MACROECONOMIC ANALYSIS OF VARIOUS PROPOSALS TO PROVIDE $500 BILLION IN TAX RELIEF

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of the
JOINT COMMITTEE ON TAXATION

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CONTENTS

INTRODUCTION

This document,[1] prepared by the staff of the Joint Committee on Taxation, provides a macroeconomic analysis of various proposals to provide $500 billion in tax relief. The staff of the Joint Committee on Taxation ("Joint Committee staff") reports the results of simulations of three different tax policies using both the Joint Committee staff's Macroeconomic Equilibrium Growth model and an overlapping generations life cycle model. This document provides an analysis of how changes in tax policy may affect the nation's economy. This is part of the Joint Committee's work to model the macroeconomic effects of proposed tax legislation and to provide information about macroeconomic models and their assumptions.

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[1] This document may be cited as follows: Joint Committee on Taxation, *Macroeconomic Analysis of Various Proposals to Provide $500 Billion in Tax Relief*, (JCX-4-05), March 1, 2005.

MACROECONOMIC ANALYSIS OF VARIOUS PROPOSALS TO PROVIDE $500 BILLION IN TAX RELIEF

EXECUTIVE SUMMARY

This document, prepared by the staff of the Joint Committee on Taxation ("Joint Committee staff"), provides macroeconomic analyses of three different proposals to reduce taxes by $500 billion over the period from 2005-2014, as measured by conventional revenue estimates of Federal fiscal year revenues. The three proposals are a decrease in individual income tax rates, an increase in the personal exemption, and a decrease in the corporate income tax rate. Each of the proposals would be effective for taxable years beginning after December 31, 2004. Each proposal is simulated both as a stand-alone policy, and assuming that Federal government spending will be contemporaneously reduced to offset the budget effects of the policy. Both the Joint Committee staff 's Macroeconomic Equilibrium Growth model and an overlapping generations life cycle model (provided through a contract with Tax Policy Advisers, LLC.) are used in the simulations.

Despite the fact that each of these tax cuts reduces revenues by the same amount according to conventional revenue estimates, their effects on the economy vary greatly, both within the ten-year budget planning horizon and in the longer run. Accordingly, the net effect of the policies on Federal receipts as measured including macroeconomic effects is also different among policies. In the short run, depending on the response of Federal fiscal and monetary policy, increases in after-tax income are likely to lead to increases in consumption of goods and services, providing a temporary demand stimulus to the economy, increasing the tax base and revenues. The reductions in individual income tax rates and the increase in the personal exemption amount, when not offset by government spending cuts, provide the largest temporary stimulus by creating the largest increases in after-tax income.

These policies also have more permanent economic effects through their impact on after-tax return to labor and capital. Reductions in the corporate tax burden affect the economy primarily by increasing business incentives to invest in productive capital like machinery, equipment and technology, thereby gradually increasing the productive capacity of the economy. Reductions in taxes on labor affect the economy by changing both average income and the after-tax return to labor, thereby immediately affecting the willingness of people to work at market wage rates. Thus, the corporate tax rate reduction has the greatest effect on long-term growth, as the stock of productive capital accumulates and leads eventually to higher labor productivity. Reductions in individual income tax rates change both after-tax income and the after-tax return to labor, immediately affecting the willingness of people to supply labor to the economy. The resulting increase in both consumption demand and available labor hours has the greatest effect on short-term growth.

Growth effects eventually become negative without offsetting fiscal policy for each of the proposals, because accumulating Federal government debt crowds out private investment. When Federal government spending is reduced to prevent debt accumulation, all three policies result in some long-term growth.

The exact magnitude of these effects is sensitive to a number of different modeling assumptions, including Federal Reserve Board policy, Federal fiscal policy, the extent to which taxpayers accurately anticipate the economic effects of the polices, and the magnitude of assumed behavioral parameters. The analysis below presents the effects of these different policies on total output, employment, capital stock, consumption, and Federal receipts under an array of different policy and behavioral assumptions.

Section I provides a description of the policies analyzed and an overview and comparative analysis of the simulation results. Section II provides a brief description of the macroeconomic models used to simulate the proposals, including a brief discussion of key differences in the models. A description of the format of detailed model results is also provided in Section II. In Section III, detailed simulation results are provided separately for each proposal, with a discussion of the effects of various modeling assumptions on these results. Specific data information and parameter assumptions are provided in a technical appendix.

I. OVERVIEW AND COMPARISON OF PROPOSALS

A. Policies Simulated

This document, prepared by the staff of the Joint Committee on Taxation, provides macroeconomic analyses of three proposals to revise the Internal Revenue Code to reduce the tax burden on different sectors of the economy. Each proposal is designed to result in a loss of $500 billion, as measured by conventional revenue estimates, in Federal fiscal year revenues over the period from 2005-2014. (Detailed annual conventional estimates appear in Table A.1. in Appendix A.) Each of the proposals would be effective for taxable years beginning after December 31, 2004. The analysis presents the results of simulating the changes contained in these proposals using two models of the economy. The models employ a variety of assumptions regarding Federal fiscal policy, monetary policy, and behavioral responses to the proposed changes in law. The following proposals are analyzed:

- Reduction in individual income tax rates.−Reduce individual income tax rates by four percent through 2014 and 2.9 percent thereafter, for each bracket for both ordinary income and capital gains and dividend income. The four percent tax rate reduction would also apply to the alternative minimum tax;

- Increase in the personal exemption.−Increase the personal exemption amount for individual taxpayers by 65 percent, which would be from $3,150 per person to $5,200 per person in 2005, indexed for inflation thereafter; and

- Reduction in the corporate income tax rate.−Reduce statutory corporate income tax rates by 20 percent for both ordinary income and capital gains income; the same percentage tax rate reduction would also apply to the alternative minimum tax.

In addition to simulations of the above three tax reductions as stand-alone policies, each proposal is simulated assuming that Federal government spending will be contemporaneously reduced to offset the budget effects of the policy. Finally, a revenue neutral version of the corporate tax rate reduction proposal is simulated, by offsetting the corporate tax rate reduction with a reduction in the personal exemption amount for individual taxpayers by 47 percent, which would be from $3,150 to $1,670 per person in 2005.

All of these proposals are analyzed relative to present law as of January 1, 2004; thus, in the present law baseline, the sunsets of existing income tax rates enacted in the Economic Growth and Tax Relief Reconciliation Act of 2001 ("EGTRRA") and the Jobs and Growth Tax Relief Reconciliation Act of 2003 ("JGTRRA") are assumed to occur as enacted. Thus, individual income tax rates are assumed to increase after 2010 in the baseline forecast for present law, while there is no parallel increase in corporate rates in the baseline forecast. For this reason, tax policies that carry the same conventional revenue cost for individual and corporate taxes within the budget window will show different amounts of revenue loss outside the budget window. In order to conform the sizes of the conventional revenue losses from each policy beyond the ten-year budget period, the individual income tax rate is reduced by 2.9 percent (rather than four percent) after 2015, and the personal exemption amount is increased by 63 percent (rather than 65 percent) after 2015.

Details of the marginal and average tax rates used to represent these policies in the macroeconomic analysis appear in Appendix A. It should be noted that we do not take into account the recently enacted tax bills, the American Jobs Creation Act of 2004 or the Working Families Tax Relief Act of 2004.

Despite the fact that each of the tax rate reductions described above reduces conventional revenues by the same $500 billion amount, they have different effects on the economy, both within the ten-year budget planning horizon, and in the longer run. As discussed in more detail below, this is primarily due to the longer time frame for the reduction in the cost of capital to impact the economy relative to the increase in the return to work for individuals.

B. Overview of Macroeconomic Effects

For all of the policies considered, the reduction in tax rates results in higher after-tax income, which stimulates consumer demand. But the extent of the stimulus depends on whether there are offsetting monetary or fiscal policy changes. The Federal Reserve Board may offset demand stimulus by increasing interest rates, which increases the cost of borrowing for both personal consumption and investment, thus reducing consumer demand and slowing the build up of capital stock. Offsetting fiscal policy is generally modeled in this analysis as a cut in Federal government spending via a cut in non-taxed Federal transfer payments, which reduces after-tax income available for consumer purchases. Offsetting monetary or fiscal policy that counteracts the demand stimulus of the uncompensated tax rate cuts reduces the strength of the economy's response to the tax rate cut within the ten-year budget horizon.

In addition, for all of the policies considered, the extent to which there are long-run increases in output, income, or employment depends on whether the loss in revenues due to the policy is accompanied by offsetting monetary or fiscal policy. Without an offsetting fiscal policy, the uncompensated loss of revenues from the Federal budget requires additional Federal government borrowing, which may raise interest rates enough to crowd out private business activity and thereby reduce the benefits of the policy, particularly if the Federal Reserve Board acts aggressively to counteract the fiscal policy.

Each of the tax policies considered here represents a relatively small change in fiscal policy, relative to the total amount of Federal receipts. The $500 billion ten-year conventional revenue estimate associated with each policy represents approximately three percent of the forecasted $16,377 billion in receipts from individual and corporate income taxes for fiscal years 2005-2014. (See Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2005-2014,* Table 1-2, January 2004, for the receipts forecast used in this analysis.) The effect of each of these proposals on economic growth is thus commensurately small.

Reduction in the individual income tax rate

A reduction in individual income tax rates affects the economy primarily through its effects on after-tax wages and wage rates, since these are the largest portion of the income tax base; but it also works through its effects on after-tax capital income, such as dividends, interest and capital gains. In the short run, the higher after-tax income resulting from the reduction in individual income tax rates may stimulate consumer demand, depending on any offsetting fiscal or monetary policy changes. In the longer run, the individual tax rate reduction affects economic growth by reducing marginal tax rates on labor and capital income, thus increasing the after-tax return to working and saving, resulting in increased in labor force participation and productivity-enhancing, additional business investment and economic growth.

Increase in the personal exemption

An increase in the personal exemption for individual taxpayers has its most direct effect from stimulating consumer demand, by increasing after-tax income, depending on offsetting fiscal or monetary policy changes. But a second, small effect occurs because changing the personal exemption has a small effect on an individual's marginal income tax rates, as a change

to taxable income moves some taxpayers into a lower tax bracket, which increases work and savings incentives. The increase in after-tax income experienced by all taxpayers provides offsetting incentives to work and save less. Thus, the personal exemption increase has a smaller effect on short-run demand growth, and a smaller effect on long-run labor supply than observed with the individual tax rate reduction.

Reductions in the corporate income tax rate

A decrease in the corporate income tax rate primarily affects the economy through increasing the after-tax rate of return on corporate capital, which provides incentives for increased investment in corporate capital. Over time, this increased investment results in more goods and services and higher total output. It also results in higher labor productivity, leading to increased wages and employment. As a result, after-tax income rises, which may stimulate additional growth due to increased consumer demand, depending on offsetting monetary or fiscal policy.

C. Graphic Comparison of Simulation Results

The figures below illustrate the different effects of these policies by depicting together the effects of each of the three tax policies on economic growth, employment, investment, consumption, and the Federal government budget. Each set of illustrations is based on simulations using the MEG model (described in section II, below). For each tax policy, four graphs are shown for each variable discussed. These differ by whether or not there is offsetting fiscal policy and by the assumed Federal Reserve Board policy. The "a" and "b" graphs show tax rate reductions with no fiscal offset. The "c" and "d" graphs show tax rate reductions that are offset with changes in Federal government transfer payments (and in the case of the corporate rate decrease, alternatively by a decrease in the personal exemption) that match the dollar amount of the conventional revenue estimate. Each set of policies is presented under two different assumptions about the Federal Reserve Board response to the policy. The "a" and "c" graphs show MEG simulations that assume the Federal Reserve Board acts aggressively to counteract any changes in aggregate demand due to the proposals. The "b" and "d" graphs show MEG simulations that assume the Federal Reserve Board targets fixed money growth, thus neither counteracting nor accommodating the tax policy change.

Growth

As Figures 1a-d show, a cut in the corporate tax rate has the greatest effect on long-term growth, while the decrease in individual income tax rates has a greater growth effect in the short run. There is more variability from year to year in short-run growth effects because the short-run MEG simulations include temporary demand effects. In the short run, the growth due to the reduction in corporate income tax rates is slowed relative to growth from the other policies because, unlike the other policies that directly increase after-tax personal income, the corporate tax rate reduction provides some incentive to save rather than consume, because it directly increases the after-tax return to capital. Growth effects eventually become negative without offsetting fiscal policy for each of the proposals, because accumulating Federal government debt crowds out private investment. When Federal government spending is reduced to prevent debt accumulation, all three policies result in some long-term growth.

Because neutral monetary policy allows for more short-run fluctuations in demand than does aggressive Federal Reserve Board policy, the path of economic growth differs depending on the monetary policy assumption. As explained in more detail in Section II.A., below, the two Federal Reserve Board policies depicted in the following graphs are not meant to represent actual predicted Federal Reserve board behavior. They represent two possible extremes: perfectly counteracting any external economic shocks ("Aggressive Fed Policy"), or completely ignoring any external economic shocks ("Neutral Fed Policy"). Thus, the aggressive "a" and "c" graphs show smoother growth paths than would be expected to occur in a world where the Federal Reserve Board acts with lagged information; while the neutral "b" and "d" graphs show greater fluctuations in the growth path response to tax policy than would be expected, given that Federal Reserve Board policy is rarely completely neutral. When tax rate reductions are not offset by spending reductions, the tax policy is likely to stimulate demand in the short run; thus the neutral Federal Reserve Board simulations in Figure 1b shows more immediate growth in the short run, with a corresponding downward correction in the out years, than the aggressive Federal Reserve Board simulations in Figure 1a.

Figure 1a.−Percent Change from Baseline in Real GDP: No Fiscal Offset; Aggressive Fed Policy

Figure 1b.−Percent Change from Baseline in Real GDP: No Fiscal Offset; Neutral Fed Policy
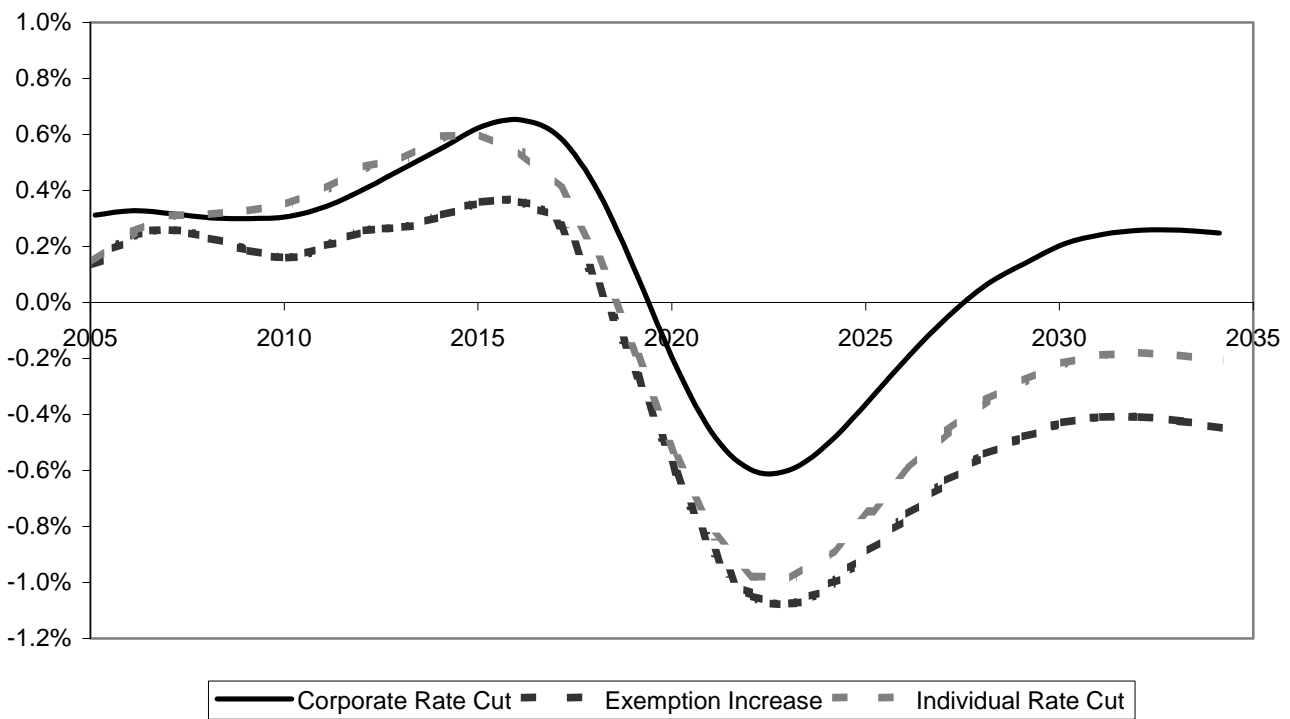
Figure 1c.−Percent Change from Baseline in Real GDP; with Fiscal Offset; Aggressive Fed Policy

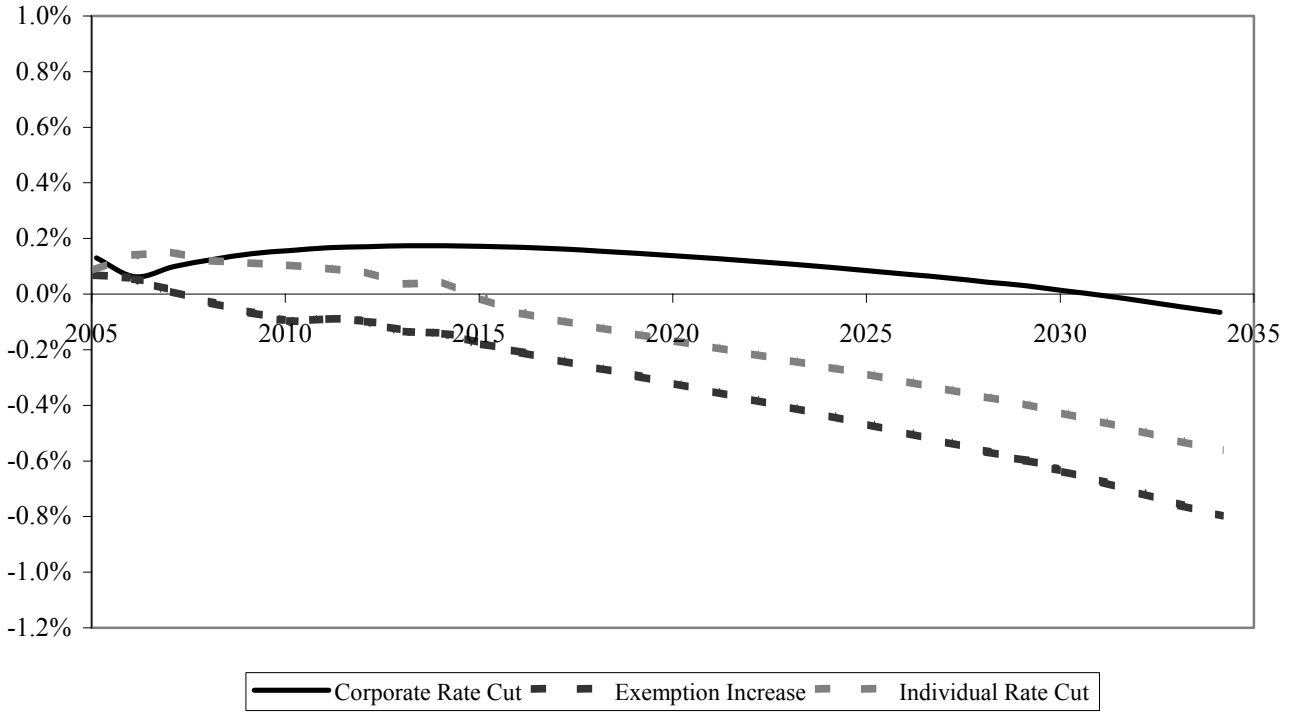|	
Corp Rate Cut, Personal Exemption Decreased	Corporate Rate Cut, Transfers Decreased
Personal Exemption Increased, Transfers Decreased	Individual Rate Cut, Transfers Decreased
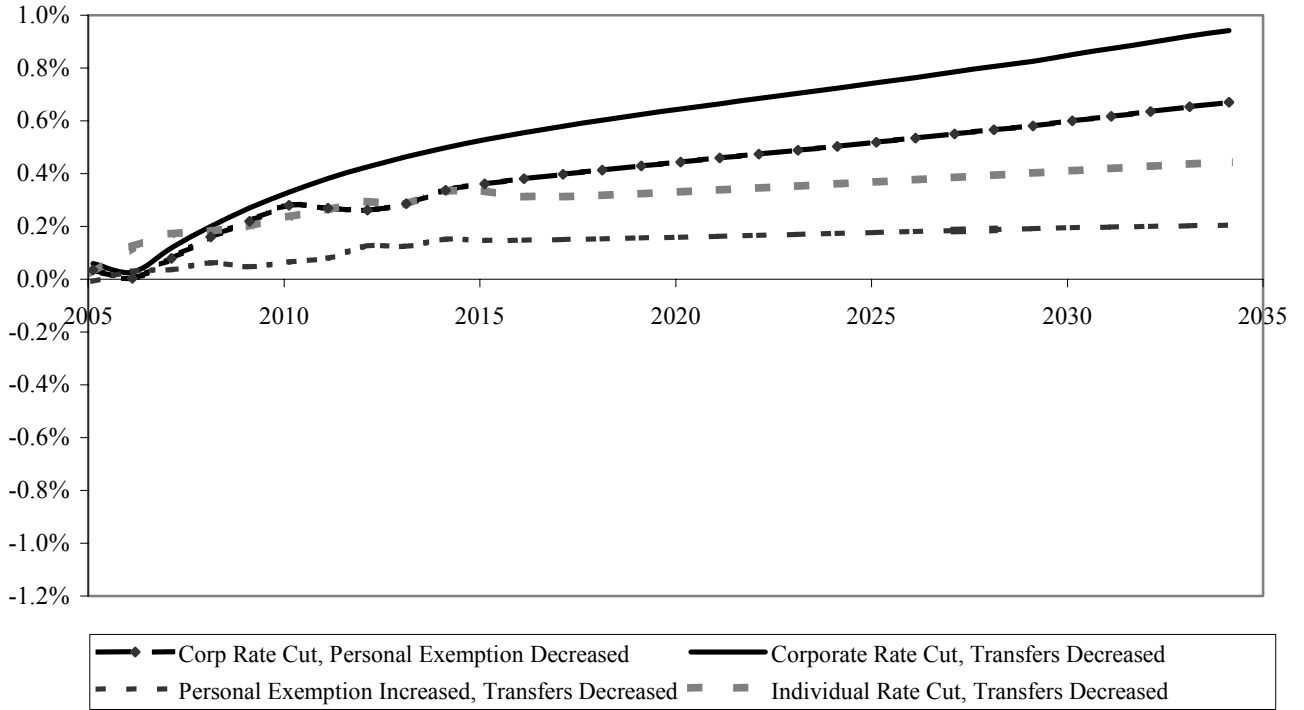
Figure 1d.−Percent Change from Baseline in Real GDP; with Fiscal Offset; Neutral Fed Policy

Corp Rate Cut, Personal Exemption Decreased	Corporate Rate Cut, Transfers Decreased
Personal Exemption Increased, Transfers Decreased	Individual Rate Cut, Transfers Decreased
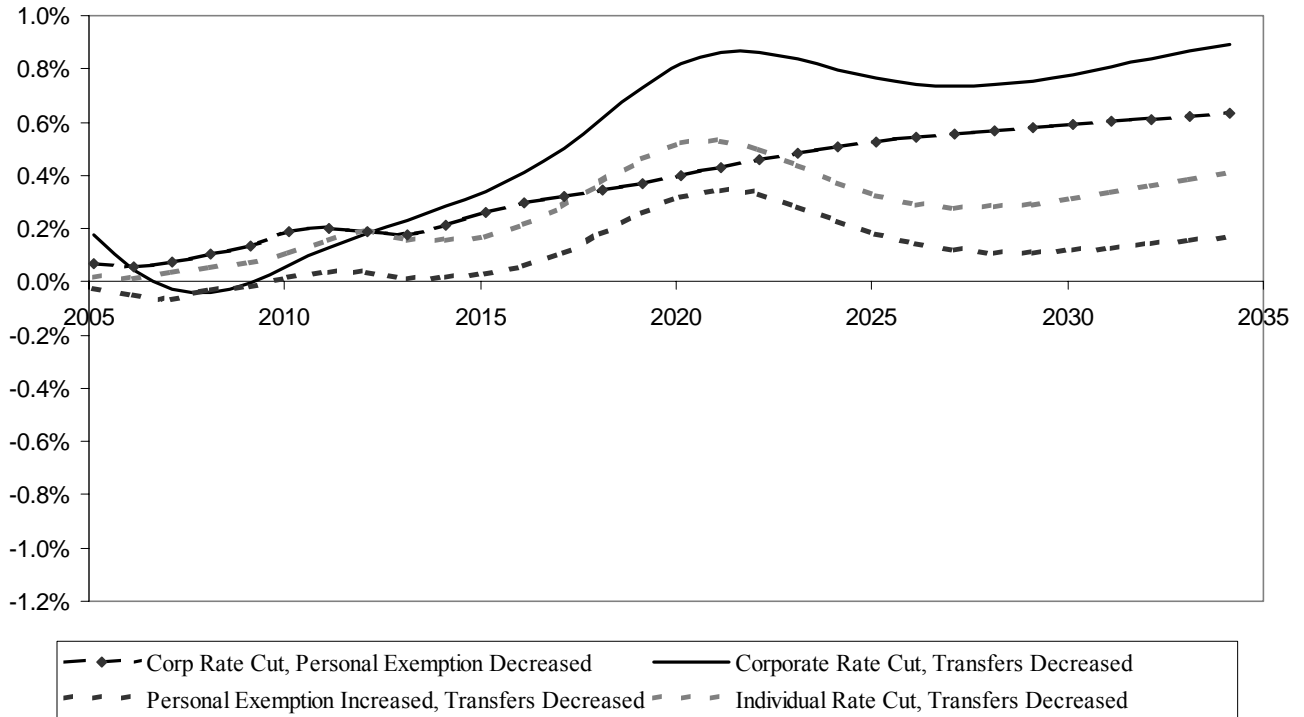
Employment

Figures 2a-d show the commensurate effects of each policy on employment. The individual tax rate reduction increases employment immediately by reducing marginal tax rates, thus increasing the after-tax return to additional labor, and this increase persists in the long run. The exemption increase has a much smaller impact on marginal tax rates on labor, and a commensurately smaller effect on employment. Both tax policies that affect individual income taxation have a greater impact on labor force participation and employment because they both provide direct incentives to individuals to work by directly increasing the after-tax return to labor. In contrast, the reduction in the corporate tax rate increases the after-tax wage rate indirectly, as the gradual increase in the capital stock leads to increasing labor productivity, and eventually higher wage rates. Because the impact of the corporate tax rate reduction on employment occurs more gradually, as it develops over time in response to the buildup of capital from the corporate tax rate reduction, the effect of the corporate tax rate reduction on employment is relatively small and takes time to build up.

Translating these employment changes into jobs, calculated as full-time equivalents based on hours worked, the percent changes in employment shown on figure 2a correspond to a long-run increase of approximately 50,000 jobs due to the corporate rate decrease, 160,000 due to the personal exemption increase, and 300,000 due to the individual income tax rate cut.

When the corporate rate cut is offset with either a decrease in transfers or a decrease in the personal exemption, as shown in Figures 2c-d, there is a small, short-term decline in employment. In the latter simulation, that decrease is sustained in the long run, while the corporate rate cut accompanied by a decrease in government spending modestly increases employment over time. The individual rate cut and personal exemption increase that are offset by spending decreases have employment effects that are very similar to those of the same policies with no fiscal offset.

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**Figure 2a.−Percent Change from Baseline in Employment: No Fiscal Offset;
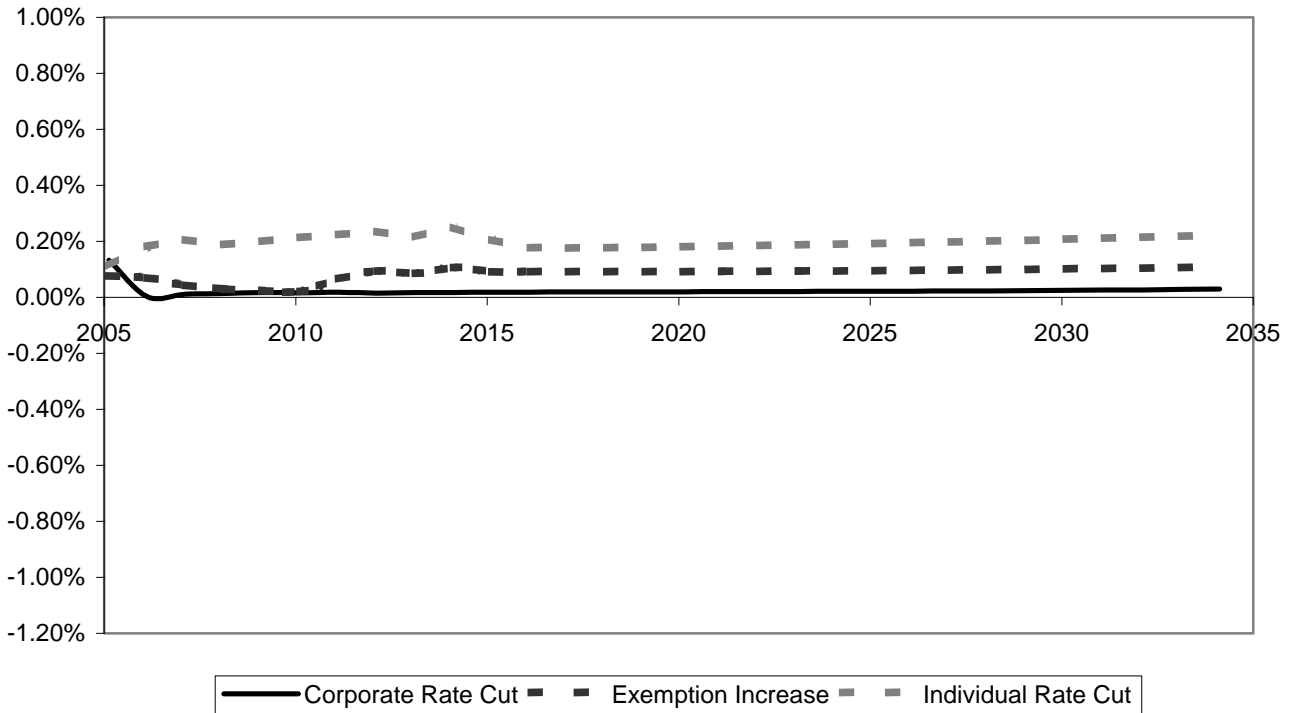Aggressive Federal Reserve Policy**

**Figure 2b.−Percent Change from Baseline in Employment: No Fiscal Offset;
Neutral Federal Reserve Policy**

Figure 2c.−Percent Change from Baseline in Employment: With Fiscal Offset; Aggressive Federal Reserve Policy

Legend:
— ♦ — Corp Rate Cut, Personal Exemption Decreased
—— Corporate Rate Cut, Transfers Decreased
▪ ▪ ▪ Personal Exemption Increased, Transfers Decreased
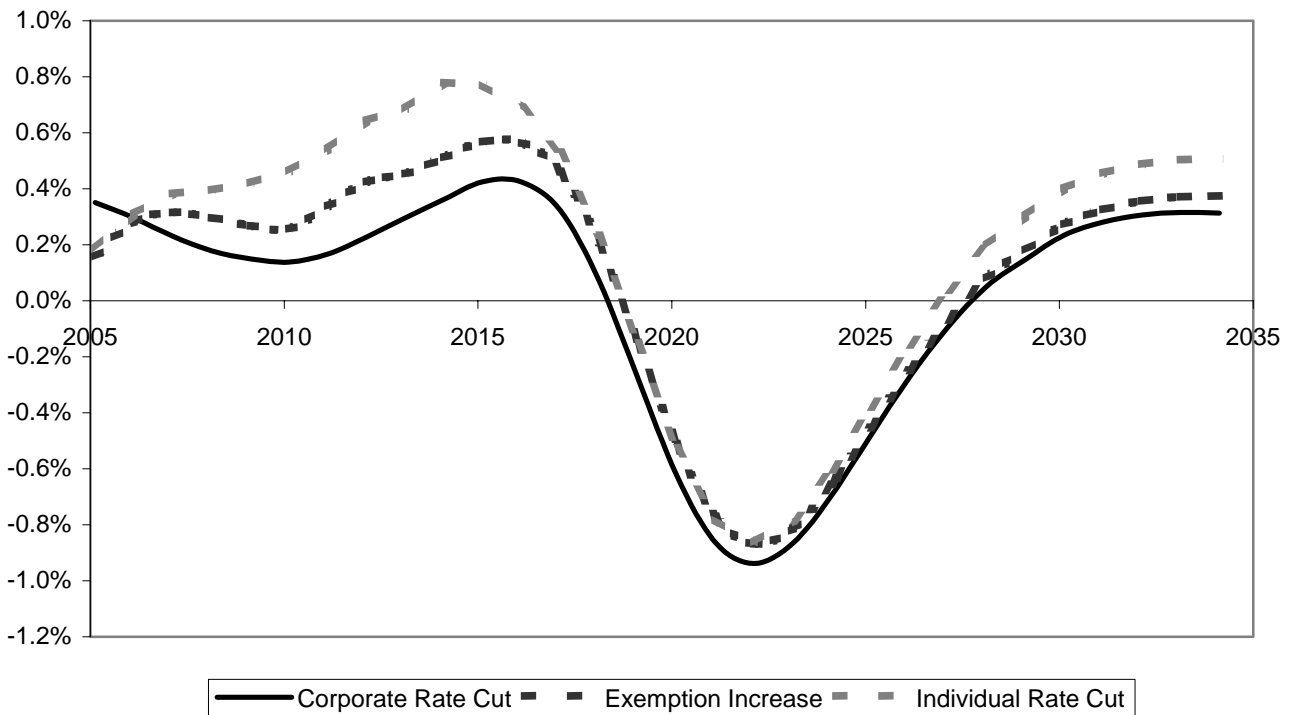▪ ▪ Individual Rate Cut, Transfers Decreased
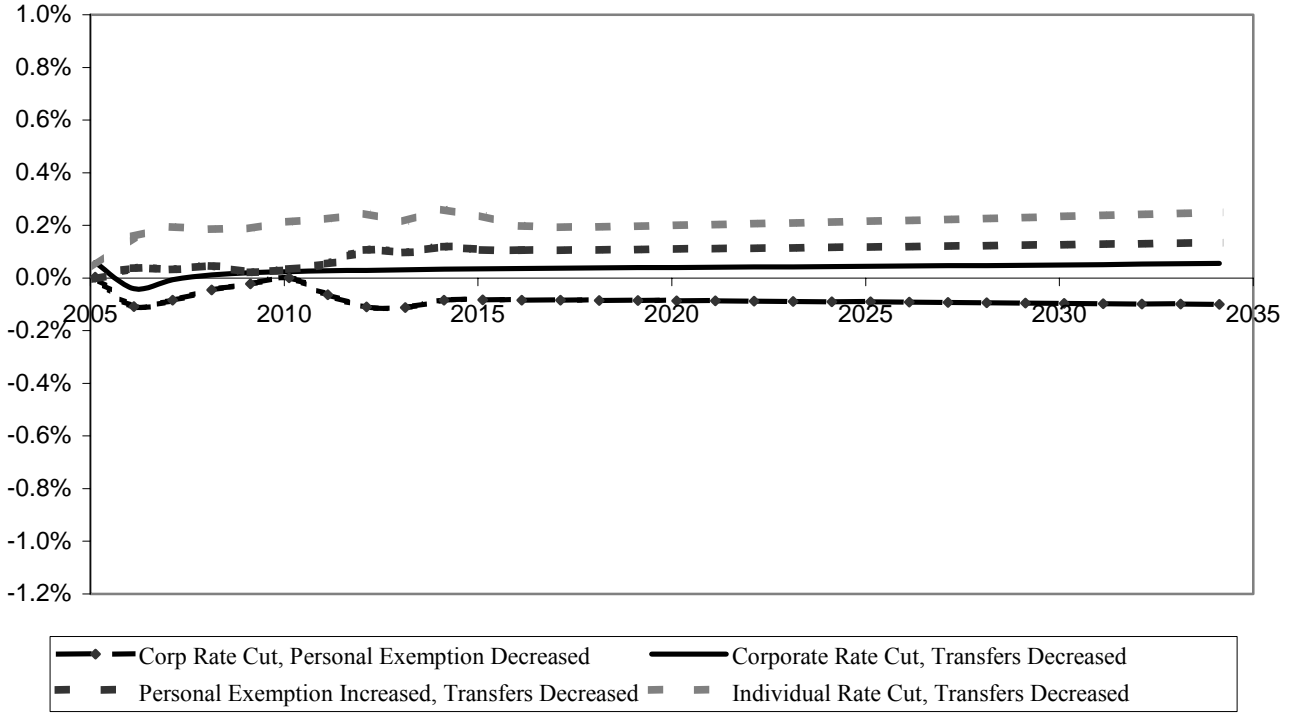
Figure 2d.−Percent Change from Baseline in Employment: With Fiscal Offset; Neutral Federal Reserve Policy

Legend:
— ♦ — Corp Rate Cut, Personal Exemption Decreased
—— Corporate Rate Cut, Transfers Decreased
▪ ▪ ▪ Personal Exemption Increased, Transfers Decreased
▪ ▪ Individual Rate Cut, Transfers Decreased
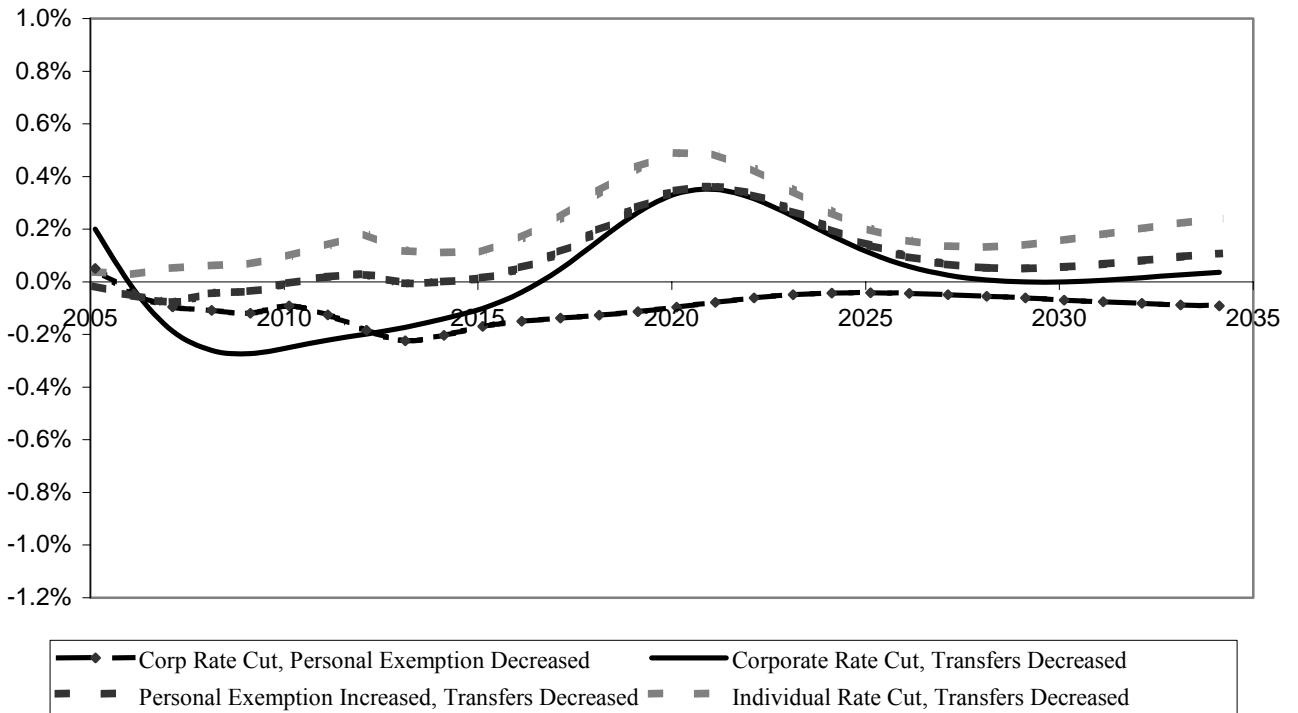
Business investment

      As Figures 3a-d illustrate, the relative effects of the individual income tax cut and the corporate tax rate reduction on producer's capital stock are reversed relative to the effects on employment. The corporate tax rate reduction directly increases the after-tax return to capital, thus increasing investment. This effect is much smaller for the relatively smaller portion of business capital (roughly 30 percent) that receives a tax cut through the reduction in individual income tax rates. Because the increase in the personal exemption has little effect on the cost of capital, it provides little incentive for an increase in the capital stock. With no fiscal offset, the effects of Federal debt crowd out almost immediately any demand-induced investment from the individual income tax cut and the increase in the exemption.

**Figure 3a.‒Percent Change from Baseline in Producers' Real Capital Stock:
No Fiscal Offset; Aggressive Federal Reserve Policy**
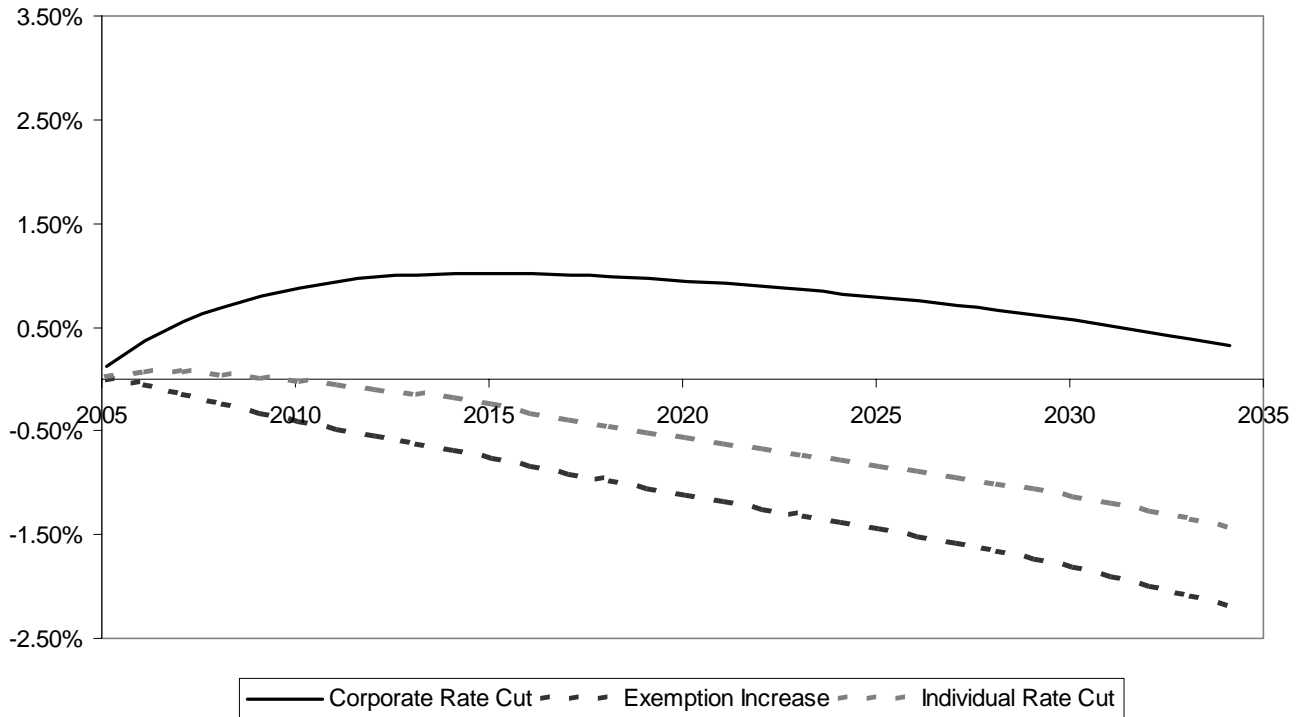
**Figure 3b.‒Percent Change from Baseline in Producers' Real Capital Stock:
No Fiscal Offset; Neutral Federal Reserve Policy**
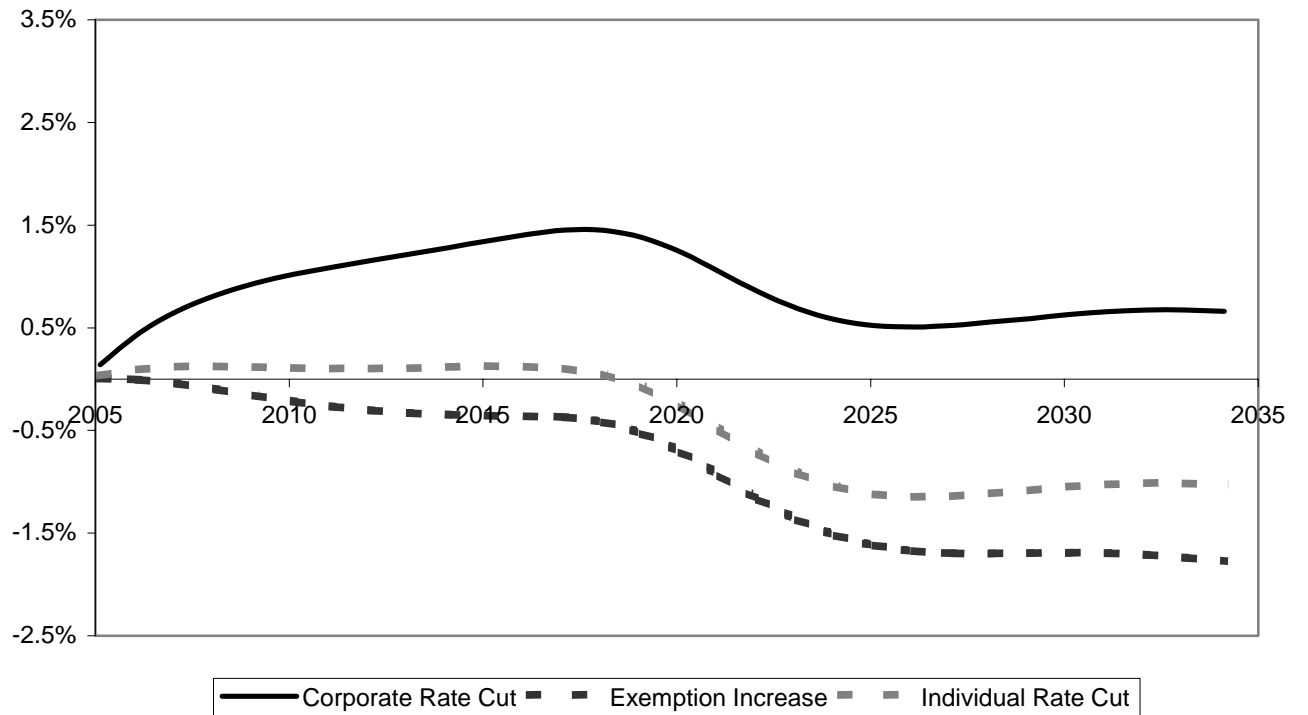
**Figure 3c.−Percent Change from Baseline in Producers' Real Capital Stock:
With Fiscal Offset; Aggressive Federal Reserve Policy**

Corp Rate Cut, Personal Exemption Decreased — Corporate Rate Cut, Transfers Decreased
Personal Exemption Increased, Transfers Decreased — Individual Rate Cut, Transfers Decreased

**Figure 3d.−Percent Change from Baseline in Producers' Real Capital Stock:
With Fiscal Offset; Neutral Federal Reserve Policy**

Corp Rate Cut, Personal Exemption Decreased — Corporate Rate Cut, Transfers Decreased
Personal Exemption Increased, Transfers Decreased — Individual Rate Cut, Transfers Decreased

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Consumption

Figures 4a-d show the effects of the policies on consumption. Consumption is particularly of interest in the short run as an indicator of demand stimulus. In the long run, consumption is sometimes used as an indicator of the effects of the policies on individuals' well-being, under the assumption that increased consumption indicates increased availability of goods and services to the economy. Consumption is sometimes viewed in combination with changes in employment or hours worked, as well, to take into account changes in the amount of leisure people are enjoying.

By increasing after-tax income directly, and providing individuals with more incentive to work, the cut in individual income tax rates increases consumption the most in the short run. The personal exemption increase also increases consumption more in the short run than the corporate tax rate reduction; but because it does not provide significant incentives to taxpayers to work more, the exemption increases consumption by less than the income tax rate cut. In the long run, because the corporate rate cut results in greater economic growth, consumption rises more as a result of the corporate rate cut than from the other two policies. Without a fiscal offset to prevent crowding out, consumption eventually declines in the case of the individual tax cut policies.
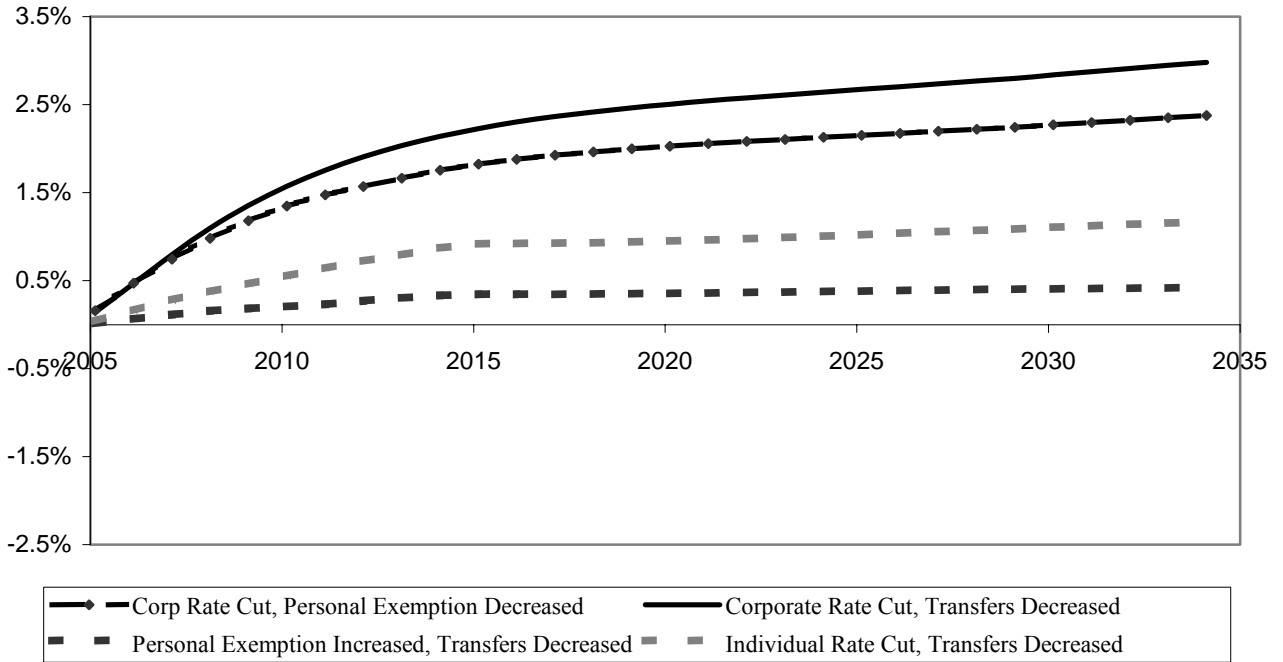
**Figure 4a.−Percent Change from Baseline In Real Consumption: No Fiscal Offset;
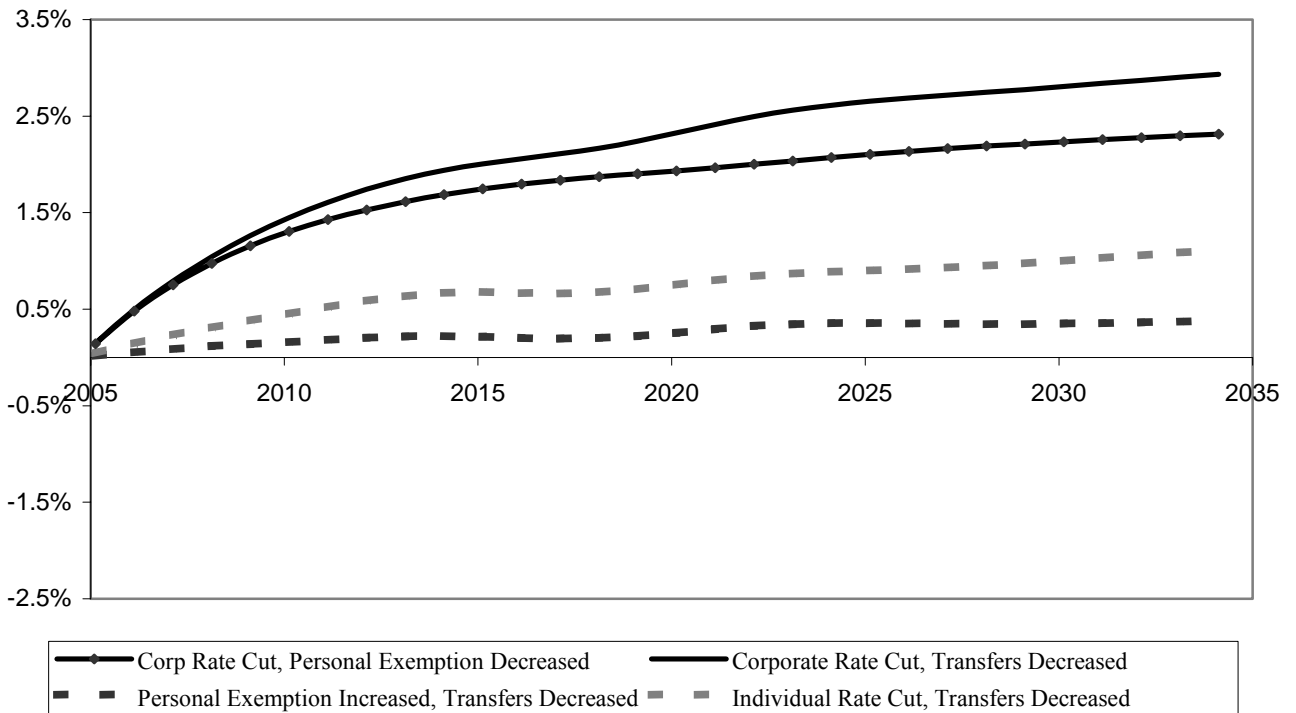Aggressive Federal Reserve Policy**
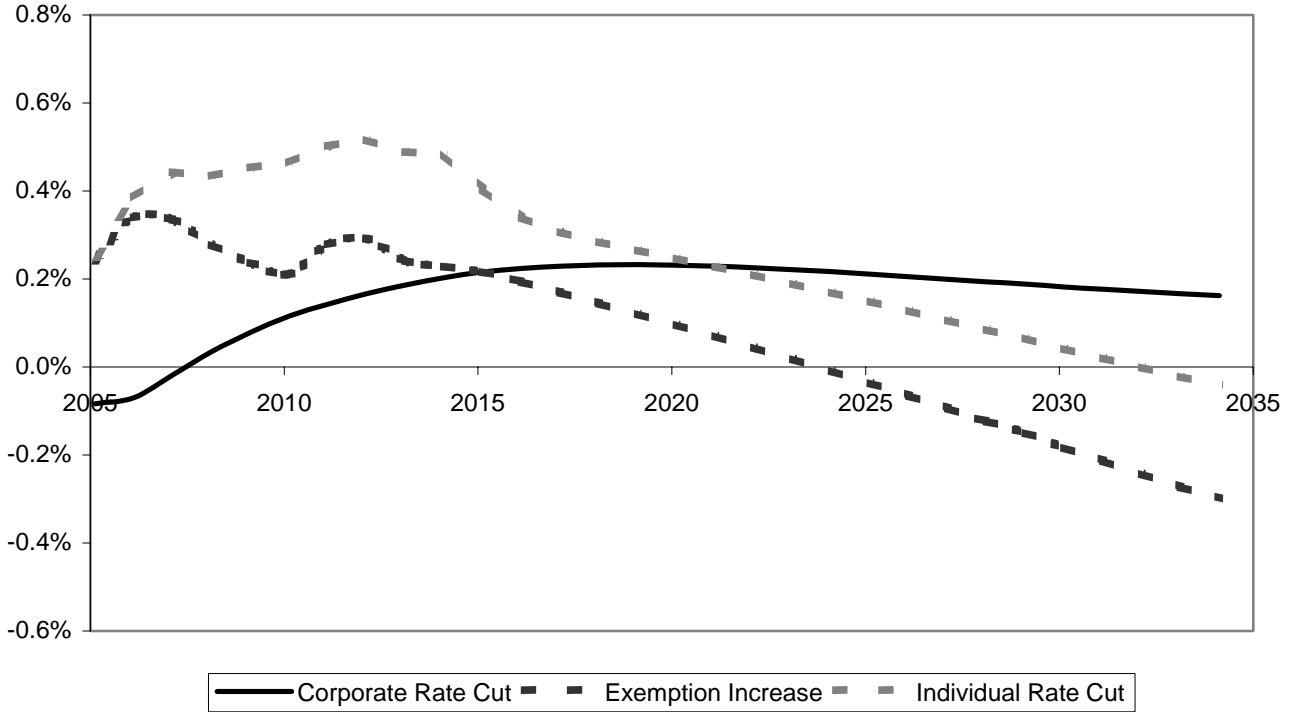
**Figure 4b.−Percent Change from Baseline In Real Consumption: No Fiscal Offset;
Neutral Federal Reserve Policy**
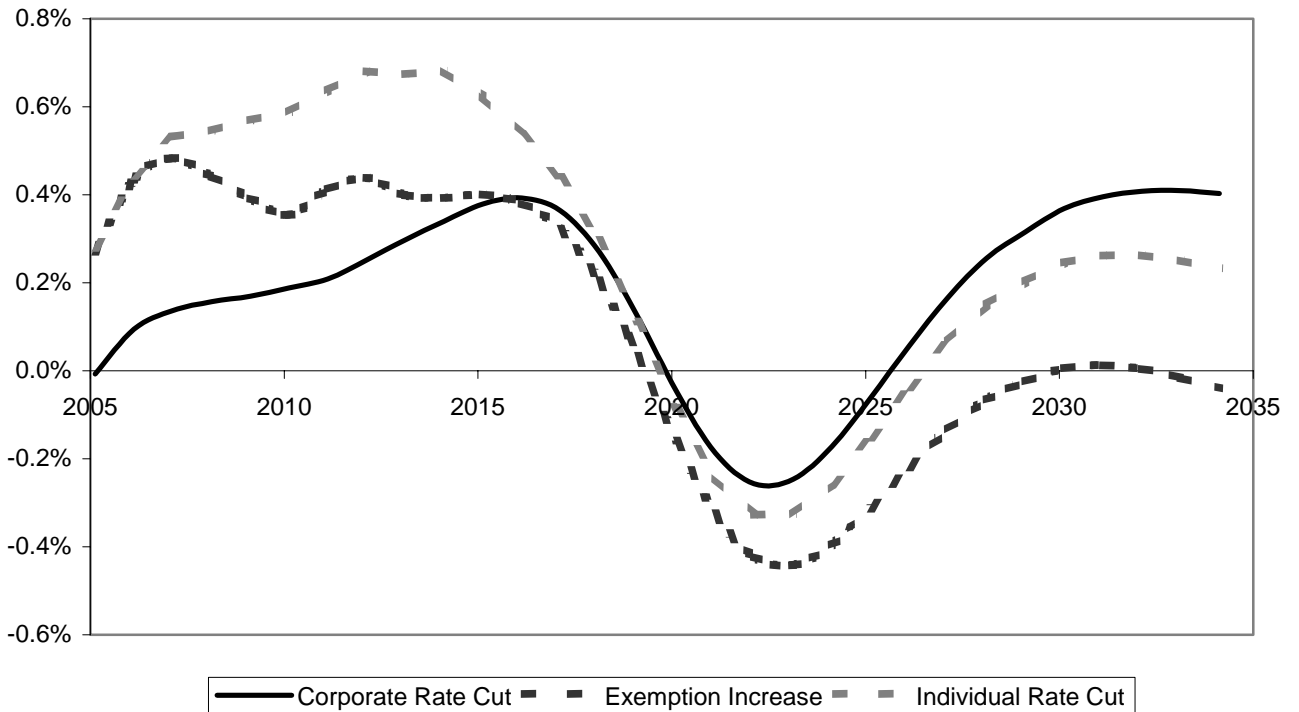
**Figure 4c.−Percent Change from Baseline in Real Consumption: With Fiscal Offset;
Aggressive Federal Reserve Policy**

Corp Rate Cut, Personal Exemption Decreased — Corporate Rate Cut, Transfers Decreased
Personal Exemption Increased, Transfers Decreased — Individual Rate Cut, Transfers Decreased
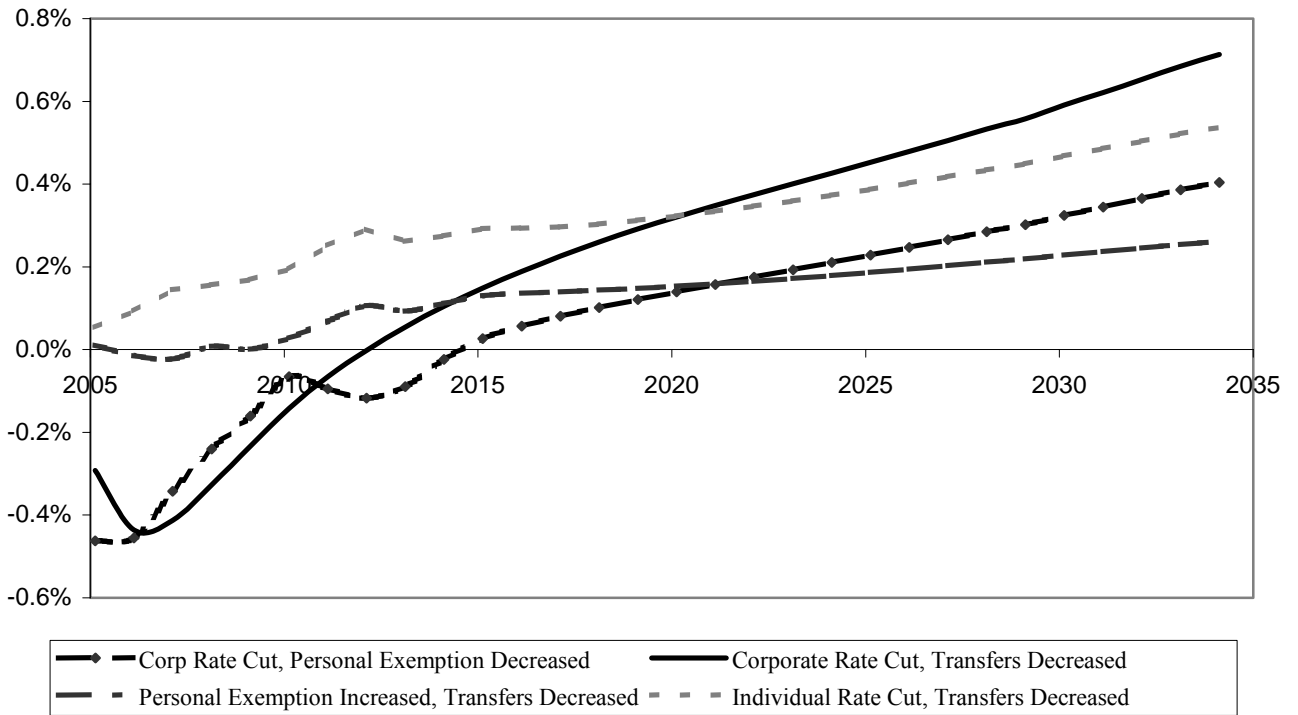
**Figure 4d.−Percent Change from Baseline in Real Consumption: With Fiscal Offset;
Neutral Federal Reserve Policy**

Corp Rate Cut, Personal Exemption Decreased — Corporate Rate Cut, Transfers Decreased
Personal Exemption Increased, Transfers Decreased — Individual Rate Cut, Transfers Decreased
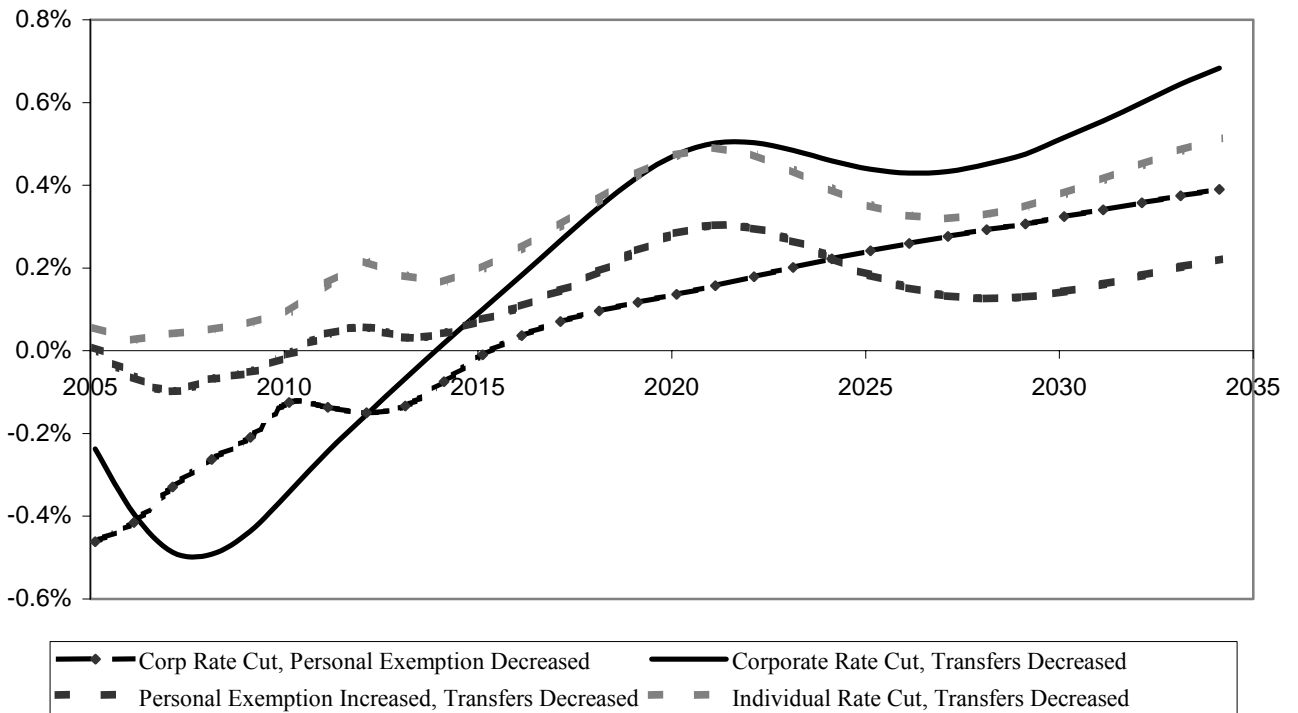
Federal surplus or deficit

To the extent that a policy results in a net decrease in Federal receipts, with no offsetting expenditure reductions, the policy results in the Federal surplus becoming more negative. Decreases in the Federal surplus generate additional debt service costs. To determine how changes in tax policy affect the ability of the government to meet its current and future obligations it is helpful to compare tax-induced changes in the deficit and GDP. If GDP is growing faster than the deficit, the fiscal situation is improving, whereas if the deficit is growing faster, the fiscal situation is worsening. If deficits are growing faster (slower) than GDP, then the ratio of Federal debt to GDP would increase (decrease), which implies that future generations would have less (more) income with which to consume and invest.

Figures 5a-d illustrate directly the impacts of the different policies on Federal debt accumulation, by showing the change in the ratio of Federal surplus to GDP as a result of the policies. Negative values on the graph indicate decreases in the ratio of surplus to GDP (or, equivalently, increases in the absolute value of the deficit to GDP ratio). In Figure 5a-b where simulations are done with no fiscal offset, the net effect of all of the policies on the Federal budget is to decrease surpluses (increase deficits), as expected, and thus decrease the ratio of Federal surplus to GDP. Moreover, the decrease in Federal surpluses accelerates over time by increasing interest costs associated with a growing Federal debt. In contrast, Figure 5c-d shows the change in the Federal surplus for the simulations that include a fiscal offset. The change in the surplus to GDP ratio starts out, by construction, to be essentially zero over the first ten years. As the growth effects of the policies take hold the economy starts to generate surpluses relative to the baseline.

**Figure 5a.−Change from Baseline: Ratio of Surplus to GDP: No Fiscal Offset;
Aggressive Federal Reserve Policy**
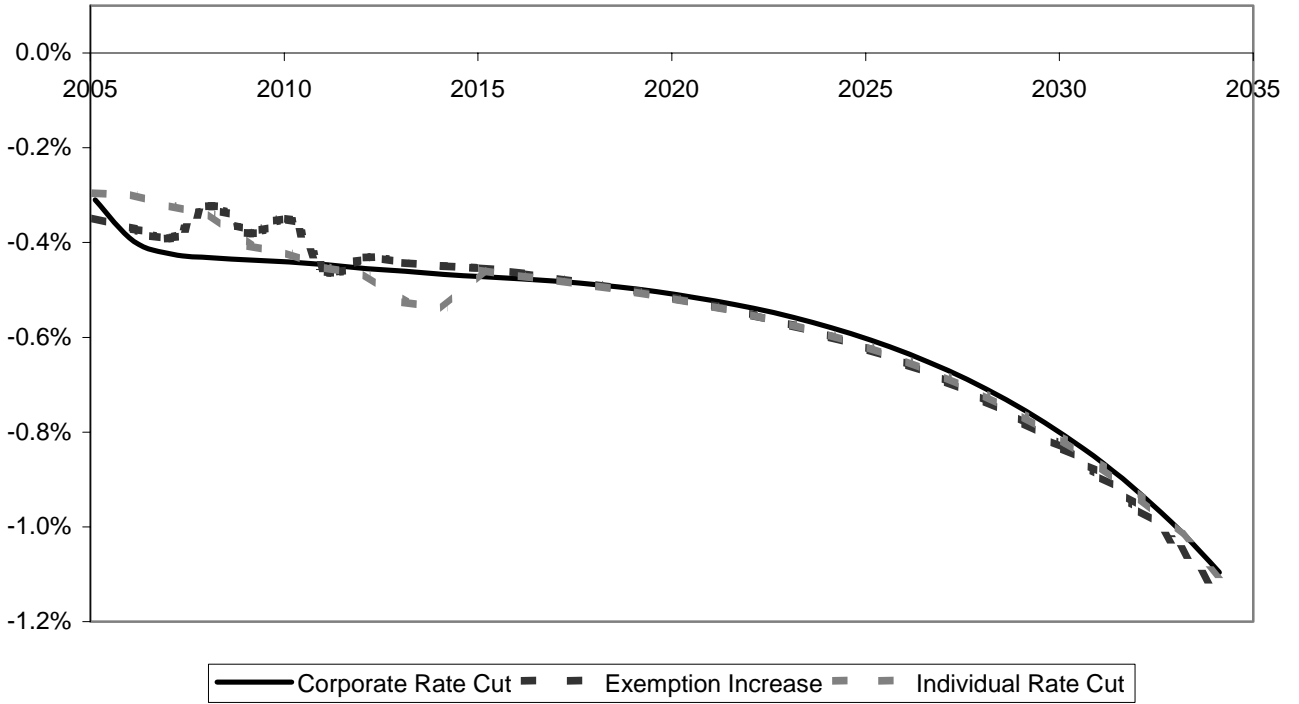
**Figure 5b.−Change from Baseline: Ratio of Surplus to GDP: No Fiscal Offset;
Neutral Federal Reserve Policy**
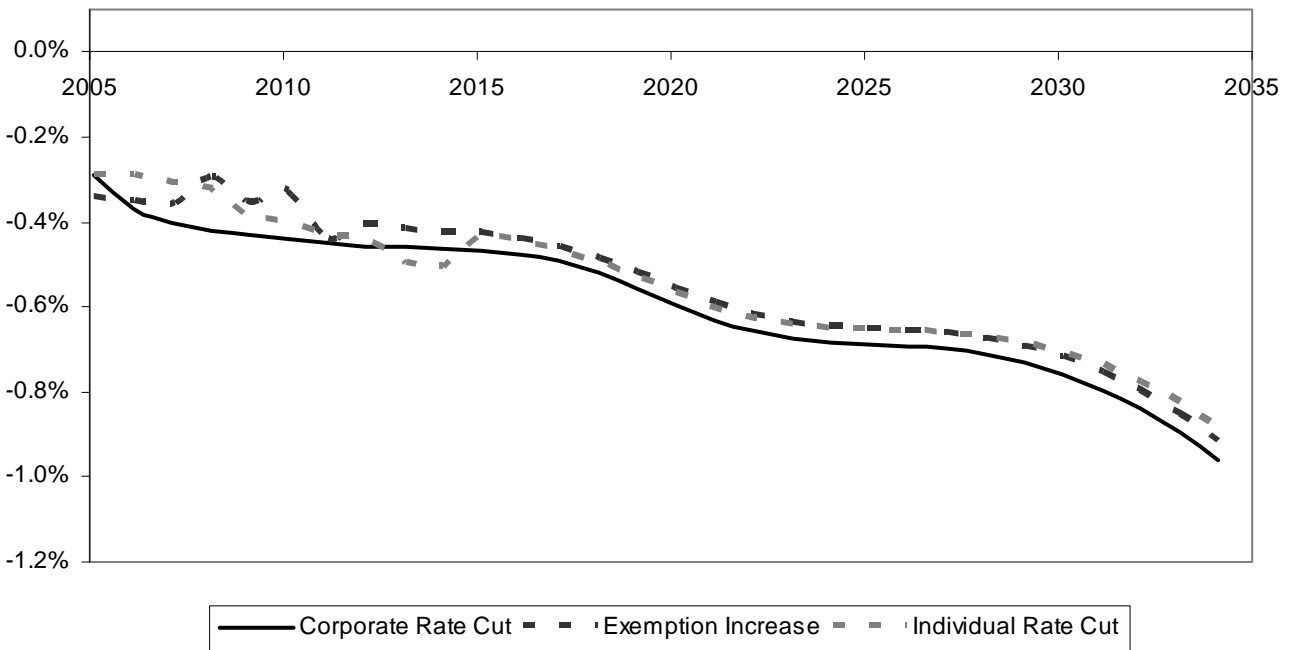
Figure 5c.−Change from Baseline: Ratio of Surplus to GDP: With Fiscal Offset; Aggressive Federal Reserve Policy

◆ Corp Rate Cut, Personal Exemption Decreased	Corporate Rate Cut, Transfers Decreased
▬ ▬ Personal Exemption Increased, Transfers Decreased	▬ ▬ Individual Rate Cut, Transfers Decreased
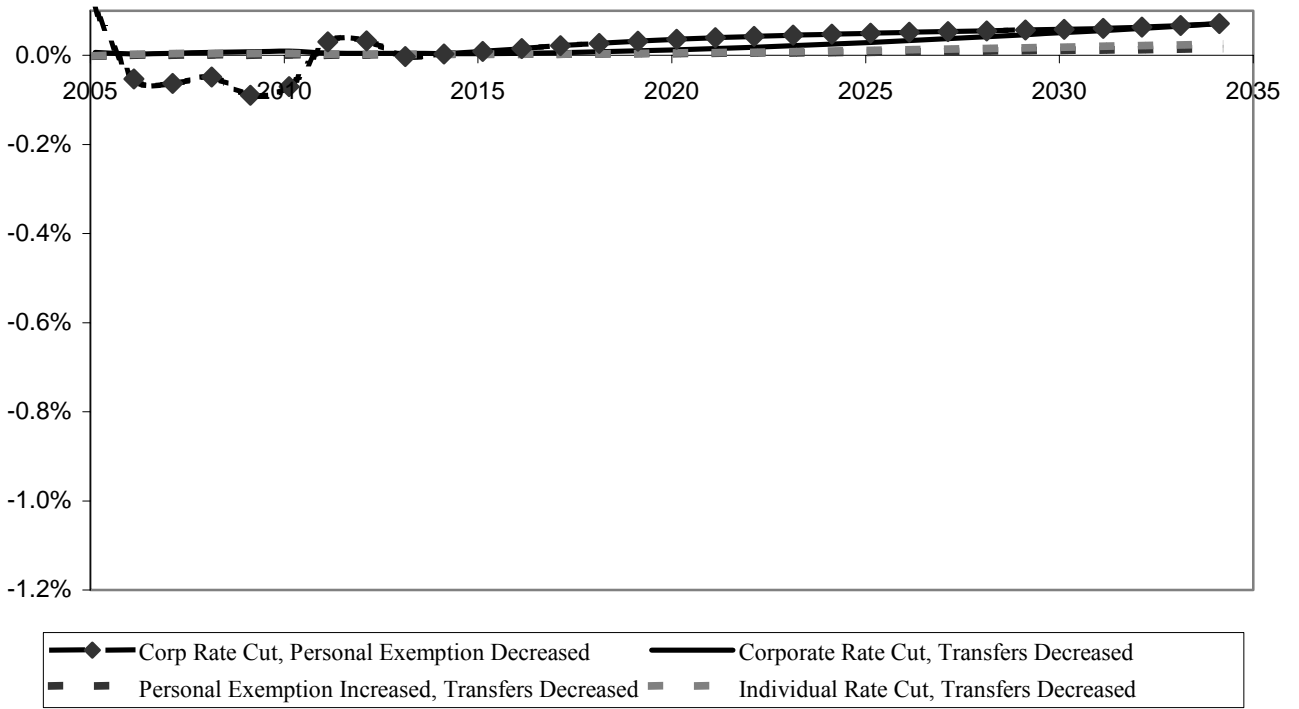
Figure 5d.−Change from Baseline: Ratio of Surplus to GDP: With Fiscal Offset; Neutral Federal Reserve Policy

◆ Corp Rate Cut, Personal Exemption Decreased	Corporate Rate Cut, Transfers Decreased
▬ ▬ Personal Exemption Increased, Transfers Decreased	▬ ▬ Individual Rate Cut, Transfers Decreased

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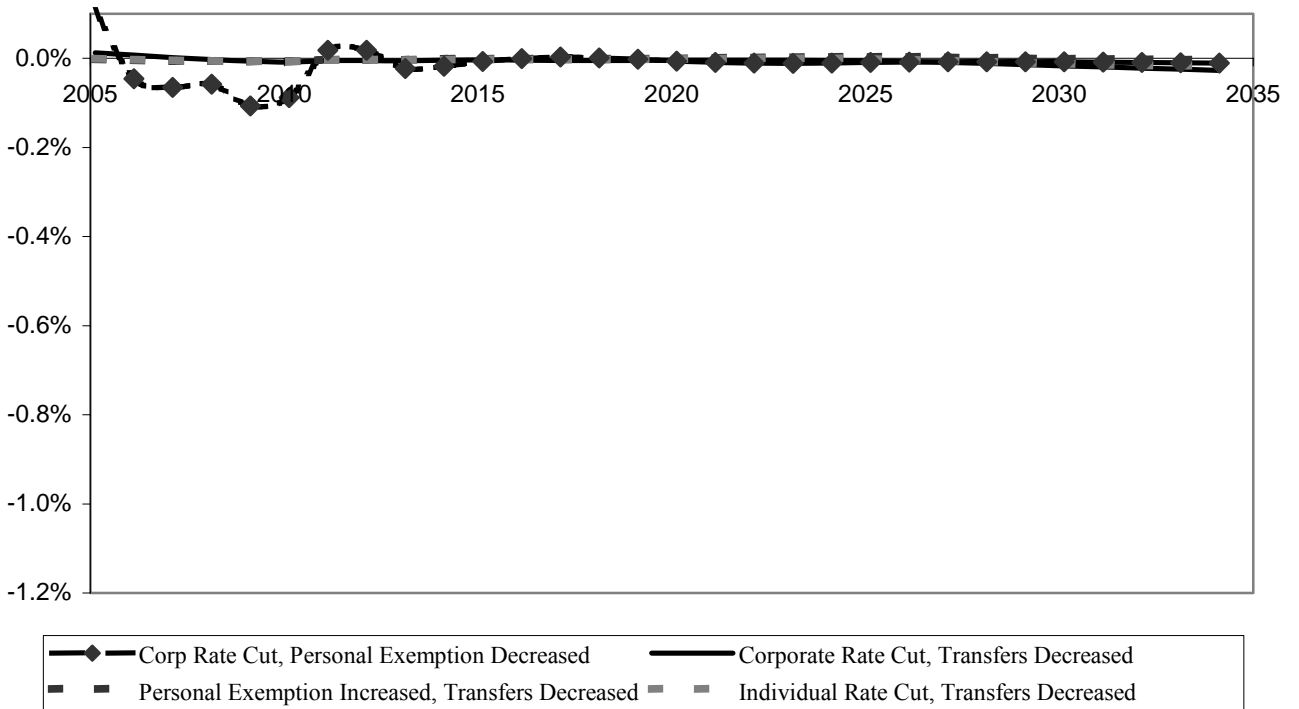
II. MODELS AND RESULTS FORMAT

This section provides information about the models used to analyze the three tax policy proposals, and the type of information that will be supplied about each proposal. For a more detailed description of these models, the economic assumptions underlying them, and the format in which results are presented, see Joint Committee on Taxation, *Overview of the Work of the Staff of the Joint Committee on Taxation to Model the Macroeconomic Effects of Proposed Tax Legislation to Comply with House Rule XIII.3.(h)(2), (JCX-105-03)*, December 22, 2003.

A. Description of the Models

The Macroeconomic Equilibrium Growth ("MEG") model

This model is based on the standard, neoclassical assumption that the amount of output is determined by the availability of labor and capital, and in the long run, prices adjust so that demand equals supply. Individuals are assumed to make decisions based on observed characteristics of the economy, including current period wages, prices, interest rates, tax rates, and government spending levels. Consumption in MEG is determined according to the life-cycle theory, which implies that individuals attempt to even out their consumption patterns during their lifetimes. Business production and housing production are modeled separately, and may substitute for each other.

The supply of labor to the economy over time is determined by the size of the working age population and their willingness to work in response to changes in after-tax wages. (See Appendix A for more detail on how labor supply is modeled.) Population and age profile projections are calibrated to the Census Bureau middle-series projections, which reflect the changing age structure of the population. Baseline receipts forecasts beyond the ten-year budget window are generated by the relevant taxable income streams generated by the MEG simulations, assuming the tax law existing in 2014 is permanently continued. The path of Federal government expenditures on the two largest transfer payment programs, Social Security and Medicare, is calibrated to projections in the intermediate scenario (5) in the Congressional Budget Office in *The Long-Term Budget Outlook,* December 2003 (pp. 3-12). This expenditure path assumes that all currently promised benefits, including prescription drugs, will be paid as promised under present law.

Individuals do not anticipate changes in the economy or government finances, thus this type of model is often referred to as a "myopic" behavior model. This feature of the MEG model allows the simulation of tax and government expenditure policy that results in a non-sustainable growth path. Specifically, policies that result in the Federal debt increasing or decreasing at a faster rate than the growth of GNP can be modeled. This feature allows the MEG model to incorporate in its simulation baseline fiscal policy that is consistent with present law for a period far beyond the ten year budget planning period.

MEG differs from a simple neoclassical growth model in that prices in MEG adjust to balance supply and demand with a delay rather than instantaneously. This feature allows the model to simulate an adjustment path, in which resources may be under-employed or used at an unsustainable rate in response to policies that depress or stimulate economic activity. This

feature also allows analysis of tax policy under different monetary policies by the Federal Reserve Board.

MEG simulations are run for each policy using two extreme assumptions about Federal Reserve Board behavior. In one variation (referred to as "MEG aggressive Fed response") it is assumed that the Federal Reserve Board acts aggressively by changing interest rates to counteract any demand effects provided by the simulated policy in each period. These simulations model Federal Reserve Board policy as if the Federal Reserve Board were omniscient and able to counteract fiscal policy effects almost completely with interest rate adjustments. In the other variation (referred to as "MEG neutral Fed response"), it is assumed that the Federal Reserve Board remains neutral with respect to any changes in fiscal policy, maintaining a fixed growth rate in the money supply, and thereby allowing temporary changes in demand to affect levels of employment and output. Neither of these simulations is an empirical prediction of actual Federal Reserve Board policy; rather, they are both stylized representations of opposite approaches to monetary policy.

For simulations of permanent policy changes that can be expected to alter demand relative to present law in each year, the different Federal Reserve Board responses (aggressive and neutral) will produce persistently different economic results throughout the period of policy stimulation. For the simulations presented in this document, this observation would apply, in particular, to the proposals that increase consumers' after-tax income (income tax rate reduction and personal exemption increase). In the simulations of tax cuts that are implemented without any offsetting reduction in Federal government transfer payments, the aggressive Federal Reserve Board reaction would raise interest rates to offset the demand stimulated by the extra after-tax income taxpayers receive; therefore, the aggressive reaction simulations would show less growth than the neutral simulations.

In the MEG simulations that include offsetting fiscal policy, non-taxed government transfer payments are reduced to match the conventionally-estimated revenue loss generated by the tax policy. Because it makes up a relatively small amount of total government spending when compared to transfer payments, Federal government spending on consumption of goods and services is unchanged in these simulations. Reduced transfer payments have the effect of reducing disposable income, or the amount of income available for personal consumption, and thus reducing the demand for goods and services. To the extent that the dynamically estimated revenue loss is smaller than the conventionally estimated loss, the reduction in transfer payments may be slightly larger than the size of the tax cut for consumers, so that the net effect of the tax cut plus transfer payment cut on disposable income could be negative. In this case, the aggressive Federal Reserve Board response would be to stimulate demand to offset the effects of the reductions in after-tax income from the reduced Federal government transfer payments; therefore, the aggressive Federal Reserve Board simulations would show slightly more short-run growth than the neutral simulations.

The Tax Policy Advisers' overlapping generations ("OLG") life cycle model

The Joint Committee staff contracts with Tax Policy Advisers, LLC, for the use of its overlapping generations life cycle model to provide an additional perspective in the macroeconomic analysis of tax policy. In this model, individuals are assumed to make

consumption and labor supply decisions with perfect foresight of economic conditions, such as wages, prices, interest rates, tax rates, and government spending, over their lifetimes. The economic decisions are modeled separately for each of 55-adult-age cohorts.

One consequence of the perfect foresight assumption is that if a policy results in an unsustainable growth path, such as increasing government deficits indefinitely into the future, the model will not solve. Therefore, to run simulations in this model, it is necessary to assume a "present law" baseline policy that follows a stable path, and in analyzing tax cut policies, it is necessary to assume that an offsetting budget balancing fiscal policy will be enacted. Hence, for all simulations using the OLG model, it is assumed in the baseline that both tax receipts and government expenditures follow a stable growth path outside the ten-year budget-planning horizon. In the OLG simulations presented here, the debt/GDP ratio is held fixed throughout the simulation period; and, the fully dynamically estimated cost of the tax policies is the amount offset by reductions in Federal government transfer payments. The increase in individual income tax rates that occurs in 2011 under present law is not implemented in the OLG simulations. In addition, because the OLG model assumes that the age profile of the population does not change over time, Social Security and Medicare payments are assumed to grow at a constant rate (as opposed to increasing with the aging of the baby boom generation as assumed in the MEG model). In simulations of tax rate cuts, it is assumed that Federal government spending will be contemporaneously reduced to offset the budget effects of the tax policy. As with the fiscal offset simulations in the MEG model, the fiscal offset in the OLG model is a reduction in non-taxed Federal government transfer payments.

As in the MEG model, the OLG model has separate production sectors for business and housing, which allows for an analysis of the effects of the different policies on the allocation of investment between housing and business. Unlike the MEG model, the OLG also treats the purchase of housing as a consumption decision, thus making investment in housing more responsive to changes in after-tax income. Also unlike the MEG model, the OLG model assumes that prices adjust instantaneously to any changes in economic conditions (such as a change in fiscal policy) so that supply always equals demand, and resources are never under- or over-utilized. Therefore, the model has no inflation and no monetary sector, and alternative monetary policy assumptions cannot be simulated with the OLG model.

B. Results Format

Although the models provide information on numerous macroeconomic variables, the following analysis focuses on real (inflation adjusted) Gross Domestic Product ("GDP"), real business and residential capital stock, employment, labor supply, and consumption. Results for each variable are presented as percent changes in the post-tax-cut simulations from the present-law baseline forecast values for the variable. Specifically, the percent change in each variable for the first five years is calculated by summing the change in the reported variable due to the proposal over the period from 2005 to 2009, and dividing that change by the sum of the baseline values of each variable over the same period. The same calculation is applied to the period from 2010 to 2014. The Joint Committee staff configures the present-law baseline forecasts for Federal receipts and spending in each of the macroeconomic models to approximate the January, 2004 forecast of the Congressional Budget Office (*The Budget and Economic Outlook: Fiscal Years 2005-2014,* January 2004) as closely as possible and extrapolates the baseline beyond 2014 as outlined above in the two model descriptions. While it is impossible to incorporate unknowable intervening circumstances, such as major resource or technological discoveries or shortages, these models are designed to predict the long-run effects of policy changes, assuming other unpredictable influences are held constant. To provide information about the longer run effects of the policy, the tables also report the percent change in each economic variable 30 years in the future (2034), which is referred to in the tables as "long run."

Another focus of the analysis is to compare the conventional revenue estimate of each tax proposal, which does not explicitly incorporate macroeconomic effects, with the revenue estimate obtained using macroeconomic models like the MEG and OLG models, which take into account macroeconomic effects of tax policy. Hence, the analysis also provides information on "revenue feedback," which is defined as the difference between the revenue effect of the proposal produced by the MEG or the OLG model and the conventional estimate for the same proposal, divided by the amount of the conventional revenue estimate. For most of the simulations, the estimated revenue feedback is presented for the first and second five years as well as the entire ten years following enactment of the policy, coinciding with the Congressional budgeting time frames.

Generally, Joint Committee staff's conventional revenue estimates are provided in nominal (unadjusted for inflation) dollars. However, when the macroeconomic effects of a tax proposal are taken into account, the tax change may result in inflation as well as real economic growth. Inflation causes increases in nominal revenues without necessarily increasing the purchasing power of the Federal government. Measuring budget variables in real terms provides a more accurate picture of the budget situation relative to economic growth. Thus, as with the other variables reported here, the revenue feedback results are reported in real terms.

Consistent with the model descriptions above, results of MEG simulations assuming different monetary policy responses are provided to show the influence monetary policy assumptions can have on the simulation results. Also for simulations using the MEG model, different fiscal policy responses are shown for each policy. Finally, for the simulations of the individual tax rate reduction, which is the policy likely to have the most effect on incentives to work, additional MEG simulations are used to show the sensitivity of results to alternate assumptions about labor supply elasticities, which measure the responsiveness of labor to the

policy incentives. Unlike the monetary policy regimes, which represent opposite extremes of possible Federal Reserve Board responsiveness, the labor supply elasticities represent the median and the lower end of mainstream econometric estimates of this parameter. For simulations of the other policies with only one labor supply response, the median elasticity is used.

As explained above, the OLG model is not designed to analyze monetary policy responses or to allow the simulation of a policy that results in a constantly increasing government deficit. Similarly, there are no alternate OLG simulations varying labor supply responsiveness, primarily because the OLG model explicitly links individuals' labor supply to their consumption and savings decisions, thus making it impractical to isolate the labor supply effects.

A description of the behavioral response mechanisms incorporated in both the MEG and OLG models, along with specific labor supply elasticities and other behavioral parameters, is provided in Appendix A, Data and Assumptions.

III. DETAILED SIMULATION RESULTS

This section outlines the detailed results from both the MEG and the OLG model simulations for each of the three tax policy proposals considered. As mentioned in section I.B., the changes to the individual income tax and corporate profits tax simulated here are relatively small fiscal policy changes; the change in revenues due to these policies before consideration of any macroeconomic feedback effects is equal to approximately three percent of projected receipts from the individual and corporate tax under the present-law baseline. Changes in the variables described below, economic growth, capital stock, and employment and labor force are correspondingly small relative to their present-law baselines.

A. Reduction in the Individual Income Tax Rate

A reduction in individual income tax rates may affect the economy in the short run by increasing after-tax income for individuals, thus stimulating consumer demand. The importance of this effect depends on whether fiscal or monetary policy changes are made to offset the demand stimulus provided by the tax rate reduction. In the longer run, the individual tax rate reduction affects economic growth primarily by changing the average and marginal tax rates on labor income. Specifically, the reduced average tax rate and resulting increase in after-tax income provides some incentive to reduce labor hours, while the reduced marginal tax rates increase the after-tax return to additional labor hours, thus providing an incentive for some individuals to work more. On net, there is a small increase in labor force participation and hours worked, which leads to an increase in GDP.

In addition, since the tax rate reduction on individual income is applied to income earned from all sources, including dividends, interest, and capital gains, as well as to wage income, this policy also works to some extent through increasing after-tax returns to investment. As with the labor supply effects, the effects of changes in tax rates on capital income can provide competing incentives to savings and investment. The increase in after-tax income resulting from a reduction in average taxes on capital can reduce incentives to save to the extent that the individual has a target savings amount in mind. In contrast, the increase in the after-tax return to capital that results from a decrease in its marginal tax rate provides an incentive for individuals to save and invest more. As modeled in these simulations, the change in the after-tax return to investment encourages additional business investment, which results in an increase in productivity that, in turn, increases wages in the long run. The effect of the individual tax rate reduction on investment is small relative to the effect on labor supply because wages make up most of the individual income tax base. For the simulations in which the revenue loss from the tax rate reduction is not offset by a reduction in government spending, as the Federal government debt accumulates over time, the positive effects of the tax rate reduction are eventually offset by the negative effects of growing government debt, which crowds out private business activity.

Because the most important behavioral response to the individual tax rate reduction is its effect on individuals' willingness to supply labor to the economy, the growth effects of this proposal are particularly sensitive to assumptions about how responsive individuals are to this incentive. Therefore, results are shown for MEG simulations using two different labor supply elasticities.

Economic growth

Table 1 shows the effects of a cut in individual income tax rates, conventionally estimated to reduce receipts by $500 billion over ten years, on real output under varying assumptions about accompanying fiscal and monetary policy, as well as differing assumptions about the responsiveness of labor supply to changes in labor income tax rates. The change in real Gross Domestic Product ("GDP") ranges from negligible to a 0.3 percent increase over the first five years, with the upper bound increasing to 0.5 percent over the second five years. The equivalent average annual real dollar amount ranges from $17 billion to $163 billion in the first five years and $18 billion to $319 billion in the second five years. In the simulations in which neither fiscal policy nor monetary policy is employed to counteract demand stimulus (the neutral Fed, no-offset simulations), growth is greater in the second five years than in the first five years. But the negative effects of the accumulating Federal debt eventually outweigh the demand stimulus. The accumulation of public debt reduces the extent to which the individual tax rate reduction lowers the cost of capital, thus slowing the growth of the capital stock. In the simulations that include a government spending decrease to offset the revenue loss, real GDP continues to increase in the long run. The growth effects increase over time because the reduction in the individual tax rate affects growth by increasing labor supply, and because of the increase in the after-tax return to investment in business capital (structures and equipment), which causes a gradual buildup in the capital stock available for business production. In turn, this increase in the capital stock increases labor productivity over time. As the low labor supply elasticity simulations show, regardless of whether the demand stimulus is offset by fiscal or monetary policy, lower responsiveness of labor supply to changes in the marginal tax rate on the labor supply results in lower real GDP growth.

Table 1.−Effects of Individual Tax Rate Reduction on Real GDP
in Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.1	0.1	-0.5
MEG aggressive Fed - low labor elasticity	0.1	0.0	-0.6
MEG neutral Fed	0.3	0.5	-0.2
MEG neutral Fed - low labor elasticity	0.3	0.4	-0.3
OLG	n.a.	n.a.	n.a.
Fiscal Offset: decrease in Government spending			
MEG aggressive Fed	0.1	0.3	0.4
MEG aggressive Fed - low labor elasticity	0.1	0.2	0.3
MEG neutral Fed	0.0	0.2	0.4
MEG neutral Fed - low labor elasticity	0.0	0.1	0.3
OLG	0.2	0.3	0.4

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Investment

As the results in Table 2 indicate, the cut in individual tax rates may increase producers' capital stock in the first five years by up to 0.3 percent. In the simulations without an offsetting decrease in government spending, the effect on the capital stock turns negative in the second five years and in the long run regardless of the monetary response. As the increasing Federal debt crowds out business investment, the capital stock could decline by as much as 1.4 percent. In the fiscal-offset policy simulations, the individual tax rate reduction unambiguously increases producers' capital stock, with the largest effect taking place in the long run, as the returns to capital increase over time in response to increasing labor effort, as well as to the small decrease in the cost of capital resulting from reduced dividend and capital gains taxation.

Table 2.−Effects of Individual Tax Rate Reduction on
Producers' Real Capital Stock in
Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.0	-0.1	-1.3
MEG aggressive Fed - low labor elasticity	0.0	-0.1	-1.4
MEG neutral Fed	0.1	0.1	-1.0
MEG neutral Fed - low labor elasticity	0.1	0.1	-1.1
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.3	0.7	1.1
MEG aggressive Fed - low labor elasticity	0.3	0.7	1.1
MEG neutral Fed	0.2	0.6	1.1
MEG neutral Fed - low labor elasticity	0.2	0.6	1.0
OLG	0.1	0.4	0.9

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Table 3 shows the effects of the individual tax rate reduction on the real residential capital stock. In the MEG model, the individual tax rate reduction reduces the preferential treatment of the housing sector relative to the business sector; therefore the proposal is likely to shift some investment from housing to business capital. As a result, the residential capital stock is reduced by up to 0.4 percent in the first five years, by as much as 1.1 percent in the second five years, and 3.0 percent in the long run. Note that across all simulations under the MEG model, the negative effects on residential capital stock are bigger without offsetting government spending reductions than those with fiscal offsets. Because the Federal government deficit crowds out private investment when a tax cut is not offset by a spending cut, the negative impact on residential investment from the individual tax rate reduction is exacerbated by the increased deficit. As expected, the crowding out effect is most prominent in the long run.

In contrast to the MEG model, the OLG model predicts that the impact on private residential capital stock from the individual tax rate reduction is negligible for the first five years and turns positive for the second five years. In the OLG model, housing is both a consumption good and an investment good. As people have more disposable income resulting from the individual tax rate reduction and increasing work effort, they increase both their consumption of housing and their investment in residential capital stock. The positive effects from increased disposable income on residential investment outweigh the negative effects from decreased relative preferential tax treatment to the housing sector.

Table 3.−Effects of Individual Tax Rate Reduction on
Real Residential Capital Stock in
Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	-0.4	-1.1	-2.9
MEG aggressive Fed - low labor elasticity	-0.4	-1.1	-3.0
MEG neutral Fed	-0.3	-0.7	-2.9
MEG neutral Fed - low labor elasticity	-0.3	-0.7	-3.0
OLG	n.a.	n.a.	n.a.
Fiscal Offset: decrease in Government spending			
MEG aggressive Fed	-0.2	-0.4	-0.2
MEG aggressive Fed - low labor elasticity	-0.2	-0.5	-0.3
MEG neutral Fed	-0.2	-0.5	-0.3
MEG neutral Fed - low labor elasticity	-0.2	-0.5	-0.4
OLG	0.0	0.2	0.6

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Employment and Labor Supply

The employment variable measures the number of people who are working in each period. Labor supply measures the number of people who are willing to work for the wages being offered by employers. When the economy is operating in equilibrium, or full employment, these two measures are equal. In the OLG model, which assumes the economy is always operating in equilibrium, these measures are always equal. In the MEG model, which incorporates periods of temporary under- or over-employment as the economy adjusts to outside shocks, these measures may not always be equal. Both variables are shown in this analysis to illustrate the contrast in the effects of the different policies on demand versus supply incentives. Changes in employment reflect both effects, while changes in labor supply reflect primarily incentives to supply more labor effort.

Table 4 shows changes in employment due to the tax cut. The impact in the first five years after the individual tax rate reduction ranges from an increase of less than 0.1 percent to 0.3 percent, and in the second five years from an increase of 0.1 percent to 0.6 percent. These changes correspond to an increase ranging from 60,000 to 400,000 jobs (calculated as full-time equivalents based on hours worked) during the first five years, and from 160,000 to 765,000 jobs in the second five years after implementation of the policy.

Table 4.−Effects of Individual Tax Rate Reduction on Employment
in Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.2	0.2	0.2
MEG aggressive Fed - low labor elasticity	0.1	0.2	0.2
MEG neutral Fed	0.3	0.6	0.5
MEG neutral Fed - low labor elasticity	0.3	0.6	0.4
OLG	n.a.	n.a.	n.a.
Fiscal Offset: decrease in Government spending			
MEG aggressive Fed	0.2	0.2	0.2
MEG aggressive Fed - low labor elasticity	0.1	0.2	0.2
MEG neutral Fed	0.0	0.1	0.2
MEG neutral Fed - low labor elasticity	0.0	0.1	0.1
OLG	0.3	0.3	0.3

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

In the short run, most of the employment effects come from changes in demand due to the policy. When the individual tax rate reduction is not offset by a spending cut, and the Federal Reserve Board does not counteract the demand stimulus from the tax cut, the reduction in individual tax rates stimulates employment growth. However, in these "neutral Federal Reserve Board" simulations, when the tax cut is offset by a spending cut, the demand stimulus

provided by the individual tax rate reduction is partially cancelled by the reduction in transfer payments. This difference persists into the long run, as the simulations showing alternate assumptions for Federal Reserve Board reactions maintain continuing differences in Federal Reserve Board policy throughout the simulation period.

Table 5 shows the effects of the individual tax rate reduction on individuals' willingness to work. The larger labor supply responses in the OLG simulations relative to those in the MEG budget neutral simulations arise from the difference in the foresight assumptions between the two models. In the MEG model, taxpayers are myopic and do not have knowledge about future policy, while in the OLG model, taxpayers have perfect foresight about future policy. As a result, taxpayers in the OLG model foresee the reduction in transfer payments as reducing both their current and future disposable income. Knowledge of the future state of the economy causes them to work harder to accumulate savings against the loss of future disposable income. This contrast between the two models can be seen more clearly by looking at the changes in labor force participation in Table 5. The OLG simulations start out with an increase of 0.3 percent over the baseline, while the MEG simulations' increases range from 0.1 to 0.2 percent. In addition to the responses described earlier, workers in the OLG model anticipate the reductions in transfer payments and increase their work in all periods in order to compensate for their future decrease in income.

In the MEG model, the determinant of peoples' willingness to work is current period after-tax average and marginal wage rates. Results in Table 5 show that the assumed responsiveness within the model (labor supply elasticity) has an effect on labor force participation in MEG. Other factors, such as fiscal and monetary policy, that might affect after-tax income do not affect labor force participation in MEG except to the extent that they affect after-tax wage rates.

Table 5.−Effects of Individual Tax Rate Reduction on Labor Force Participation in Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.2	0.2	0.2
MEG aggressive Fed - low labor elasticity	0.1	0.2	0.2
MEG neutral Fed	0.2	0.2	0.2
MEG neutral Fed - low labor elasticity	0.1	0.2	0.2
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.2	0.2	0.2
MEG aggressive Fed - low labor elasticity	0.1	0.2	0.2
MEG neutral Fed	0.2	0.2	0.2
MEG neutral Fed - low labor elasticity	0.1	0.2	0.2
OLG	0.3	0.3	0.3

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Consumption

Table 6 shows the effects of the individual tax rate reduction on consumption of goods and services. In the first five years, consumption increases by between 0.4 percent and 0.5 percent when the individual tax cut is not offset by a spending cut, and by less than 0.1 percent when the stimulus is offset by a spending cut. In the first 10 years after the policy implementation consumption rises more when there is no fiscal offset because government transfer payments directly reduce consumers' disposable income. In the long run, however, the positive consumption response is reduced, or even turns negative, when there is no fiscal offset, reflecting the effects of an accumulating Federal debt on the economy. On the other hand, when there is a fiscal offset, consumption has a relatively small positive response immediately after the tax cut, but a much bigger positive response in the long run.

Table 6.−Effects of Individual Tax Rate Reduction on Consumption
in Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.4	0.5	0.0
MEG aggressive Fed - low labor elasticity	0.4	0.5	-0.1
MEG neutral Fed	0.5	0.7	0.3
MEG neutral Fed - low labor elasticity	0.5	0.6	0.2
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.1	0.3	0.5
MEG aggressive Fed - low labor elasticity	0.1	0.2	0.4
MEG neutral Fed	0.0	0.2	0.4
MEG neutral Fed - low labor elasticity	0.0	0.1	0.4
OLG	0.2	0.3	0.4

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Revenue feedback

Table 7 shows the revenue feedback for changes in receipts generated using macroeconomic analysis relative to those generated using conventional revenue estimates. A positive percentage indicates the estimated revenue loss is less when macroeconomic effects are taken into account than when they are not. The relative magnitudes across simulations generally correspond to those in real GDP; simulations with larger GDP effects have larger revenue feedback effects. The revenue feedback ranges from 2.8 percent to 17.7 percent in the first five years, and 5.8 percent to 23.0 percent over the ten-year budget period.

**Table 7.−Effects of Individual Tax Rate Reduction on Real Revenue Feedback
in Percent Changes Relative to Conventional Estimates**

Calendar Year Period	2005-2009	2010-2014	2005-2014
No fiscal offset			
MEG aggressive Fed	8.9	10.2	9.7
MEG aggressive Fed - low labor elasticity	7.3	8.0	7.7
MEG neutral Fed	17.7	26.7	23.0
MEG neutral Fed - low labor elasticity	17.0	24.9	21.7
OLG	n.a.	n.a.	n.a.
Fiscal Offset: decrease in Government spending			
MEG aggressive Fed	9.6	16.1	13.5
MEG aggressive Fed - low labor elasticity	7.9	13.6	11.3
MEG neutral Fed	3.5	9.8	7.2
MEG neutral Fed - low labor elasticity	2.8	8.0	5.8
OLG	16.9	20.4	18.6

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

B. Increase in the Personal Exemption

The most direct effect from an increase in the personal exemption for individual taxpayers operates in the short run by increasing after-tax income for individuals, thus stimulating consumer demand. The importance of this effect depends on whether the Federal Reserve Board decides to suppress this demand stimulus. As with the individual tax rate reduction, another channel for the increase in the personal exemption to impact economic growth is through changing incentives for labor supply via changes in average and marginal individual income tax rates. However, an increase in the personal exemption from $3,150 to $5,200 per qualifying person reduces the total tax payment made by most taxpayers, but reduces marginal tax rates only for those near breakpoints in the individual income tax brackets. The negative incentive for labor supply from higher disposable income is not generally outweighed by the positive incentive due to slightly lowered marginal tax rates in the first and second five years. Thus, the personal exemption increase has a smaller effect on short-run demand growth, and a smaller effect on long-run labor supply than observed with the individual tax rate reduction.

Economic growth

Table 8 shows the effects on real output of a $500 billion tax cut over the budget window arising from increasing the personal exemption under varying assumptions about accompanying fiscal and monetary policy. The change in real GDP ranges from negligible to an increase of 0.2 percent over the first five years, with a slightly larger range from less than -0.1 percent to 0.2 percent over the second five years. The equivalent average annual real dollar amount ranges from a decline of $21 billion to an increase of $125 billion in the first five years and a decline of $80 billion to an increase of $164 billion in the second five years. Unlike the results from the individual tax rate reduction, which show positive growth effects in the first and second five years after the policy implementation across simulations, the exemption increase has mixed results in its effect on growth. Most of the growth effects due to the personal exemption increase in the MEG model are caused by fluctuations in the incentives it provides for consumer purchases. If the demand stimulus provided by the reduction in the average tax rate is largely offset by either aggressive monetary policy or spending cuts, the major economic effect of the exemption increase is to reduce incentives to work by increasing after-tax income without reducing marginal tax rates for most taxpayers.

In the long run, for an exemption increase without offsetting spending cuts, the buildup of public debt results in a decline in GDP. This is consistent with the results of the simulations for the individual tax rate reduction. The declines shown in the exemption simulations are larger than those in the individual tax rate reduction simulations; and the long-term growth in the simulations with offsetting fiscal policy is smaller than the growth in the individual tax rate reduction simulations. In the MEG simulations, when the conventional revenue cost of the personal exemption increase is offset by a reduction in government transfer payments, the net effect of the policy is to reduce after tax income of consumers, thus dampening demand in the short run. This is because within the simulations, the cost of the tax decrease is slightly reduced relative to the conventional estimate (as shown in Table 14 below), so the reduction in transfer payments is slightly greater than the reduction in tax liability. In this case, the neutral Federal Reserve Board policy allows a slight slowdown in the economy, while the aggressive Federal Reserve Board policy slightly reduces interest rates to stimulate consumption. In the longer run,

this policy leads to an increase in GDP in the MEG simulations because the fiscal offset leads to a slight decrease in Federal government debt, and thus reduces crowding out.

In the OLG simulation, transfer payments are reduced to match the dynamically calculated cost of the tax proposal, thus resulting in no change in after-tax income, and no reduction in consumer purchasing power. In this simulation, the primary effect on growth comes from the small increase in incentives to work and save due to the marginal rate reductions for taxpayers near the boundaries of their tax rate brackets.

Table 8.−Effects of Personal Exemption Increase on Real GDP
in Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.0	-0.1	-0.7
MEG neutral Fed	0.2	0.2	-0.4
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.0	0.1	0.2
MEG neutral Fed	-0.0	0.0	0.1
OLG	0.0	0.1	0.2

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Investment

Table 9 shows that without a fiscal offset, the increase in Federal debt resulting from the exemption increase crowds out business investment by up to 0.2 percent in the first five years, by up to 0.5 percent over the second five years, and by up to 2.0 percent in the long run. Although we observe the negative impact on business investment in the proposal of the individual tax rate reduction, the negative effect does not show up until the second five years after the policy implementation. In the simulations that include a reduction in government expenditures to offset the cost of the increase in the personal exemption, the policy increases the stock of producers' capital by as much as 0.1 percent in the first five years, by as much as 0.3 in the second five years, and by as much as 0.4 percent in the long run. In the short run, there is some induced response to the temporary increase in aggregate demand. The largest effects take place in the long run as the small reductions in the cost of capital, through the reductions in marginal rates, build up over time.

**Table 9.−Effects of Personal Exemption Increase on Producers' Real Capital Stock
in Percent Changes Relative to Present Law Baseline**

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	-0.2	-0.5	-2.0
MEG neutral Fed	-0.1	-0.3	-1.7
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.1	0.3	0.4
MEG neutral Fed	0.1	0.2	0.4
OLG	0.0	0.1	0.4

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Table 10 shows the effects of the increase in the personal exemption on the real residential capital stock. The stock of residential capital is reduced by up to 0.2 percent in the first five years, and by as much as 0.7 percent in the second five years. In the long run the results show the stock of residential capital declining as much as 2.6 percent in the simulations without a fiscal offset where debt accumulates, and increasing by as much as 0.3 percent with a fiscal offset. The pattern of the response follows those in the individual tax rate reduction, but is smaller in magnitude. Because there are smaller marginal tax rate changes with the exemption increase, there is less incentive to shift away from residential capital than in the individual tax rate reduction simulations. With no fiscal offset, the shift from housing to producers' capital is not enough to overcome the negative incentives to investment from the crowding out of private investment by public debt. In addition, as with the individual income tax rate reduction, the OLG model shows an increase in housing capital because housing consumption increases with GDP growth.

Table 10.−Effects of Personal Exemption Increase on
Real Residential Capital Stock in
Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	-0.2	-0.7	-2.6
MEG neutral Fed	-0.2	-0.3	-2.5
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.0	-0.1	0.1
MEG neutral Fed	-0.1	-0.1	0.1
OLG	0.0	0.1	0.3

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Employment and labor supply

As shown in Table 11, the impact in the first five years after the increase in the personal exemption ranges from a loss of employment of less than 0.1 percent to an increase of employment of 0.3 percent, and in the second five years from an increase of less than 0.1 percent to an increase of 0.4 percent. These changes correspond to a range of employment effects from an annual loss of 53,000 jobs (calculated on a full-time equivalent basis) to an annual increase of 60,000 jobs during the first five years, and an annual increase of 9,000 to 490,000 jobs in the second five years after implementation of the policy. As expected, the largest increases in employment occur when the policy is not offset with a reduction in government expenditures.

Table 11.−Effects of Personal Exemption Increase on Employment
in Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.0	0.1	0.1
MEG neutral Fed	0.3	0.4	0.4
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.0	0.1	0.1
MEG neutral Fed	-0.0	0.0	0.1
OLG	0.0	0.0	0.1

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Finally, because the exemption increase provides a smaller decrease in individuals' average marginal tax rates than the rate reduction does, the labor response to the exemption increase is smaller than the corresponding increase due to the individual tax rate reduction.

Table 12.−Effects of Personal Exemption Increase on Labor Force Participation
in Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.0	0.1	0.1
MEG neutral Fed	0.0	0.1	0.1
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.0	0.1	0.1
MEG neutral Fed	0.0	0.1	0.1
OLG	0.0	0.0	0.1

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Consumption

Table 13 shows the effects of the exemption increase on consumption. In the first five years, the percent changes in consumption vary from a decline of 0.1 percent to an increase of 0.4 percent, and in the second five years, it ranges from less than 0.1 percent to 0.4 percent. As with the individual tax rate reduction, changes in consumption reflect changes in disposable income due to the exemption increase. For the simulations without a fiscal offset, consumption patterns generally follow those under the proposal of the individual tax rate reduction but are smaller in magnitude, resulting from the smaller growth impact of the exemption increase. In the short run, the neutral Fed without a fiscal offset raises aggregate demand.

In the simulations with a fiscal offset, there is no incentive to increase consumption in the short run in the myopic MEG simulations because the reduction in transfer payments reduces after-tax income available to consumers. Because the changes in marginal rates are so small, any growth effects due to labor supply responses that could generate consumption are also minimal. In the long run, the economic growth associated with the reduction in government transfer payments increases consumption. In the OLG simulation, in which consumers foresee the future growth in GDP in the long run, they adjust their lifecycle consumption immediately.

Table 13.−Effects of Personal Exemption Increase on Consumption
Percent Change in Consumption Relative to Present Law

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.3	0.3	-0.2
MEG neutral Fed	0.4	0.4	0.0
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.0	0.1	0.2
MEG neutral Fed	-0.1	0.0	0.2
OLG	0.1	0.1	0.2

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Revenue feedback

Table 14 shows the revenue feedback for changes in receipts generated using macroeconomic analysis relative to those generated by conventional revenue estimates. A positive percentage indicates the estimated revenue loss is less when macroeconomic effects are taken into account than when they are not. A negative feedback effect indicates that when macroeconomic effects are taken into account, the revenue cost of the proposal is higher than under the conventional estimate. The negative revenue feedback corresponds with a negative effect on economic growth. The relative magnitudes across simulations generally correspond to the relative magnitudes of changes in real GDP. Real GDP can be regarded roughly as the tax base; when a tax cut induces large growth effects, it tends to generate large revenue feedback. For example, both GDP growth and revenue feedback are significantly higher for the OLG simulations than for the other simulations of an offsetting increase in government spending. The revenue feedback ranges from -1.7 percent of the conventional revenue estimate to 12.6 percent in the first five years, and 0.4 percent to 15.2 percent over the ten-year budget period.

**Table 14.−Effects of Personal Exemption Increase on Revenue Feedback
in Percent Changes Relative to Conventional Estimates**

Calendar Year Period	2005-2009	2010-2014	2005-2014
No fiscal offset			
MEG aggressive Fed	1.2	-0.0	0.5
MEG neutral Fed	12.6	17.4	15.2
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	2.1	6.7	4.6
MEG neutral Fed	-1.7	2.2	0.4
OLG	7.6	8.2	7.9

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

C. Reduction in the Corporate Income Tax Rate

A decrease in the corporate income tax rate primarily affects the economy through increasing the after-tax rate of return on corporate capital, which provides incentives for investment in corporate capital. As the capital stock in the corporate sector builds up in response to this incentive, more goods and services are produced, increasing total output. Also, because workers have more technology to use in production, the productivity of labor increases along with the growth of business capital stock. Thus, the increase in capital stock leads to increasing wage rates and employment. The amount of growth in output and employment generated by the corporate tax rate reduction increases gradually over time as the capital stock accumulates.

Within the second five years, after the capital stock has increased sufficiently to generate wage increases, the increase in after-tax income resulting from the corporate tax rate reduction may stimulate additional growth due to increased consumer demand. The extent to which this occurs depends on whether the Federal Reserve Board acts to counter this demand stimulus, and whether the Federal government enacts an offsetting fiscal policy. The Federal Reserve Board may offset demand stimulus by increasing interest rates, which increases the cost of borrowing for both business investment and personal consumption. Offsetting fiscal policy is modeled in this analysis as either a tax increase by decreasing the personal exemption amount, or a Federal government spending cut in non-taxed Federal transfer payments. Offsetting fiscal policies reduce the demand stimulus from the initial tax cut by reducing after tax income available for consumer purchases. Offsetting monetary or fiscal policy that dampens demand reduces the strength of the economy's response within the ten-year budget horizon.

The extent to which the increases in output, income, and employment resulting from the corporate tax rate reduction persist in the long run depends on whether the loss in revenues due to the policy is accompanied by offsetting monetary or fiscal policy. Without an offsetting fiscal policy, the uncompensated loss of revenues from the Federal budget requires additional Federal government borrowing, which may raise interest rates enough to outweigh the benefits of the corporate tax rate reduction, particularly if the Federal Reserve Board acts aggressively to counteract the fiscal policy. However, to the extent that the corporate tax rate reduction is offset by a reduction in spending or a (mostly) non-marginal increase in individual income taxes, in the long run GDP is likely to increase by significantly more than it does during the ten-year budget period.

Economic growth

Table 15 shows the real effects of a $500 billion reduction in corporate tax rates on output under varying assumptions about accompanying fiscal and monetary policy. The change in real GDP ranges from less than a 0.1 percent change to a 0.3 percent increase over the first five years, with an increase of 0.1 percent to 0.4 percent over the second five years. The equivalent average annual real dollar amount ranges from $20 billion to $185 billion in the first five years and $120 billion to $285 billion in the second five years. In the simulations that include an alternate tax increase or a spending decrease to offset the revenue loss of the corporate tax cut, the effects of this policy are generally greater in the second five years after implementation of the policy than in the first five years, and even greater in the long run. Growth effects increase over time because the reduction in the corporate tax rate affects growth

in the economy by increasing the after-tax return to investment in business capital, which causes a gradual buildup in the capital stock available for business production. In turn, this increase in the capital stock enhances the productivity of labor, and hence the wage rate, over time. In the simulations that have no fiscal offset, the growth effects are greatest in the second five years, especially in the simulation in which the Federal Reserve Board does not counteract the demand stimulus created by the tax cut. In the long run, however, growth is reduced when there is no offsetting fiscal policy to stem increases in government debt; the buildup of public debt reduces the extent to which the corporate tax rate reduction lowers the cost of capital, thus slowing the buildup of the capital stock. In contrast, for the simulations in which there is offsetting fiscal policy, the results for simulations with neutral Federal Reserve Board policy (middle rows of each panel) show lower economic growth. In these cases, because the offsetting fiscal policy results in a net reduction in aggregate demand, the aggressive Federal Reserve Board reaction is actually more stimulative than the neutral Federal Reserve Board reaction.

For the budget neutral simulations, in the long run, the simulations that offset the corporate tax cut with a reduction in transfer payments have a bigger effect on real GDP than the simulations with the reduction in the personal exemption as the fiscal offset. The reduction in transfer payments reduces individuals' disposable income without affecting the marginal tax rate on their labor income; thus it provides an unambiguous incentive for individuals to work more, supplying more labor. While the reduction in the exemption amount has roughly the same effect on disposable income as the reduction in transfer payments, it also slightly increases the marginal tax rate on wage income for some taxpayers. Thus, the reduction in the exemption amount decreases the after-tax return to work for those taxpayers, and provides some offsetting incentive for individuals to reduce their work effort.

**Table 15.−Effects of Corporate Tax Rate Reduction on Real GDP
in Percent Changes Relative to Present Law Baseline**

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.1	0.2	-0.0
MEG neutral Fed	0.3	0.4	0.3
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in personal exemption			
MEG aggressive Fed,	0.1	0.3	0.6
MEG neutral Fed	0.1	0.2	0.6
OLG	0.2	0.3	0.5
Fiscal offset: decrease in Government spending			
MEG aggressive Fed,	0.1	0.4	0.9
MEG neutral Fed	0.0	0.2	0.8
OLG	0.2	0.4	0.5

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

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Investment

As Table 16 indicates, the reduction in corporate tax rates may increase producers' real capital stock in the first five years by up to 0.8 percent. These effects increase over time, with business capital increasing by as much as 1.9 percent in the second five years, and 2.9 percent in the long run. This policy lowers the cost of capital by increasing the after-tax return on business equipment, thus providing an incentive for more business investment. When Federal revenues lost from the tax cut are not offset (in the no fiscal offset simulations), Federal government borrowing is increased; the beneficial effects of the corporate tax rate reduction on the cost of capital are reduced by the competition of Federal government borrowing in domestic capital markets. Therefore, the growth of producers' real capital stock is much greater in the simulations that include fiscal offsets.

Table 16.−Effects of Corporate Tax Rate Reduction on Producers'
Real Capital Stock in
Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.5	1.0	0.5
MEG neutral Fed	0.6	1.2	0.7
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in personal exemption			
MEG aggressive Fed	0.7	1.6	2.3
MEG neutral Fed	0.7	1.5	2.3
OLG	0.5	1.1	1.9
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.8	1.9	2.9
MEG neutral Fed	0.8	1.7	2.9
OLG	0.6	1.3	2.7

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Table 17 shows the effects of the corporate tax rate reduction on the residential capital stock. Because the reduction in taxation of corporate capital lowers the cost of capital for business investment relative to that for housing, the investment incentives for producers' capital in this proposal are likely to shift some investment from housing to business capital. The residential capital stock is reduced by up to 0.4 percent in the first five years, by as much as 0.9 percent in the second five years, and 1.8 percent in the long run. The size of the shift differs between the MEG and OLG simulations because of different assumptions about adjustment costs associated with business investment and savings responses. Because the corporate rate reduction has a smaller effect on consumption incentives, the difference between the consumption treatment of housing between OLG and MEG is less important in these simulations than it was in the individual income tax simulations. In the long run, the simulations with a fiscal offset result in increases in the real residential capital stock relative to the no fiscal offset simulations. This is primarily because there is no crowding out in the simulations with a fiscal offset.

Table 17.−Effects of Corporate Tax Rate Reduction on Real Residential Capital Stock In Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	-0.4	-0.9	-1.8
MEG neutral Fed	-0.3	-0.6	-2.0
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in personal exemption			
MEG aggressive Fed	-0.1	-0.2	0.8
MEG neutral Fed	-0.1	-0.2	0.5
OLG	-0.2	-0.4	-0.2
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	-0.2	-0.2	0.9
MEG neutral Fed	-0.2	-0.4	0.7
OLG	-0.2	-0.3	0.2

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Employment and labor supply

As shown in Table 18, the impact on employment is highly sensitive to the varying assumptions in each simulation. The impact in the first five years after the corporate tax rate reduction may range from a decrease of 0.1 percent to an increase of 0.2 percent, and in the second five years from a decrease of 0.2 percent to an increase of 0.2 percent. These changes correspond to a range of employment effects from a 130,000 decrease to a 280,000 increase in jobs (calculated as full-time equivalents based on hours) during the first five years, and a 250,000 decrease to a 280,000 increase in jobs in the second five years after implementation of the policy.

Table 18.−Effects of Corporate Tax Rate Reduction on Employment
in Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.0	0.0	0.0
MEG neutral Fed	0.2	0.2	0.3
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in personal exemption			
MEG aggressive Fed	-0.1	-0.1	-0.1
MEG neutral Fed	-0.1	-0.2	-0.1
OLG	0.1	0.0	0.0
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.0	0.0	0.1
MEG neutral Fed	-0.1	-0.2	0.0
OLG	0.1	0.0	0.0

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

The different employment effects across various simulations arise from different policy assumptions and modeling perspectives between the MEG model and the OLG model. Like investment, employment responds both to increases in demand for goods and services and to long-run growth incentives. In the short run, most of the employment effects come from changes in demand due to the policy. When the corporate tax rate reduction is implemented alone, and the Federal Reserve Board does not work to counteract the demand stimulus, the increase in activity stimulates short-run employment growth. However, when the Federal Reserve Board counteracts the demand effects there is a negligible positive effect of the policy on employment.

Because a fiscal offset reduces the stimulus to demand provided by the corporate tax rate reduction, there are no demand-driven increases in employment in the simulations of the corporate tax rate reduction combined with the personal exemption decrease or the cut in Federal government spending. In fact, the effects are as likely to be negative as they are to be positive.

Cutting the exemption amount produces a more negative result than cutting transfer payments. As shown in Table 19, the labor supply incentive is also affected by whether the corporate tax rate reduction is offset by a fiscal policy that creates countervailing incentives, and by how that offset is viewed by the individual worker. In the case of labor, the long-run growth incentives of a corporate tax cut take effect gradually as the capital stock accumulates, increasing the productivity of labor and the wage rate. In addition, as shown in Table 19, the employment numbers reflect the effects the exemption decrease has on increasing marginal tax rates for some taxpayers, thus providing an incentive for them to reduce their labor force participation relative to the other sets of simulations presented here.

Table 19.−Effects of Corporate Tax Rate Reduction on Labor Force Participation
In Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	0.0	0.0	0.0
MEG neutral Fed	0.0	0.0	0.0
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in personal exemption			
MEG aggressive Fed	-0.1	-0.1	-0.1
MEG neutral Fed	-0.1	-0.1	-0.1
OLG	0.1	0.0	0.0
Fiscal offset: decrease in Government spending			
MEG aggressive Fed,	0.0	0.0	0.0
MEG neutral Fed	0.0	0.0	0.1
OLG	0.1	0.0	0.0

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

The differences in employment responses between the MEG budget neutral simulations and the OLG budget neutral simulations highlight a couple of differences in modeling perspective between the myopic expectations in the MEG model and the perfect foresight expectations in the OLG model. Because taxpayers in the MEG model base their behavior on current variables, not expected future variables, the negative demand and marginal rate change effects dominate their behavior. In contrast, in the OLG model, taxpayers view the continuing reduction in transfer payments as reducing their disposable income currently and in the future, and thus work harder throughout the budget window to accumulate savings against this loss of disposable income.

Consumption

Table 20 shows the effects of a cut in the corporate tax rate on consumption of goods and services. In the first five years, consumption may decrease by as much as 0.4 percent if the corporate tax cut is offset by a cut in Federal government spending, or increase by 0.1 percent if the stimulus is not offset by either fiscal or monetary policy. In the second five years, consumption may decrease by as much as 0.2 percent if there is a reduction in government expenditures, and it may increase by as much as 0.3 percent without a fiscal offset. In the long run, unlike the first five and ten year results, the buildup of capital stock increases labor productivity, and therefore real wages and consumption are higher in all of the simulations. Consumption is significantly lower in the short run in the MEG model simulations with a fiscal offset, reflecting the reduction in disposable income as a result of the reduction in the personal exemption or transfer payments.

Table 20.−Effects of Corporate Tax Rate Reduction on Real Consumption
in Percent Changes Relative to Present Law Baseline

Calendar Year Period	2005-2009	2010-2014	Long Run
No fiscal offset			
MEG aggressive Fed	-0.0	0.2	0.2
MEG neutral Fed	0.1	0.3	0.4
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in personal exemption			
MEG aggressive Fed	-0.3	-0.1	0.4
MEG neutral Fed	-0.3	-0.1	0.4
OLG	0.0	0.2	0.3
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	-0.3	-0.0	0.7
MEG neutral Fed	-0.4	-0.2	0.6
OLG	-0.1	0.0	0.2

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

Revenue feedback

Table 21 shows the revenue feedback for changes in receipts generated using macroeconomic analysis relative to those generated by a conventional revenue estimate. A positive percentage indicates the estimated revenue loss is less when macroeconomic effects are taken into account than when they are not. The relative magnitudes across simulations generally correspond to the relative magnitudes of changes in real GDP. Real GDP can be regarded roughly as the tax base; when a tax cut induces big growth effects, it tends to generate big revenue feedback. For example, both GDP growth and revenue feedback are both significantly higher under neutral Federal Reserve Board policy when there is no offsetting decrease in government spending than when there is an offsetting decrease in government spending (middle rows of both panels). Depending on how much temporary demand stimulus is generated by the proposal, the revenue feedback could range from 3.6 percent of the conventional revenue estimate to 17.9 percent in the first five years, and 8.3 percent to 21.0 percent over the ten-year budget period. Revenue feedback is not computed for the simulations of the corporate tax rate reduction offset by a decrease in the personal exemption because the conventional revenue estimate that is in the denominator of all of these calculations is zero for that proposal. See Appendix B for an alternate measure.

Table 21.−Effects of Corporate Tax Rate Reduction on Real Revenues
in Percent Changes Relative to Conventional Estimates

Calendar Year Period	2005-2009	2010-2014	2005-2014
No fiscal offset			
MEG aggressive Fed	7.7	18.2	13.2
MEG neutral Fed	17.9	27.5	21.0
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	9.2	26.7	18.4
MEG neutral Fed	3.6	12.6	8.3
OLG	8.7	11.8	10.2

Note: 0.0 indicates a change of zero to 0.05, and -0.0 indicates a change of zero to -0.05.

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APPENDIX A: DATA AND ASSUMPTIONS

Data

All of the macroeconomic models used by the Joint Committee staff are based primarily on data from the quarterly National Income and Product Accounts ("NIPA") data published by the Bureau of Economic Analysis, U.S. Department of Commerce. In the MEG model, and to the extent possible in the OLG model, the Joint Committee staff uses the forecast for Federal and State and local government expenditures and receipts forecast by the Congressional Budget Office (*The Budget and Economic Outlook: Fiscal Years 2005-2014,* January 2004). The Internal Revenue Code includes many deductions, credits, exclusions, and phaseouts that can cause the actual tax rates faced by taxpayers to differ from their statutory rates. To obtain these effective average and marginal tax rates on different sources of income under the present law baseline as well as under the tax proposals, the Joint Committee staff uses its individual microsimulation tax models, which are based on tax return data provided by the Statistics of Income Division of the Internal Revenue Service ("SOI"). Specifically, when using the microsimulation models, the tax calculator computes the change in liability due to the proposal for each sample tax return. These changes are aggregated for use in the macroeconomic models by computing the income-weighted average rate for each income source.

Table A.1. shows the conventional estimate of the change in Federal fiscal year revenues due to the three tax policies analyzed.

Table A.1.-Conventional Fiscal Year Revenue Estimates
Billions of Dollars

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	05-09	10-14
Individual Tax Cut......	-25	-38	-41	-44	-48	-450	-57	-61	-65	-69	-196	-500
Corporate Tax Cut......	-28	-46	-51	-52	-53	-53	-54	-56	-58	-60	-231	-511
Exemption Increase......	-34	-47	-46	-45	-45	-44	-57	-63	-62	-61	-217	-505

Table A.2. shows the percent changes in marginal and average effective tax rates due to the various proposals. The largest percentage changes in the marginal tax rate on wages result from the individual tax rate reduction. The exemption increase has a larger effect on marginal rates after the expiration of the tax cuts enacted in EGTRRA. The rate changes in the corporate tax rate reduction with the exemption decrease follow an almost identical path to those in the exemption increase, but of the opposite sign. Finally, it should be noted that effects on the average tax rates on wages are of similar magnitudes across the three proposals because the simulations are designed to have a similar conventional estimated revenue loss across proposals.

Table A.2.−Percent Change in Marginal and Average
Tax Rates on Wages Due to the Proposals

Year	Average Effective Marginal Rates on Wages			Average Effective Rates on Wages		
	Individual Tax Rate Reduction	Exemption Increase	Corporate Tax Rate Reduction with Exemption Decrease	Individual Tax Rate Reduction	Exemption Increase	Corporate Tax Rate Reduction with Exemption Decrease
2005	-3.9	-1.3	2.2	-4.7	-6.5	7.5
2006	-3.9	-0.9	1.7	-4.5	-6.3	5.4
2007	-3.8	-0.4	1.3	-4.2	-5.9	5.0
2008	-4.2	-0.4	0.4	-4.3	-4.3	5.2
2009	-4.1	-0.4	0.4	-5.0	-5.0	4.1
2010	-4.1	-0.4	0.4	-5.0	-4.1	4.1
2011	-4.1	-1.9	1.9	-4.1	-4.8	4.8
2012	-3.7	-1.1	1.9	-4.1	-4.1	4.7
2013	-3.7	-1.1	1.9	-4.6	-4.0	4.0
2014	-4.0	-1.1	1.5	-4.5	-3.9	3.9

Table A.3. presents the percentage changes in tax rates on interest, dividend, and capital gain income. Similar to the results in Table A.2. for the percentage changes in the marginal tax rates on wages, the results presented in the table indicate that the largest marginal changes result from the individual tax rate reduction.

Table A.3.−Percent Changes in Marginal Tax Rates on Interest,
Dividends, and Capital Gains Due to the Proposals

Year	Interest			Dividends			Gains		
	Individual Tax Rate Reduction	Exemption Increase	Corporate Tax Rate Reduction with Exemption Decrease	Individual Tax Rate Reduction	Exemption Increase	Corporate Tax Rate Reduction with Exemption Decrease	Individual Tax Rate Reduction	Exemption Increase	Corporate Tax Rate Reduction with Exemption Decrease
2005	-4.0	-2.0	2.0	-4.3	-0.7	0.0	-3.5	0.0	0.7
2006	-3.9	-1.5	2.0	-3.6	0.0	0.7	-3.5	-0.7	0.7
2007	-3.8	-1.4	1.0	-3.6	0.0	0.7	-4.2	-0.7	0.0
2008	-3.8	-1.0	1.0	-3.9	0.0	0.0	-3.5	-0.7	0.7
2009	-4.1	-0.9	0.9	-4.0	-0.8	0.4	-4.4	-0.5	0.0
2010	-4.0	-0.9	0.9	-4.0	-0.4	0.4	-3.8	0.0	0.5
2011	-4.0	-1.6	1.6	-3.9	-0.7	0.7	-4.3	0.0	0.0
2012	-4.0	-1.6	1.6	-3.9	-0.7	0.7	-4.3	0.0	0.0
2013	-4.3	-1.6	1.2	-3.8	-0.7	0.7	-4.3	0.0	0.0
2014	-3.9	-1.2	1.2	-4.2	-0.7	0.7	-4.3	0.0	0.0

Table A.4. presents the baseline average effective individual marginal income tax rates for wages, interest, dividends, capital gains, and total income. The marginal rates are income weighted. As can be seen in the table, the sunsets of EGTRRA and JGTRRA increase marginal rates in 2011 and 2009, respectively. The marginal tax rate on dividends drops from 14 percent in 2007 to 12.9 percent in 2008, reflecting the introduction of the zero rate.

Table A.4.−Baseline Marginal Tax Rates on Wages, Interest, Dividends, Capital Gains, and Total Income

Year	Average Effective Individual Marginal Rates				
	Wages	**Interest**	**Dividends**	**Gains**	**Total Income**
2005	0.229	0.199	0.139	0.142	0.224
2006	0.231	0.205	0.139	0.142	0.231
2007	0.234	0.209	0.140	0.143	0.234
2008	0.237	0.209	0.129	0.142	0.236
2009	0.241	0.221	0.247	0.183	0.243
2010	0.243	0.224	0.252	0.184	0.245
2011	0.267	0.250	0.283	0.187	0.271
2012	0.268	0.252	0.285	0.187	0.272
2013	0.270	0.256	0.287	0.187	0.274
2014	0.272	0.257	0.289	0.187	0.275

To obtain information about the effects of proposals affecting business tax liability, the Joint Committee staff uses its corporate tax microsimulation model, similar in structure to the individual microsimulation tax model. The data source for the corporate model is a sample of approximately 140,000 corporate tax returns provided by SOI. The staff's individual tax microsimulation model is used to obtain tax rates on non-corporate business, such as partnerships and S Corporations.

Depending on the requirements of the policy simulation, the corporate model can be run either on a full cross section of sampled tax returns (i.e., one full year) or on a panel of returns constructed from any combination of tax years in the 1987 through 1998 period. This panel feature is particularly useful in tracking net operating losses and credits that can be either carried back or carried forward to other tax years. The extent to which these carrybacks or carryforwards occur depends on how the corporate rate is being changed, and thus affects the size of the effective change in corporate tax rates.

Table A.5. presents the percentage changes in marginal tax rates on business income due to the proposals, obtained using the Joint Committee staff's individual microsimulation model. Business income includes both corporate income and pass-through income to the individuals, such as partnership, S Corporation, and sole proprietorship income. Therefore, not surprisingly, the individual tax rate reduction and the exemption increase reduce the marginal rates on business income. Finally, as can be seen from the table, the percentage change in the marginal

tax rates on business income declines after the sunset of the EGTRRA in 2010. This is due to the higher rates on pass-through business income after 2010.

**Table A.5.−Percent Changes in Marginal Tax Rates on Business
Income Due to the Proposals**

Year	Individual Tax Rate Reduction	Exemption Increase	Corporate Tax Rate Reduction	Corporate Tax Rate Reduction with Exemption Decrease
2005	-1.3	-0.2	-11.3	-11.1
2006	-1.3	-0.2	-11.3	-11.0
2007	-1.4	-0.2	-11.3	-11.1
2008	-1.3	-0.2	-11.3	-11.2
2009	-1.3	-0.1	-11.2	-11.0
2010	-1.4	-0.2	-11.2	-11.1
2011	-1.5	-0.3	-10.7	-10.4
2012	-1.5	-0.2	-10.6	-10.4
2013	-1.4	-0.2	-10.6	-10.4
2014	-1.5	-0.1	-10.6	-10.4

Modeling assumptions

The magnitude of the macroeconomic effects generated by these simulations depends upon a number of assumptions about the size of the behavioral response of taxpayers to changes in after tax income. The specific response parameters used in the MEG and OLG models are summarized in Tables A.6. and A.7., with a discussion of their significance following.

Table A.6.−Key Parameter Assumptions in the MEG Model

Labor supply elasticities in disaggregated labor supply	Income	Substitution	Low Elasticity Substitution
Low income primary	-0.1	0.2	0.15
Other primary	-0.1	0.1	0.1
Low income secondary	-0.3	0.8	0.4
Other secondary	-0.2	0.6	0.3
Wage-weighted population average with baseline rates	-0.1	0.2	0.1

Savings/consumption parameters underlying lifecycle consumption function	
Rate of time preference	0.015
Intertemporal elasticity of substitution	0.25
Derived long-run savings elasticity to the after tax rate of return on capital	0.29

Table A.7.−Key Parameter Values in the OLG Model

Description	Value
Rate of time preference	0.005
Intertemporal elasticity of substitution	0.25
Intratemporal elasticity of substitution	0.5
Leisure share of time endowment	0.3
Population growth rate	0.01
Technological growth rate	0.01
Capital share in non-housing production	0.27
Capital share in housing production	0.98
Adjustment cost parameter (quadratic adjustment cost function)	2
Debt-to-capital ratio (average across all production sectors)	0.35
Housing elasticity of substitution between capital and labor	0.5
Non-housing elasticity of substitution between capital and labor	0.7

Effects of tax rate reductions on labor supply

Reductions in individual tax rates have two opposing influences on labor supply incentives. On one hand, reductions in marginal individual income tax rates (tax rates on incremental amounts of income earned) create an incentive to work more because taxpayers get to keep more of each dollar earned, making each additional hour of work more valuable. On the other hand, reductions in the average tax rate create an incentive to work less, because they result in taxpayers having more after-tax income at their disposal for a given amount of work.

Consistent with existing research, the simulations assume that taxpayers in different financial positions respond differently to these incentives. Typically, the largest response comes from secondary workers (individuals whose wages make a smaller contribution to household income than the primary earner in the household) and other underemployed individuals entering the labor market. Labor supply responses are modeled separately for four different groups in MEG: low-income primary earners, other primary earners, low-income secondary earners, and other secondary earners. The model simulations assume that for secondary earners, the marginal rate effect is larger than the average rate effect; thus reductions in wage tax rates result in increases in labor supplied to the economy. As the individual income tax rate reduction has substantial impact on average and marginal labor income tax rates, simulations are presented using two different sets of assumptions about the responsiveness of labor supply to changes in tax rates (the results obtained under assumed smaller labor responses are referred to as "low labor elasticity"). Since the other two proposals involve little or no changes in individual tax rates, the simulations on low labor elasticity are not performed.

In the OLG model, the labor supply response to tax changes is determined by taxpayers' preferences for consuming leisure versus other consumer items. To the extent that taxpayers prefer consumption of goods and services over leisure, they will choose to increase their work effort. As in the MEG model, tax policy affects these decisions through changing the average and marginal amount of after-tax income available to the taxpayer. Unlike the MEG model, these labor supply decisions are made not just with respect to current returns on labor; the taxpayer allocates labor across his lifetime in response to his expectations about the relative returns to labor in the future as well as currently. For this reason, the rate of time preference (for consumption) and the intertemporal elasticity of substitution (degree to which the individual is willing to defer leisure in order to earn more current income) also play a role in the individual's labor supply decisions.

Effects of tax rate reductions on investment

Reductions in marginal tax rates on interest, dividend, or capital gains income create incentives for individuals to save and invest more of their income, as each additional dollar of investment yields more after-tax income. Conversely, reductions in the average tax rate on income from capital provide taxpayers with more after-tax income for the same amount of investment, reducing their incentive to save and invest. Changes in the statutory tax rate affect both marginal and average rates of tax on these sources of income, providing offsetting incentives. Consistent with existing research, the model simulations assume that on net, the marginal rate effect is slightly larger than the average rate effect, and thus decreases in tax rates on capital income increase savings. In addition, because both the MEG and the OLG models

assume some substitutability between investment in housing and investment in business capital, proposals that change the relative after-tax rate of return between these two sectors are assumed to cause shifting in investment between the sectors. The positive effects of investment incentives on growth are slightly enhanced within the simulations by an assumed interaction between increasing capital stock and increasing technological development. Thus, increases in capital stock are assumed to increase labor productivity through technological progress as well as through capital build up.

There is general agreement that taxation of dividend income reduces the return on investments financed with new share issues. However, two alternative views exist regarding the effect of reducing dividend taxation on corporate investment returns financed with retained earnings. The "traditional view" holds that reductions in dividend taxes would lower the cost of corporate investment financed with either new share issues or retained earnings, and thus would provide an incentive for corporations to increase investment. Alternatively, the "new view" holds that a reduction in the dividend tax rate would not lower the cost of corporate investment financed with retained earnings. Under this view, a decrease in the dividend tax rate would result in an immediate increase in the value of outstanding stock reflecting the reduction in dividend tax payments, thus increasing the wealth of the stockholders, and providing an incentive for additional consumption. The model simulations assume that half of the corporate sector is in accordance with the traditional view and half with the new view.

Effects of accumulating Federal government debt and international capital flows

Increased Federal government budget deficits increase the amount of borrowing by the Federal government. Unless individuals increase their savings enough to finance the increased deficit, the increase in government borrowing will reduce the amount of domestic capital available to finance private investment. As government borrowing increases, the government and private firms compete for available funds and interest rates rise to equate the demand and supply of funds. This effect is often referred to as "crowding out" of private business activity by Federal government activity, and leads to a reduction in domestic investment and domestic capital formation. Crowding out is alleviated by two responses. First, individuals may increase their savings in response to rising interest rates; second, rising interest rates may attract international investors, increasing the total amount of capital available to the U.S. economy. The MEG simulations incorporate an assumption that there would be some inflow of foreign capital to the extent that the rate of return on capital is increased by the tax policy. However, the inflow in foreign capital is not enough to offset completely the increased Federal borrowing. The OLG simulations assume no inflow of foreign capital. Both models incorporate an assumption that an increase in the interest rate increases domestic savings.

To provide an idea of the extent of crowding out in the MEG model, Table A.8. compares real long term interest rates from the three proposals simulated in this analysis, both with and without a fiscal offset. The simulations with fiscal offsets show the effects of the tax policy assuming virtually no increasing Federal government debt accumulation, and thus provide the long term interest rate for the policy with no crowding out. The difference in real interest rates between these simulations is about 20 to 50 basis points. These changes correspond to an increase ranging from 1.5 to five basis points for every one percent increase in the ratio of Federal debt to GDP.

Table A.8.−Annual Real Long-Run Interest Rates

	Individual Tax Rate Reduction	Personal Exemption Increase	Corporate Tax Rate Reduction
No fiscal offset			
MEG aggressive Fed	0.046	0.047	0.046
MEG neutral Fed	0.044	0.044	0.044
Fiscal Offset: decrease in Government spending			
MEG aggressive Fed,	0.042	0.042	0.042
MEG neutral Fed	0.042	0.042	0.042

APPENDIX B: ALTERNATE FEEDBACK MEASURE

For proposals that include a revenue-neutral change in tax policy, such as a reduction in the corporate income tax rate and an offsetting decrease in the personal exemption, the traditional "revenue feedback" measure is undefined. The conventional revenue feedback measure divides the change in receipts due to macroeconomic effects by the amount of the conventional revenue estimate; for revenue neutral proposals, the conventional revenue estimate is near zero, and thus cannot be put in the denominator. An alternate way to illustrate the relationship between macroeconomic effects of tax policy and their impacts on revenues is to present a measure of the change in proposed-law revenues that owes to macroeconomic effects, as a percent of present-law baseline receipts: revenues are computed under proposed law with and without macroeconomic effects, and the difference between these measures is divided by present-law baseline receipts. This methodology provides an indication of the long-run impact of the growth effects of the proposals on revenues.

Tables B.1., B.2., and B.3. below, show a comparison of feedback as computed under this alternative measure for the individual tax rate reduction, the increase in the personal exemption, and the corporate tax rate reduction, respectively. Inside the budget horizon, the results are broadly comparable to our standard measure of revenue feedback; in the long run, the measure is consistent with the macroeconomic effects presented in figures and discussed above. Growth-induced changes in revenues are likely to be greater within the budget window in response to a cut in individual income tax rates than in response to the other proposals. In the long run, the corporate tax cut produces a greater growth induced change in revenues.

Table B.1.−Macroeconomic Effect of Individual Tax Rate Reduction on Real Revenues
Percent Changes in Total Real Revenues Owing to Macroeconomic Effects

Calendar Year Period	2005-2009	2010-2014	2005-2014
No fiscal offset			
MEG aggressive Fed	0.1	0.2	0.2
MEG aggressive Fed - low labor elasticity	0.1	0.2	0.1
MEG neutral Fed	0.3	0.5	0.4
MEG neutral Fed - low labor elasticity	0.3	0.5	0.4
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.1	0.3	0.2
MEG aggressive Fed - low labor elasticity	0.1	0.3	0.2
MEG neutral Fed	0.1	0.2	0.1
MEG neutral Fed - low labor elasticity	0.0	0.2	0.1
OLG	0.7	0.9	0.8

Table B.2.−Macroeconomic Effect of Personal Exemption Increase on Real Revenues
Percent Change in Total Real Revenues Owing to Macroeconomic Effects

Calendar Year Period	2005-2009	2010-2014	2005-2014
No fiscal offset			
MEG aggressive Fed	0.0	-0.0	0.0
MEG neutral Fed	0.2	0.3	0.2
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.0	0.1	0.1
MEG neutral Fed	-0.0	0.0	0.0
OLG	0.3	0.3	0.3

Table B.3.−Macroeconomic Effect of Corporate Tax Rate Reduction on Real Revenues
Percent Change in Total Real Revenues Owing to Macroeconomic Effects

Calendar Year Period	2005-2009	2010-2014	2005-2014
No fiscal offset			
MEG aggressive Fed	0.1	0.3	0.2
MEG neutral Fed	0.3	0.5	0.4
OLG	n.a.	n.a.	n.a.
Fiscal offset: decrease in personal exemption			
MEG aggressive Fed	0.1	0.3	0.2
MEG neutral Fed	0.1	0.2	0.1
OLG	0.2	0.4	0.3
Fiscal offset: decrease in Government spending			
MEG aggressive Fed	0.2	0.4	0.3
MEG neutral Fed	0.1	0.2	0.1
OLG	0.3	0.5	0.4