for their claim. They charge that the Reagan administration assumed too much growth from the 1981 tax cuts. Because less tax revenue was forthcoming, they argue that the Reagan tax cuts are directly responsible for the run up in federal deficits and the explosion of federal debt.

Let's look back at rosy scenario and see what actually happened. Table 1 compares the Reagan administration forecast from February 1981 with actual performance for nominal GNP, real GNP growth and inflation.[5] By 1986, the administration forecast for nominal GNP was $641 billion too high. As a result, federal tax receipts came in $100 billion lower than forecast. Over the period 1981 to 1986, federal receipts came in $310.7 billion below forecast. But was this revenue "shortfall" due to overly optimistic growth assumptions contained in the Reagan budget?

Growth in tax receipts is most closely linked to the growth in nominal, not real, GNP. Nominal GNP growth is the sum of real growth and inflation. Splitting the administration's forecast into these two components shows that, while real growth came in lower than expected, prices came in much lower. While the administration predicted that inflation would gradually decline, prices fell roughly twice as fast. By 1986, the GNP deflator was running at 2.3 percent instead of the 4.9 percent

	Nominal GNP ($billions):		Real GNP Growth:		Deflator:	
	Forecast	Actual	Forecast	Actual	Forecast	Actual
1981	2,920	3,053	1.1%	1.6%	9.9%	10.1%
1982	3,293	3,187	4.2%	-2.3%	8.3%	6.8%
1983	3,700	3,424	5.0%	3.8%	7.0%	3.5%
1984	4,098	3,811	4.5%	6.0%	6.0%	5.0%
1985	4,500	4,068	4.2%	2.9%	5.4%	3.7%
1986	4,918	4,277	4.2%	2.8%	4.9%	2.3%
	Forecast Error Due To:				Change in Federal Receipts Due to Forecast Error ($billions):	
	Growth	Prices			Growth	Prices
1982	4.6%	-4.4%			-12.4	-8.2
1983	-2.0%	-1.3%			-20.4	-29.7
1984	-3.1%	-4.5%			-12.3	-39.3
1985	-1.7%	-5.4%			-23.2	-54.2
1986	-2.9%	-6.9%			-35.5	-75.7
1952-86					-103.7	-207.0

Table 1

Analysis of a Budget Forecast: The Reagan Administration's 1981 Rosy Scenario

The Reagan budget forecast comes from The White House, *America's New Beginning: A Program for Economic Recovery*, February 18, 1981, p. S-1.

forecast by the administration. As a result, two-thirds of the forecast error on receipts was attributable to the price forecast and one-third could be attributed to the growth forecast. In other words:

- Only $103.7 billion of the $310.7 billion shortfall in the Reagan administration's 1981-86 revenue forecast was due to overly optimistic assumptions about growth.
- Two-thirds was due to an overly pessimistic inflation forecast.

Moreover, the 1981-82 recession was primarily to blame for the lower growth over 1981 to 1986 rather than the tax cuts not delivering. And the Reagan administration was not the only one caught off-guard by the course of economic events. As Table 2 shows, a CBO report issued in January 1981 predicted even higher real

	Reagan[1]	CBO[2]	Private[3]	Actual[4]
Nominal GNP				
1980:4 to 1981:4	11.0%	12.8%	12.0%	9.5%
1981:4 to 1982:4	13.3%	14.1%	13.8%	2.8%
Real GNP				
1980:4 to 1981:4	1.4%	2.2%	2.1%	0.1%
1981:4 to 1982:4	5.2%	4.0%	4.8%	-1.5%
GNP Deflator				
1980:4 to 1981:4	9.5%	10.3%	9.7%	9.4%
1981:4 to 1982:4	7.7%	9.7%	9.1%	4.4%

Table 2

Economic Outlook at the Start of 1981: Comparison of Government and Private Forecasts

[1]The White House, *America's New Beginning: A Program for Economic Recovery*, February 18, 1981, p. S-1.

[2]Congressional Budget Office, *An Analysis of President Carter's Budgetary Proposals for Fiscal Year 1982*, Staff Working Paper, January 1981, Table 1.

[3]Midpoint of a range of private forecasts made with the following models and dates: Chase Econometrics, 1/7/81; Data Resources Inc., 12/24/80; Evans Economics, 1/7/81; and Wharton Econometric Forecasting Associates, Inc., 12/3/80.

[4]U.S. Dept. of Commerce, National Income Product Accounts quarterly data, latest revision.

growth and price inflation than the administration. Further, four major private forecasting models also were predicting higher levels of nominal GNP. No one at the beginning of 1981, it seems, foresaw either the rapid decline in inflation or the 1981-82 recession. In other words:

- A budget based on any of the Reagan, CBO, or major private economic forecasts at the start of 1981 would have produced the same results. All would have been considerably wrong on deficits. Even without tax cuts, these forecasts would have predicted much lower deficits than occurred.

Past Deficit Errors

Current estimation methods have produced dubious results in the past. As Table 3 shows, multi-year deficit forecasts over the last decade have been off by as much as 500 percent. And in all but one case, actual deficits turned out to be higher than what was forecast on either a current services or policy basis. In general, higher deficits were a combination of revenues coming in lower than expected and spending coming in higher than forecast.

Table 3

Budget Deficits: Projected and Actual

	Forecast ($bil.)	Actual ($bil.)	Error ($bil.)	% Error
FY 1986 Budget: Fiscal Years 1985-89				
Current Services				
Receipts	4,377.2	4,257.0	-120.2	-2.8%
Outlays	5,557.1	5,147.3	-409.8	-8.0%
Deficits	-1,179.9	-890.5	289.4	-32.5%
Policy				
Receipts	4,372.6	4,257.0	-115.6	-2.7%
Outlays	5,191.6	5,147.3	-44.3	-0.9%
Deficits	-819.0	-890.5	-71.5	8.0%
FY 1987 Budget: Fiscal Years 1986-89				
Current Services				
Receipts	3,537.1	3,522.9	-14.2	-0.4%
Outlays	4,213.3	4,201.0	-12.3	-0.3%
Deficits	-676.3	-678.2	-1.9	0.3
Policy				
Receipts	3,556.8	3,522.9	-33.9	-1.0%
Outlays	4,064.3	4,201.0	136.7	3.3%
Deficits	-507.5	-678.2	-170.7	25.2%
FY 1988 Budget: Fiscal Years 1987-90				
Current Services				
Receipts	3,760.6	3,785.1	24.5	0.6%
Outlays	4,357.8	4,462.9	105.1	2.4%
Deficits	-597.2	-677.9	-80.7	11.9%
Policy				
Receipts	3,783.5	3,785.1	1.6	0.0%
Outlays	4,216.7	4,462.9	246.2	5.8%
Deficits	-433.3	-677.9	-244.6	56.5%

"Current Services" budget assumes a continuation of present law, including future program growth and inflation.

"Policy" budget includes the effect of proposed administration tax and spending initiatives.

Source: Budget Documents, selected years.

Table 3 (cont.)

	Forecast ($bil..)	Actual ($bil..)	Error ($bil..)	% Error
FY 1989 Budget: Fiscal Years 1988-92				
Current Services				
Receipts	5,228.3	5,075.8	-152.5	-2.9%
Outlays	5,774.1	6,162.2	388.1	6.7%
Deficits	-545.9	-1,086.6	-540.7	99.0%
Policy				
Receipts	5,232.3	5,075.8	-156.5	-3.0%
Outlays	5,743.1	6,162.2	419.1	7.3%
Deficits	-510.8	-1,086.6	-575.8	112.7%
FY 1990 Budget: Fiscal Years 1989-93				
Current Services				
Receipts	5,656.4	5,320.3	-336.1	-5.9%
Outlays	6,151.6	6,506.4	354.8	5.8%
Deficits	-495.1	-1,186.2	-691.1	139.6%
Policy				
Receipts	5,668.9	5,320.3	-348.6	-6.1%
Outlays	6,019.5	6,506.4	486.9	8.1%
Deficits	-355.4	-1,186.2	-830.8	233.8%
FY 1991 Budget: Fiscal Years 1990-94				
Current Services				
Receipts	6,189.4	5,586.8	-602.6	-9.7%
Outlays	6,471.7	6,824.4	352.7	5.4%
Deficits	-274.4	-1,237.6	-963.2	351.0%
Policy				
Receipts	6,226.0	5,586.8	-639.2	-10.3%
Outlays	6,421.7	6,824.4	402.7	6.3%
Deficits	-195.6	-1,237.6	-1,042.0	532.7%
FY 1992 Budget: Fiscal Years 1991-94				
Current Services				
Receipts	4,871.5	4,555.5	-316.0	-6.5%
Outlays	5,746.5	5,572.7	-173.8	-3.0%
Deficits	-875.0	-1,017.2	-142.2	16.2%
Policy				
Receipts	4,874.4	4,555.5	-318.9	-6.5%
Outlays	5,736.8	5,572.7	-164.1	-2.9%
Deficits	-862.3	-1,017.2	-154.9	18.0%

"Current Services" budget assumes a continuation of present law, including future program growth and inflation.

"Policy" budget includes the effect of proposed administration tax and spending initiatives.

Source: Budget Documents, selected years.

Forecasting errors were particularly large between the fiscal year 1989 and 1991 budgets. The fiscal year 1991 budget, issued before the 1990 budget summit, contained a five-year forecasting error of $1 trillion. Despite the higher taxes enacted in OBRA90, revenues between 1990 and 1994 came in over $600 billion short of forecast. Despite strict spending limits, outlays came in over $350 billion higher.

Defenders of the current system might say that the 1990-91 recession was to blame. If true, confidence in the current system's ability to meet deficit reduction goals is at best misplaced. A change in economic fortunes can throw a deficit forecast off by hundreds of billions of dollars. Further, critics of the current method might argue that government policies enacted in 1990 contributed to the recession and, therefore, to widening deficits.

Deficit errors even can be quite large for forecasts made only one year earlier. Table 4 shows administration reconciliations for the actual and forecast revenues, outlays and deficits for fiscal years 1984 through 1993. Differences are attributed to policy, changes in economic conditions and technical revisions. A technical revision is essentially an error in estimation method. While changing economic conditions were more important during the mid-1980s, technical revisions have accounted for a larger share of recent missed forecasts. [See Figure 1.]

Table 4

Reconciliation of Budget Forecasts from Prior Year ($billions)

	FY84	FY85	FY86	FY87	FY88	FY89	FY90	FY91	FY92	FY93
DEFICIT ESTIMATE[1]	-202.8	-195.2	-180.0	-143.6	-111.1	-129.5	-90.5	-100.5	-284.9	-354.8
Receipts:										
Policy Changes	-7.0	1.6	1.8	21.4	4.5	—	-6.3	21.8	-11.2	1.8
Economic Baseline	21.4	-13.7	-32.1	-30.6	-12.0	25.6	-18.0	-65.5	-34.6	-24.4
Technical Revisions	-7.6	1.0	5.7	12.9	-0.2	1.2	-9.5	-58.4	-26.1	7.1
Subtotal	6.8	-11.1	-24.6	3.7	-7.7	26.8	-33.8	-102.1	-71.9	-15.5
Error Subtotal[2]	13.8	-12.7	-26.4	-17.7	-12.2	26.8	-27.5	-123.9	-60.7	-17.3
Outlays:										
Policy Changes	-13.8	-13.9	-9.3	-19.0	-13.8	-22.0	-14.4	37.0	-20.8	-4.5
Economic Baseline	17.0	0.8	4.9	14.3	-6.8	-15.4	-13.0	-19.5	14.3	11.8
Technical Revisions	7.5	1.0	-11.7	-5.8	-15.7	4.9	-9.5	-83.7	72.8	108.2
Subtotal	10.7	-12.1	-16.1	-10.5	-36.3	-32.5	-36.9	-66.2	66.3	115.5
Error Subtotal	24.5	1.8	-6.8	8.5	-22.5	-10.5	-22.5	-103.2	87.1	120.0
Deficit:										
Policy Changes	-20.8	-12.4	-7.5	2.4	-9.3	-21.9	-20.7	58.8	-31.9	-2.7
Economic Baseline	38.4	-12.9	-27.2	-16.3	-18.8	10.2	-31.0	-85.0	-20.9	-12.5
Technical Revisions	-0.1	8.1	-6.0	7.1	-15.9	6.1	-19.0	-142.1	46.8	115.3
Subtotal	17.5	-17.2	-40.7	-6.8	-44.0	-5.6	-70.7	-168.3	-5.4	100.1
Error Subtotal	38.3	-4.8	-33.2	-9.2	-34.7	16.3	-50.0	-227.1	26.5	102.8
ACTUAL DEFICIT	-185.3	-212.3	-220.7	-150.4	-155.1	-152.0	-220.4	-288.7	-290.4	-254.7
DEFICIT ERRORS EXCLUDING POLICY CHANGES DUE TO:[3]										
Economic Conditions	20.7%	6.1%	12.3%	10.8%	12.1%	6.7%	14.1%	29.4%	7.0%	4.9%
Technical Revisions	0.1%	3.8%	2.7%	4.7%	10.3%	4.0%	8.6%	49.2%	16.1%	45.3%

[1]Deficit estimate made prior year. For example, the estimate for fiscal year 1984 would have been made in January 1983.
[2]Sum of estimation errors from economic conditions and technical revisions.
[3]Absolute values of economic and technical revisions divided by the actual deficit.

Source: Budget documents, selected years.

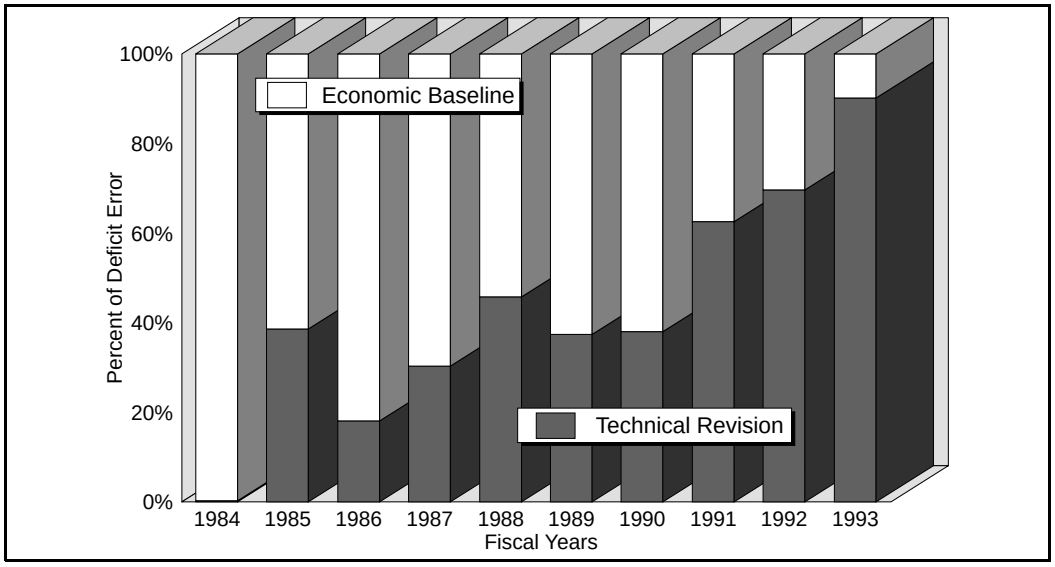


Figure 1

Forecasting Error on Prior Year Deficit Due To Economic and Technical Revisions

III. Errors in the Current Revenue Estimation System

According to Treasury's Office of Tax Analysis, a five-year revenue forecast is typically within plus or minus 4 percent of actual revenues. Three-quarters of this error (or three percentage points) is due to mistakes in the economic baseline. The remaining one percentage point of error is attributable to other parts of the forecasting process.[6]

An incorrect baseline leads to incorrect forecasts of tax bases. While a three percent forecasting error may seem small, it can greatly affect the deficit. At current annual revenue levels, a three percent error would represent a cumulative deficit swing of $225 billion over five years. With roughly half that error also on the spending side, the cumulative deficit swing would be nearly $400 billion.[7] Put another way, changes in economic performance dramatically affect the deficit. For example:

- Without the downturn in 1990-91, today's federal deficit would be under $100 billion, or about half.[8]

The remaining forecasting error stems from the way specific components of aggregate tax receipts are estimated. Components include personal income taxes, corporate income taxes, payroll taxes and excise taxes. As discussed earlier, government forecasters use estimating equations that relate a specific tax to approximate measures of its tax base. For example, personal income taxes would equal some percent of personal income; corporate income taxes would equal some percent of corporate profits; payroll taxes would equal some percent of wages and salaries and so forth.

These estimating equations also must account for changes in law that have occurred over the years. For example, base-broadening measures enacted in the Tax Reform Act of 1986 affected both personal and corporate income taxes. And recent increases in the Medicare wage base affected payroll tax revenues.

Government estimators have chosen to use *ad hoc* adjustments to account for these changes in tax law. Unfortunately, *ad hoc* adjustments also introduce more error into the estimation process. Because these adjustments are a "black box," there is no real check on whether law changes are appropriately represented.

Estimators sometimes turn to micro tax models for input. Although micro model data can lead to improved estimates, it also can introduce its own errors. For example, elimination of the deduction for credit card interest could lead to an overestimate of taxable income if the modeler does not correctly anticipate the widespread use of second mortgages as an alternate debt instrument. Thus, errors at the lowest level—that of the micro models—can compound throughout the entire estimation procedure.

While errors in the economic baseline are more important to estimating total revenues, errors in estimating the major tax components are vital in assessing alternate tax policies. Examples from the aftermath of tax reform make this point.

The Tax Reform Act of 1986 dramatically lowered tax rates on individuals while raising them on business. As Table 5 shows, Treasury expected more revenue from corporations and less from individual taxpayers than occurred.[9] In other words, Treasury estimators missed the fact that corporate income would grow more slowly while personal income would grow more rapidly after tax reform simply due to changes in tax rates. Fortunately for the deficit, the shortfall in corporate tax receipts was offset by higher individual tax receipts.

Table 5

Average Income Tax Receipts, 1987-1989, Forecast vs. Actual ($ Billions)

Type of Tax	Actual	Forecast	Difference
Individual	413	391	+5.6%
Corporate	94	117	-24.5%

Source: U.S. Department of the Treasury

Policy makers were also told that eliminating the capital gains exclusion would add nearly $45 billion annually to federal receipts during the 1990s. This estimate was based on estimating equations that related capital gains realizations to economic growth, while ignoring the effects of higher tax rates.[10] What has happened instead is that realizations have fallen so dramatically that total revenue from capital gains is little more than it was before 1986.[11]

This review of errors inherent in the current estimation system leads to the following conclusions:

- The current method has little value in predicting what future budget deficits will be. A small forecasting error of four percent on total revenues and two percent on spending translates into a sizable forecasting error of 40 percent for the budget deficit over five years.[12]
- The current method is definitely flawed as an evaluator of alternate tax or spending policies.

The key question that must be answered by defenders of the current estimation system is whether policy makers would have chosen to increase taxes on business, or increase capital gains tax rates, had they known that those actions would yield little revenue. If that answer is no, a closer look should be taken at current estimation methods used in evaluating alternate policies.

IV. Evaluating Alternate Policies: The Current System

The previous discussion has shown that a large part of the forecasting error is due to mistakes in the economic baseline. Because economic forecasters have a generally poor record, this drawback is not unique to the current system. And the current system's 3 percent error is well within the bounds of the best private forecasters.

Where the current system does run into trouble, however, is in evaluating alternate policies. As discussed earlier, government estimators use the same economic baseline to assess the effects of any proposed tax or spending change. What happens, however, if a policy change affects economic incentives and, therefore, the total level of economic activity? As economic activity changes, so do the appropriate tax bases. The current method not only ignores this link during the policy formulation process, it explicitly forbids it.[13]

It is in this sense that the current method is *static*. In a *dynamic* analysis, the economic baseline itself is subject to change in response to the policy change.

While defenders of the current system claim that it accounts for economic behavior, it does so only in a narrow sense. One example often cited is the 1990 luxury tax on pleasure boats. Revenue estimators predicted that 30 percent of the tax increase would be offset because people would buy fewer boats at a 10 percent higher price. But the revenue estimators also assumed that the resources displaced from the boat industry would be immediately picked up somewhere else and at the same levels of compensation. As a result, all other federal tax receipts were assumed to stay the same. In other words, the economic baseline did not change.

In reality, a contraction did occur. But, as policy makers in affected states found out, displaced boat builders did not immediately find re-employment elsewhere. The total level of economic activity, or baseline, declined as a result. The federal government lost not only 30 percent of the increased luxury tax revenue due to lower demand for boats, but the payroll and income taxes on wages that would have been paid to now-unemployed workers. And federal outlays went up as a result of increased unemployment and welfare benefits.

Similar criticism applies to government estimation of spending programs. For example, only eight months into the new Medicare Catastrophic Coverage Act, government analysts had to raise their five-year cost estimates by up to 80 percent.[14] Although defenders of the current system would argue that government estimators do take behavior into account, in the case of the new Medicare prescription drug benefit one could argue that the adjustments were in the wrong direction. Although spending estimates on the drug benefit had to be increased shortly after passage, earlier estimates had even assumed that 15 percent of those eligible for the drug benefit would not claim it due to the "stigma" attached to accepting a government handout.[15]

By ignoring the effects of tax and spending policies on economic activity, the current system is biased in favor of higher taxes and spending. Current scoring methods give full credit to a tax increase, even though that increase may discourage work, saving and investment. Current scoring methods often *undercount* the costs of a new spending initiative that subsidizes a particular activity. In other words:

- A static estimate of a tax increase will overestimate the actual tax revenue received and lead to a larger than expected budget deficit.
- A static estimate of a tax "cut" will underestimate the actual tax revenue and lead to a smaller than expected budget deficit.
- A static estimate of a spending increase will underestimate the actual cost and lead to a larger than expected budget deficit.
- A static estimate of a spending "cut" will underestimate the actual savings and lead to a smaller than expected budget deficit.

Combined, these forecasting errors all point toward ever-higher deficits. When revenues from higher taxes fail to materialize, spending decisions predicated upon receiving them drive up the deficit. Moreover, program costs are likely to be higher because static analysis underestimated the number of people eligible for federal assistance. This phenomenon helps explain why every dollar raised in higher taxes has resulted in $1.58 in new spending since 1947.[16]

Codification of a Flawed Budget Scoring Method

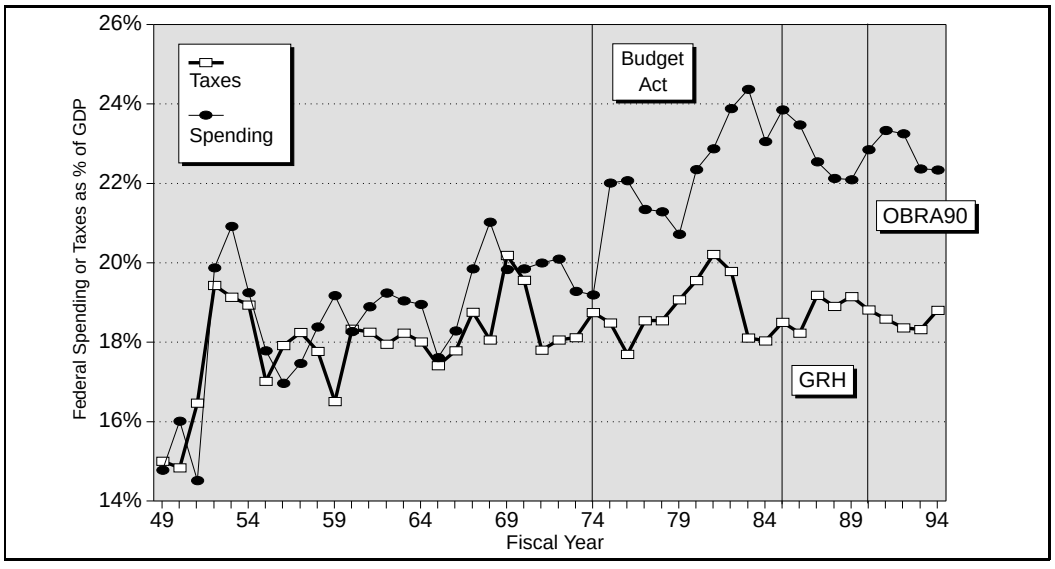
Before the Congressional Budget Act of 1974, there were no formal legislative rules that linked revenue or spending estimates to the legislative process. The 1974 Budget Act, however, prescribed a process by which the Congress set tax and spending targets in a budget resolution early in the legislative session. Estimators then scored proposed legislation against those targets.[17] In other words, the estimation process could now *directly* influence the legislative process.

Gramm-Rudman-Hollings (GRH) tightened the link between legislation and estimation.[18] The Act set specific deficit targets for each fiscal year through 1993. If the Office of Management and Budget (OMB) estimated at the beginning of the fiscal year that the target would not be met within $10 billion, the President was required to sequester sufficient funds to achieve the target.

OBRA90 replaced the GRH deficit targets with spending targets and added more exotic sequester requirements. Furthermore, the Act designated how the estimates were to be prepared. Specifically, it requires OMB to make its estimates according to existing scorekeeping guidelines used to prepare the Budget Summit Agreement and the 1991 budget.[19] In other words, *OBRA90 essentially codifies the existing static methods of government estimators.*

Figure 2

Scorekeeping And Growing Deficits: Spending and Taxes as a % of GDP



Current budget estimation rules are biased toward greater spending and higher taxes, because estimates for new government programs understate costs, and estimates of higher government taxes overstate the revenue they will bring in. This, in large part, explains the expansion of the deficit over the past twenty years. [See Figure 2.] Correcting this bias requires changing current methods and moving in a new direction.

V. An Alternative: Dynamic Scoring

An alternate approach is to acknowledge the effects that fiscal policy has on the economy, and to take steps to incorporate those effects into official estimation procedures. The first step is to develop a model that recognizes taxes as one of the determinants of economic growth. Many candidates already exist in economics as neoclassical growth models. Most can trace their heritage back to ones developed by Robert Solow and Frank Knight.

Neoclassical Growth Models

In standard neoclassical theory, more capital and labor mean more private output. But the additions to output get smaller and smaller as more and more of one factor is used without increasing others.[20] Adding more of one input makes the others more productive, however.

Another characteristic of the production process is known as *constant returns to scale*. This means that increasing (decreasing) all inputs by the same percentage will increase (decrease) output by that same percentage. For example, replicating a plant and its workforce should lead to a doubling of output.

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, determine how much capital and labor will be hired and at what price.

Workers supply labor based on the wages they take home after taxes and inflation. Similarly, investors supply capital based on the real aftertax return they receive. Workers and investors will supply more (less) labor and capital as the aftertax returns increase (decrease).

Businesses, however, 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 (less) labor and capital as their total costs decrease (increase). As taxes go up (down), businesses will want to hire less (more) labor and capital.

The Role of Taxes

Taxes affect the economy in both the Solow and Knight growth models but to different degrees.[21] The key difference between these two models hinges on how the productivity of capital changes over time. In general, the productivity of capital depends upon technology and labor. In Solow's model, the productivity of capital is determined outside the system, and growth depends solely on the stock of physical capital. Imposition of a new tax will slow the economy in the short run. Because the productivity of capital is exogenous, however, the economy will eventually return to its former growth path. In other words, *in Solow's model the change in taxes affects the economy's total level of output but not its rate of growth.*

Knight's model challenges the view that only the stock of physical capital can be quickly and easily increased over time. He argues that, while the amount of labor may be fixed in the short run, the quality of the workforce is easily augmented. Even land, a supposedly fixed factor, can be improved. And investment in physical and human capital can influence the rate of technological change. As a result, in the Knight model, *imposition of a new tax will affect both the economy's total level of output and its rate of growth.*

In sum, economic theory provides support for the position that taxes affect economic growth. Even the growth model developed by liberal economist Robert Solow would lead to the result that higher (lower) taxes would increase (decrease) economic output at least for the first few years. The Knight model would find an even greater effect of taxes on growth. The next step involves translating theoretical models into revenue estimation tools.

Incorporating Growth Into Revenue Estimation

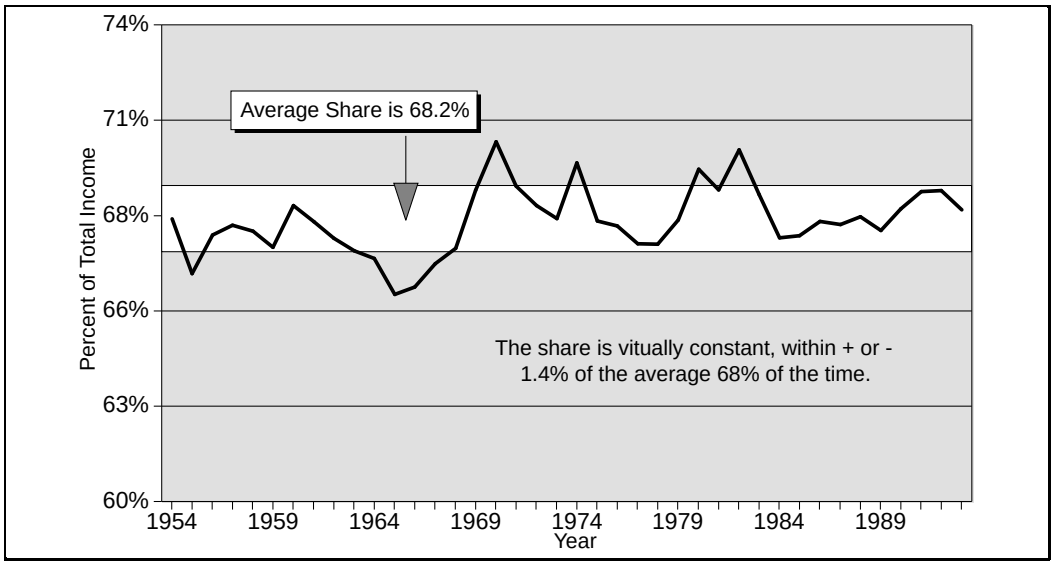
Incorporating growth into the revenue estimation process requires answering the following three questions about key economic relationships:

- First, how are labor and capital combined to produce private output?[22]
- Second, how does the supply of labor respond to changes in its aftertax wage rate?
- And, third, how does the supply of capital (investment) respond to changes in its aftertax return?

These interrelated pieces of information determine how the general economy will respond to changes in the tax laws.

There are many mathematical ways to represent the production process. The simplest, and most widely used, is known as a Cobb-Douglas production function.[23] One of its characteristics is that the shares of income going to labor and capital are constant over time, and U.S. historical data confirm this result. As Figure 3 shows, labor compensation averages 68 percent of output. And labor's share is within 1.4 percent of that average more than two-thirds of the time. Conversely, capital averages 32 percent of output as its compensation.[24] For purposes of revenue estimation, the Cobb-Douglas production function provides an adequate representation of the U.S. production process and can be used to derive the demand for labor and capital by U.S. businesses.

Figure 3
Labor's Share of Income as as % of Total



The supply of capital and labor increases as its reward increases. In other words, as take-home pay goes up, workers are more willing to supply labor. As the aftertax return to capital increases, investors are more willing to invest in real assets. Estimates of the supply of labor and capital can be obtained from historical data.

The Responsiveness of Capital

Measuring the responsiveness of capital requires estimating the aftertax return to capital. We have developed a detailed set of U.S. capital accounts from investment series published by the Department of Commerce.[25] We also have created a historical tax depreciation series for each of the investment categories (tax depreciation is discussed in a later section). These investment series are converted into capital stocks using the Treasury's Class Life estimates underlying that tax depreciation system. The net capital stocks are divided among legal forms of organization to allow us to associate effective marginal tax rates to each of the stock measures. Tax rates are derived from Internal Revenue Service and Commerce information about tax bases and revenues.

This information on capital stocks, tax rates and depreciation yields a system of equations that calculates the real internal rate of return to the stock of U.S. capital. The most striking finding from this analysis is the remarkable stability of the return on U.S. capital after taxes and inflation. As Figure 4 shows, the estimated U.S. real aftertax rate of return averaged 3.3 percent from 1954 through 1990. Moreover, the return is within plus or minus 10 percent of its average more than two-thirds of the time — an exceptional constancy in contrast to real interest rates.

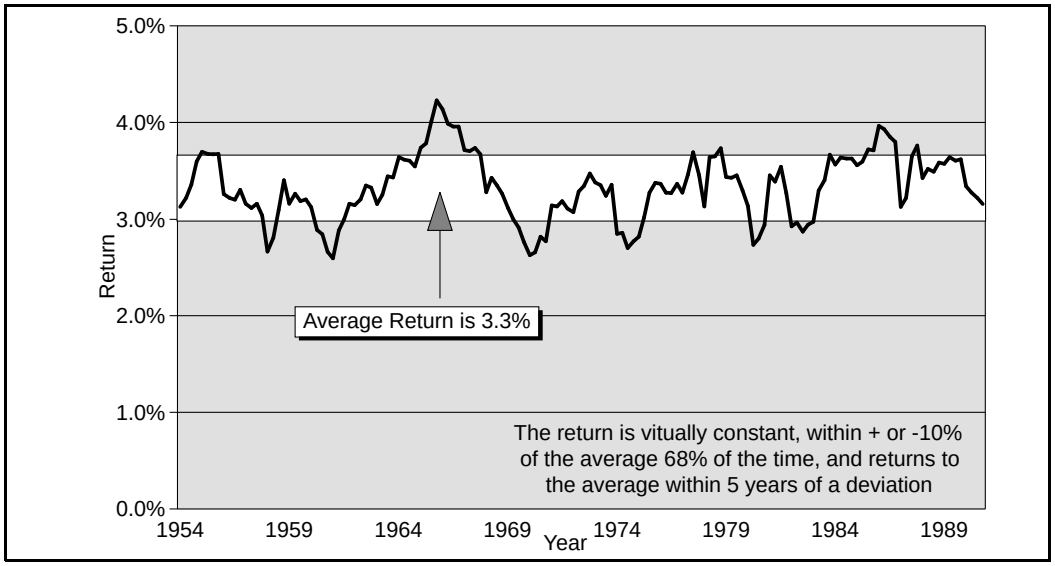


Figure 4

Real Aftertax Rate of Return To All U.S. Sited Capital

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 U.S. economy behaves as if it operates in a worldwide market for sites to place new investment. As the U.S. taxes its capital more heavily, investors site new investments elsewhere. As taxes on capital are lowered, investors are more willing to invest in the U.S. The result is that the observed real aftertax rate of return in the U.S. bounces along the worldwide rate of return to capital.

The Responsiveness of Labor

The responsiveness of labor to a change in its aftertax wage rate is the last of the information needed to estimate the effect of taxes on growth. Empirical estimates of the elasticity of supply of labor vary a great deal. Researchers usually separate the market into segments—a primary consisting of working-age males, and secondary made up of the rest. Estimates of the responsiveness of primary labor market participants are generally low and even negative by some studies. The consensus estimate of the responsiveness (called "supply elasticity") of this segment is 0.11.[26] In other words, a 10 percent increase (decrease) in the aftertax wage rate of primary workers would cause a 1.1 percent increase (decrease) in hours worked.

Estimates of the responsiveness of secondary workers are much higher than that of working-age males. The *supply elasticity* for married women is about 0.9.[27] The rest of the labor force seems to lie 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.[28] In other words, a 10 percent increase (decrease) in the aftertax wage rate of U.S. workers would cause a 3.7 percent increase (decrease) in hours worked.

Our estimates using a complete labor supply and demand system are consistent with the results reported above. Depending on the mathematical form, our estimates of labor supply elasticity range between 0.2 and 0.4. We generally assume a long-run labor supply elasticity of 0.3 for labor response in policy simulations.[29]

In sum, our empirical analysis suggests that:

- 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.
- Capital in the U.S. economy is very responsive to changes in its aftertax return. Adjustment to a change in its return occurs quickly, with most being completed at the end of five years.
- Labor is less responsive than capital 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.
- These empirical results lie somewhere between the long-run findings of the Solow and Knight growth models. Our results would show a greater output response to changes in investment than the Solow model because labor also would increase. They would show a smaller long-run change than the Knight model because our measure of labor's responsiveness is considerably less than Knight's.

Incorporating Taxes

In our model, taxes affect the economy through their effects on the supply of labor and capital. What happens if the tax rate on labor goes up? First, the gross wage rate that business must pay workers increases. Because nothing has happened to change productivity, businesses will want to hire less labor. However, with less labor in use, the existing amount of capital is less productive than before, leading businesses to cut back the amount of capital in service 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 gross wage rate that businesses must pay workers decreases, leading businesses to hire more labor. More labor makes the existing amount of capital more productive than before, leading businesses to put more capital in service as well. More labor and capital mean more output. A similar process occurs if the tax rate on capital is cut.

Because we are interested in *changes* in labor and capital, the marginal tax rate is the appropriate measure.[30] Measuring marginal tax rates on labor and capital is one of the most important and time-consuming elements of dynamic estimation. Below is a discussion of how we have approached the problem.

Taxes on Labor

Taxes on labor income consist of 1) personal income taxes on wages and salaries, 2) payroll taxes, and 3) labor's share of sales and excise taxes, at the federal, state and local levels. We use a micro tax model similar to those previously discussed to measure the economy-wide marginal tax rate on wages and salaries resulting from the income tax.[31] We add payroll taxes to the marginal tax rate on labor income to the extent that wages and salaries for each income group exceed wage ceilings. For example, the Social Security tax rate will apply to wages up to $61,200 in 1995, 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. Roughly two-thirds of sales and excise taxes—labor's share of output—are attributed to compensation.

After declining from a historical high of 46.6 percent in 1981, the tax on labor has been on the rise in recent years. We estimate that today the economy-wide marginal tax rate on labor compensation today is 42.1 percent. [See Figure 5.]

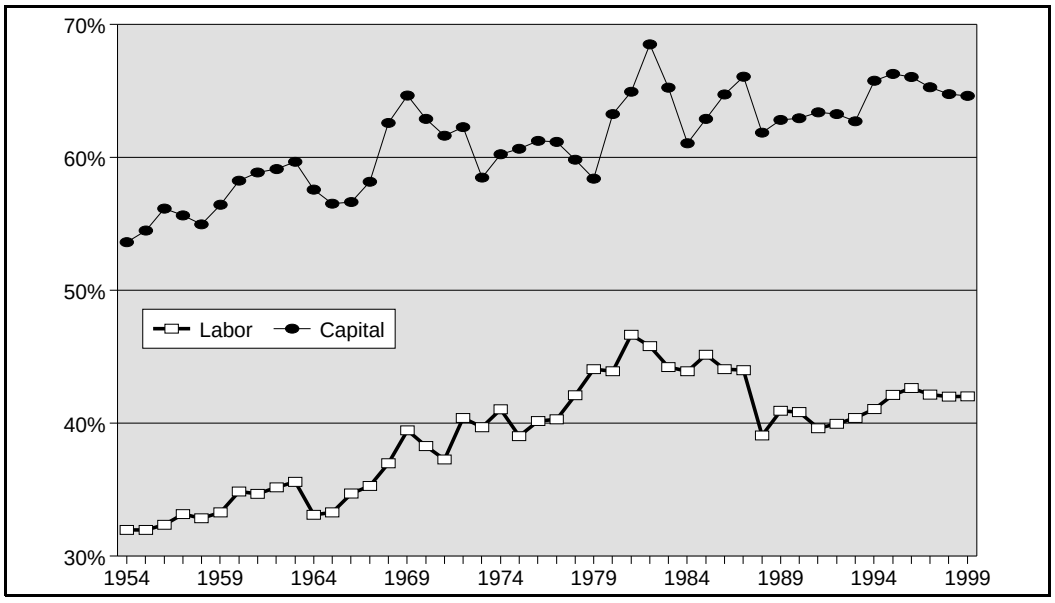


Figure 5

Marginal Tax Rates on Labor & Private Business Capital

Taxes on Capital

Taxes are levied on assets directly, on the output produced by assets, and on the return accruing to the owners. Examples of taxes on assets are *property* or *wealth taxes*. Sales and excise taxes are placed on the value of the output of assets. Taxes on the return accruing to the owners of capital are personal income taxes on dividends, net business income, rental income, and interest; and corporate income taxes (usually income less tax depreciation). Our model averages the tax treatment for 20 capital classifications of 5,000 specific assets, weighted by their capital stocks.[32]

To calculate marginal tax rates, we derive personal federal income tax rates 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. Property taxes are computed using the nominal value of the appropriate type of capital including land.

Tax depreciation presents an added complication. Depreciation is an *artificial construct* that 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 alternate tax regimes in place in the U.S. during the period 1954 to 1991.[33]

We estimate that today the economy-wide marginal tax rate on productive assets is 66.3 percent, nearing the all-time high of 68.5 percent reached in 1982. [Figure 5-previous.] Productive assets refer to private business capital. The other component of the capital stock, owner-occupied housing, has a much lower marginal tax rate of 21 percent.

Policy Simulations

In assessing how a tax change will affect the economy, we first calculate what the change will do to the marginal tax rates on labor or capital. For example, lowering the capital gains tax rate to 15 percent would reduce the marginal tax rate on capital by 4 percent. Eliminating capital gains taxes would reduce the marginal rate by twice that, or 8 percent.[34] A reduction in the marginal tax rate on capital, in turn, lowers the cost of capital. A 15 percent capital gains tax rate would reduce the net cost of capital by 3 percent, while eliminating the tax would reduce net capital costs by 6 percent.[35]

A similar analysis would apply to tax changes that affect labor compensation. For example, a two percentage point reduction in the payroll tax rate would reduce the marginal tax on labor by 4 percent.[36] That, in turn, would reduce the economy-wide, aftertax wage rate by 3 percent. Higher take-home pay would lead to an increase in labor supply of almost 1 percent, thereby lowering labor costs.

Changes in the costs of labor and capital translate into effects for the general economy. Lower (higher) labor or capital costs mean more (less) investment, employment, output and growth. In other words, *the economic baseline changes.* Typically, the policy simulations we do are pegged to either the latest administration or CBO economic forecast. We report the effects of a tax change as relative to that baseline. For example, at the end of seven years, a 15 percent capital gains tax rate would increase annual GDP by 2 percent, hours worked by 0.4 percent, the stock of U.S. capital by 5 percent and the growth rate by 0.2 percentage points. We also report these changes as amounts using current levels of each economic variable. For example, a 0.4 percent increase in hours worked would translate into over 500,000 jobs.[37]

Federal Reserve Policy

As discussed earlier, government forecasters implicitly assume that the Federal Reserve will conduct monetary policy to maintain the same level of nominal and real output as well as assuring no change in interest rates. The implicit assumption about monetary policy that we make in our policy simulations is that the Fed will hold prices constant. Added (diminished) growth from a tax cut (hike), therefore, will result in higher (lower) nominal GDP.

Some have argued, however, that if the Federal Reserve acts to offset the effect of the tax change, the growth effects from dynamic analysis will be overstated. For example, to offset the real effects of a tax cut, the Fed could act to lower prices and hold nominal GDP constant. Because revenues depend on nominal GDP, and it would be unchanged under this Fed assumption, federal government revenues would seemingly fall even with added real growth. Does this conclusion necessarily follow, however?

To test what would happen, we ran two policy simulations on a capital gains tax cut. The first assumes that the Fed conducts monetary policy to hold prices constant, and the second assumes the Fed holds nominal GDP constant. As Tables 6a and 6b show, in the first case, nominal GDP would be 2.7 percent higher than the baseline at the end of six years, and real growth would by 0.45 percentage points higher. In the second case, although real growth would be 0.46 percentage points higher, nominal GDP would be unchanged because prices would be 2.7 percent lower.

Table 6a

CHANGES IN THE ECONOMY WITH CONSTANT PRICES H.R. 3739, 50% Exclusion and Prospective Indexing, Housing Losses Allowed

Year	Percentage Change in GDP	Percentage Change in Jobs	Percentage Change in Capital	Percentage Change in Real Growth	Percentage Change in Prices
1995	0.26%	0.02%	0.69%	0.26%	0.00%
1996	0.75%	0.08%	1.98%	0.38%	0.00%
1997	1.32%	0.18%	3.41%	0.44%	0.00%
1998	1.85%	0.29%	4.71%	0.46%	0.00%
1999	2.34%	0.42%	5.92%	0.46%	0.00%
2000	2.70%	0.51%	6.77%	0.45%	0.00%

Table 6b

CHANGES IN THE ECONOMY WITH CONSTANT NOMINAL GDP H.R. 3739, 50% Exclusion and Prospective Indexing, Housing Losses Allowed

Year	Percentage Change in GDP	Percentage Change in Jobs	Percentage Change in Capital	Percentage Change in Real Growth	Percentage Change in Prices
1995	0.00%	0.02%	0.43%	0.26%	-0.26%
1996	0.00%	0.09%	1.22%	0.38%	-0.76%
1997	0.00%	0.18%	2.10%	0.45%	-1.32%
1998	0.00%	0.30%	2.88%	0.47%	-1.86%
1999	0.00%	0.42%	3.60%	0.48%	-2.35%
2000	0.00%	0.53%	4.12%	0.46%	-2.72%

The static revenue loss would be the same in either case. [See Tables 6c and 6d.] The dynamic federal revenue pickup of $130.2 billion over six years in the first case, however, would become a loss of $4.7 billion in the second case.[38] It would appear that monetary policy could offset growth effects.

Table 6c

REVENUE CHANGES WITH CONSTANT PRICES H.R. 3739, 50% Exclusion and Prospective Indexing, Housing Losses Allowed ($ bil. nominal)

Year	Static Federal Tax	Dynamic Federal Tax	Net to Federal Government
1995	8.5	4.3	12.8
1996	5.6	10.0	15.6
1997	-0.2	16.9	16.7
1998	-2.7	24.8	22.1
1999	-5.7	33.2	27.6
2000	-9.3	40.9	31.6
1995-2000	-3.8	130.2	126.4

Table 6d

REVENUE CHANGES WITH CONSTANT NOMINAL GDP H.R. 3739, 50% Exclusion and Prospective Indexing, Housing Losses Allowed ($ bil. nominal)

Year	Static Federal Tax	Dynamic Federal Tax	Net to Federal Government
1995	8.5	1.1	9.6
1996	5.6	-0.3	5.3
1997	-0.2	-1.6	-1.8
1998	-2.7	0.0	-2.7
1999	-5.7	-3.1	-8.8
2000	-9.3	-0.7	-10.0
1995-2000	-3.8	-4.7	-8.5

But upon closer examination, the criticism is invalid. As Table 6e shows, because prices are lower in the second simulation, every dollar of receipts buys more than it did in the baseline. Adjusting revenues under both the baseline and proposal for the price drop, the net pickup from this capital gains tax reduction is $145.3 billion over six years, more than in the first policy simulation.

Table 6e

TOTAL REVENUE WITH CONSTANT NOMINAL GDP VS. BASELINE H.R. 3739, 50% Exclusion and Prospective Indexing, Housing Losses Allowed ($ bil. nominal and using baseline prices)

Year	Baseline Total Revenue	Total Under Proposal	Proposal Adjusted for Price Change	Price Adjusted Change
1995	1,353.8	1,363.4	1,367.0	13.1
1996	1,427.3	1,432.6	1,443.5	16.2
1997	1,505.1	1,503.3	1,523.4	18.3
1998	1,586.9	1,584.2	1,614.2	27.2
1999	1,672.9	1,664.2	1,704.3	31.3
2000	1,763.6	1,753.6	1,802.7	39.1
1995-2000				145.3

Assumptions about monetary policy are important, for they underlie all budget forecasts. *Criticism that monetary policy could undermine dynamic forecasts also applies to static forecasts.* Monetary policy that overshoots its mark, as happened pre-1981, can bring on a recession and lead to falling revenues and widening deficits under any scenario.

The charge that the Fed can offset dynamic effects by holding nominal GDP constant is unfounded, however. Real growth effects are the same and, once price changes are considered, so are the dynamic revenue effects.

VI. Conclusions and Recommendations

The preceding analysis points to several major conclusions. First, *any budget estimation system, including the current system, is an unreliable predictor of deficits.* Even seemingly small forecasting errors on spending and taxes translate into large errors on the deficit. These forecasting errors relate primarily to mistakes in the economic baseline — mistakes common to both government and private economists.

Unfortunately, although the current system should not be used to fine-tune deficits, budget legislation since 1974 has increasingly ingrained current scorekeeping methods into the decision-making process. As a result, federal deficits as a percent of GDP have increased.

A second major conclusion is that *current estimation methods do a poor job in assessing alternate policies.* By ignoring major incentive effects, the current system is biased toward higher taxes, spending and deficits.

To remove this bias, government forecasting methods should move toward the incorporation of dynamic analysis for evaluating alternate policies. Here are some gradual steps that, if followed, could transform current government estimation methods from static to more dynamic analysis.

- For deficit purposes, acknowledge that any forecasting process, including the current one, is flawed.
- Begin to discuss how existing estimation methods could be altered to include dynamic analysis. A place to start would be a review of existing theoretical and empirical models that incorporate taxes as a determinant of growth.
- As discussion proceeds, there will inevitably be differing opinions on how large growth effects actually are. To accommodate these differences, government estimators could present policy makers with a range of estimates. Presenting a range of estimates, rather than a point forecast, acknowledges the vulnerability of *all* tax and spending estimates.
- If growth effects are to be ignored for deficit purposes, current methods must be altered to treat policies symmetrically. Ignoring positive growth effects from a tax cut overestimates the amount of revenue that will be lost and, therefore, overestimates the size of the deficit.

  A similar penalty must be applied to tax increases as well. Although higher taxes will lead to lower growth and, therefore, less revenue, current methods give full credit to the tax increase. To be symmetrical, and conservative on the deficit, a tax increase should be credited with a smaller revenue gain than is the current practice.
- To ease the transition from static to dynamic methods, and to develop a framework upon which future decisions can be better evaluated, "backcasts" should be used to simulate dynamically past changes in tax policy. A backcast uses actual economic data, rather than baseline predictions, to estimate revenue. By eliminating errors due to external factors, backcasting provides a purer check of errors inherent in the method itself. Of course, performance of a backcast requires a systematic approach that can be replicated. Anything less implies a completely judgmental estimation procedure.
- At the very least, the spotlight should be directed at the "black boxes" by making government forecasting methods open to public scrutiny.

Bringing about a major change in the way government estimators do their job won't be easy. Human beings find change difficult and often try to avoid it. Change for bureaucracy is virtually impossible. However, the ground has begun to shift if only so slightly. The first line of defense—that taxes do not matter for the economy—has already been abandoned. So has the second line—that government estimators already take dynamic effects into account. The current defense—that macroeconomic feedback effects are impossible to predict along with monetary policy—will eventually be overrun as well. The last line of defense—that it is hard to incorporate economic effects—will ultimately be rejected by policy makers and the American people.

Endnotes

1. The forecast itself consists of a set of aggregate national income and product accounts and other subsidiary economic series based on information developed by the U.S. Department of Commerce.
2. Executive Office of the President, *Budget of the United States Government, Fiscal Year 1995: Analytical Perspectives*, Washington, DC, February 1994, Tables 1-1 and 4-1. Receipts and tax bases are on a calendar year basis.
3. IRS data are gathered from stratified random samples drawn from a particular tax year. The sample for the individual income tax model, which is the largest, is over 150,000
4. Policy changes can also upset the *ad hoc* relationships used to translate law changes into the proper effective tax rate changes. Changes in the mix of income can lead to errors that do not show up in the aggregate levels of the various tax bases. Current estimates of legislative changes also are subject to a large number of errors due to the assumptions that estimators are forced to make about changes in the affected tax bases, or of timing of payments, etc. This is particularly true in the case of taxes affecting extremely narrow proposals aimed at rare income circumstances or situations involving a great deal of taxpayer discretion.
5. The White House, "America's New Beginning: A Program for Economic Recovery," February 18, 1981.
6. *A Review of the Accuracy of Treasury Revenue Forecasts, 1963-1978*, Staff Working Paper, Congressional Budget Office, February 1981 and unpublished OTA data.
7. The sensitivity of outlay projections to changes in economic variables is about half that of receipts. *Fiscal Year 1995 Budget: Analytical Perspectives*, Table 1-6.
8. Below-trend growth is currently costing the federal government about $80 billion annually in foregone receipts. See Aldona and Gary Robbins, "Looking Back to Move Forward: What Tax Policy Costs Americans and the Economy," TaxAction Analysis, Lewisville, TX, Policy Report No. 127, September 1994. Sensitivity analysis from the budget indicates that growth effects on spending are roughly half those on revenue. See *Fiscal Year 1995 Budget: Analytical Perspectives*, Table 1-6.
9. U.S. Department of the Treasury, "Statement of Harvey S. Rosen, Deputy Assistant Secretary (Tax Policy), Department of the Treasury, Before the Finance Committee, United States Senate," Washington, DC, May 3, 1990, Table 1.
10. The Joint Committee on Taxation specifically states that " . . . gains realizations are more affected by growth in GNP and stock market performance than by changes in tax rates." The technical equation says that the percent change in capital gains realizations equals 1.2 times the percent change in prices plus 0.5 times the change in real household holdings of corporate equity plus 0.95 times the change in real GDP plus 2.11 times the change in real GDP lagged one quarter. The JCT method is outlined in a March 27, 1990 staff document entitled, "Explanation of Methodology Used to Estimate Proposals Affecting the Taxation of Income from Capital Gains."
11. Capital gains realizations in 1984 were $135.9 billion. The Joint Tax Committee forecast that realizations would be $285 billion in 1991 while actual realizations were $102.8 billion. The forecast for 1992 was $305 billion versus actual realizations of $108.1 billion. With an average marginal tax rate on capital gains realizations of 22.5 percent, actual revenues were $41 billion and $44 billion below forecast. See "Capital Crimes: How Higher Capital Gains Tax Rates Have Cost the U.S. Economy and the Federal Government Billions of Dollars," prepared for Reps. Dick Armey and Jim Saxton, Republican Members of the Joint Economic Committee, December 1993.
12. This error is at current levels of the deficit. The Clinton administration budget issued in January 1994 forecasted a deficit of $918 billion over five years.
13. Scorekeeping provisions, discussed in a later section, were part of OBRA90.

14. U.S. Congress, Congressional Budget Office, "Background Material on the Catastrophic Drug Insurance Program," prepared for the U.S. Senate, Committee on Finance; U.S. House of Representatives, Committee on Ways and Means; and U.S. House of Representatives, Committee on Energy and Commerce, Washington, DC, July 1989.

15. Project HOPE, Center for Health Affairs, "The Medicare Catastrophic Drug Benefit: An Analysis of the Cost Estimates," Washington, DC, September 1987.

16. Christopher Frenze, Richard Vedder, and Lowell Gallaway, "Federal Tax Increases and the Budget Deficit, 1947-1986," Report Prepared for Senator William Roth, Washington, DC, April 29, 1987.

17. Emil M. Sunley and Randall D. Weiss, "The Revenue Estimation Process," *Tax Notes,* June 10, 1991.

18. The legislation was the Balanced Budget and Emergency Deficit Control Act of 1985.

19. *Conference Report, Omnibus Budget Reconciliation Act of 1990,* p. 1172.

20. In economic parlance, this is called the law of diminishing returns.

21. For details see Peter N. Ireland, "Two Perspectives on Growth and Taxes," Federal Reserve Bank of Richmond Economic Quarterly, Volume 80/1, Winter 1994, pp. 1-18.

22. Government output is simply the amount spent on compensation of government employees.

23. Mathematically, the Cobb-Douglas production function is: $Q=A*K^{\alpha}*L^{(1-\alpha)}$
where Q (output), K (capital), and L (labor) are variables. Parameters are A for technological change, and α for capital's share of output.

24. The Cobb-Douglas production function yields estimates within plus/minus 1.5 percent for most years.

25. These accounts follow the method outlined in Laurits R. Christensen and Dale W. Jorgenson, "U.S. Real Product and Real Factor Input, 1929-1967," *Review of Income and Wealth,* Series 16, No. 1, March 1970, pp. 19-50.

26. Major empirical studies are reported in J. Pencavel, "Labor Supply of Men," Handbook of Labor Economics, Vol. 1, O. Ashenfelter and R. Layard, eds. (Amsterdam: North Holland, 1986).

27. See J. Hausman, "Labor Supply," in How Taxes Affect Economic Behavior, H.J. Aaron and J. Pechman, eds., (Washington, DC: 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.

28. This is (0.55*0.11 + 0.9 + 0.2*0.5) = 0.37.

29. We estimate the economy-wide elasticity under a complete specification of the labor supply and demand system using full information maximum likelihood econometric techniques. We also employ a distributed lag specification of the overall supply response that spreads the total effect of the labor change over five years.

30. For a discussion of how we calculate marginal tax rates, see Aldona and Gary Robbins, "Looking Back to Move Forward: What Tax Policy Costs Americans and the Economy," TaxAction Analysis, Lewisville, TX, Policy Report No. 127, September 1994.

31. 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 1954-91. The 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.

32. There are five distinct types of capital in the Fiscal Associates Tax Model: (1) producers' durable equipment, (2) non-residential structures, (3) residential structures, (4) inventories, and (5) 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 and non-corporate. Certain categories of capital are, by definition, zero, such as household producers' durable equipment. Thus, there are a total of 20 major capital classifications in the Model.

    The model computes capital stocks according to estimated economic depreciation schedules for a disaggregated matrix of investment flows over the period 1865-1991. This matrix consists of 74 industries and 40 specific capital assets, e.g., furniture in chemical manufacturing. The 20 capital classifications are aggregations of these approximately 5,000 individual investment series.

33. 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 current.

34. See Gary and Aldona Robbins, "Putting Capital Back to Work for America," TaxAction Analysis, Lewisville, TX, Policy Report No. 124, May 1994.

35. Currently, the marginal tax rate on capital accounts for roughly 24 percent of the gross cost of capital. The other components are economic depreciation (cost recovery), which accounts for 60 percent, and the return paid to investors, which accounts for 16 percent. The net cost of capital subtracts out depreciation to provide a measure of capital income.

36. See Aldona and Gary Robbins, "Reducing Social Security Taxes: Sound Policy for Today and Tomorrow?" The Institute for Policy Innovation, IPI Policy Report No. 110, Lewisville, TX, March 1991.

37. We define a job to be a full-time equivalent of 2,080 hours worked.

38. This includes the effect of a reduction in the capital gains indexing provisions and the effect of concurrent lower interest rates on investment.

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