

# Effects of Income Tax Changes on Economic Growth

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## **Abstract**

This paper examines how changes to the individual income tax affect long-term economic growth. The structure and financing of a tax change are critical to achieving economic growth. Tax rate cuts may encourage individuals to work, save, and invest, but if the tax cuts are not financed by immediate spending cuts, they will likely also result in an increased federal budget deficit, which in the long-term will reduce national saving and raise interest rates. The net impact on growth is uncertain, but many estimates suggest it is either small or negative. Base-broadening measures can eliminate the effect of tax rate cuts on budget deficits, but at the same time, they reduce the impact on labor supply, saving, and investment and thus reduce the direct impact on growth. They may also reallocate resources across sectors toward their highest-value economic use, resulting in increased efficiency and potentially raising the overall size of the economy. Results in the literature suggest that not all tax changes will have the same impact on growth. Reforms that improve incentives, reduce existing distortionary subsidies, avoid windfall gains, and avoid deficit financing will have more auspicious effects on the long-term size of the economy, but may also create trade-offs between equity and efficiency.

**Keywords:** Income Taxes, Economic Growth, Tax Cuts, Tax Reform

## **I. Introduction**

Policy makers and researchers have long been interested in how potential changes to the personal income tax system affect the size of the overall economy. In 2014, for example, Representative Dave Camp (R-MI) proposed a sweeping reform to the income tax system that would reduce rates, greatly pare back subsidies in the tax code, and maintain revenue levels and the distribution of tax burdens across income classes (Committee on Ways and Means 2014).

In this paper, we focus on how tax changes affect economic growth. We focus on two types of tax changes – reductions in individual income tax rates and “income tax reform.” We define the latter as changes that broaden the income tax base and reduce statutory income tax rates, but nonetheless maintain the overall revenue levels and the distribution of tax burdens implied by the current income system. Our focus is on individual income tax reform, leaving consideration of reforms to the corporate income tax (for which, see Toder and Viard 2014) and reforms that focus on consumption taxes for other analyses.

By “economic growth,” we mean expansion of the supply side of the economy and of potential Gross Domestic Product (GDP). This expansion could be an increase in the annual growth rate, a one-time increase in the size of the economy that does not affect the future growth rate but puts the economy on a higher growth path, or both. Our focus on the supply side of the economy in the long run is in contrast to the short-term phenomenon, also called “economic growth,” by which a boost in aggregate demand, in a slack economy, can raise GDP and help align actual GDP with potential GDP.

The importance of the topics addressed here derive from the income tax’s central role in revenue generation, its impact on the distribution of after-tax income, and its effects on a wide variety of economic activities. The importance is only heightened by concerns about the long-

term economic growth rate (Gordon 2016; Summers 2014) and concerns about the long-term fiscal status of the federal government (Auerbach and Gale 2016).

We find that, while there is no doubt that tax policy can influence economic choices, it is by no means obvious, on an ex ante basis, that tax rate cuts will ultimately lead to a larger economy in the long run. While rate cuts would raise the after-tax return to working, saving, and investing, they would also raise the after-tax income people receive from their current level of activities, which lessens their need to work, save, and invest. The first effect normally raises economic activity (through so-called substitution effects), while the second effect normally reduces it (through so-called income effects).

The financing of tax cuts significantly affects its impact on long-term growth. Tax cuts financed by immediate cuts in unproductive government spending could raise output, but tax cuts financed by reductions in government investment could reduce output. If they are not financed by spending cuts, tax cuts will lead to an increase in federal borrowing, which in turn, will reduce long-term growth. The historical evidence and simulation analyses suggest that tax cuts that are financed by debt for an extended period of time will have little positive impact on long-term growth and could reduce growth.

Tax reform is more complex, as it involves tax rate cuts as well as base-broadening changes. There is a theoretical presumption that such changes should raise the overall size of the economy in the long-term, though the effect and magnitude of the impact are subject to considerable uncertainty. One fact that often escapes unnoticed is that broadening the tax base by reducing or eliminating tax expenditures *raises* the effective tax rate that people and firms face and hence will operate, in that regard, in a direction opposite to rate cuts and mitigate their effects on economic growth. But base-broadening has the additional benefit of reallocating

resources from sectors that are currently tax-preferred to sectors that have the highest economic (pre-tax) return, which should increase the overall size of the economy.

A fair assessment would conclude that well-designed tax policies have the potential to raise economic growth, but there are many stumbling blocks along the way and certainly no guarantee that all tax changes will improve economic performance. Given the various channels through which tax policy affects growth, a tax change will be more growth-inducing to the extent that it involves (i) large positive incentive (substitution) effects that encourage work, saving, and investment; (ii) small or negative income effects, including a careful targeting of tax cuts toward new economic activity, rather than providing windfall gains for previous activities; (iii) reductions in distortions across economic sectors and across different types of income and consumption; and (iv) minimal increases in, or reductions in, the budget deficit.

The remainder of the paper is organized as follows. Section II provides a conceptual framework by discussing the channels through which tax changes can affect economic performance, including the many ways in which a positive substitution effect in response to a tax rate cut might be dissipated or even reversed by other factors.

Section III provides an empirical starting point. We show that growth rates over long periods of time in the United States have not changed in tandem with the massive changes in the structure and revenue yield of the tax system that have occurred. We also report findings from Piketty, Saez and Stantcheva (2014) that, across advanced countries, even large changes in the top marginal income tax rate over time do not appear to be strongly correlated with rates of growth.

Section IV explores empirical evidence on taxes and growth from studies of major income tax changes in the United States. Consistent with the discussion in Section III, the

studies find little evidence that tax cuts or tax reform since 1980 have impacted the long-term growth rate significantly.

Section V examines the new “narrative” approach to identifying tax changes that are exogenous to current economic conditions, stemming from the seminal work of Romer and Romer (2010). The literature, which generally uses vector autoregression (VAR) models, finds that tax cuts that meet the exogeneity criteria raise short-term output and other economic activity. The narrative literature does not speak to the long-term effects, though.

Section VI discusses the results from the literature on simulation models, which has generated two main results. First, debt-financed tax cuts will tend to boost short-term growth (as in standard Keynesian models and in the literature using the narrative approach), but also tend to reduce long-term growth, if they are financed eventually by higher taxes. Second, revenue-neutral income tax reform can provide a modest boost to economic growth.

Section VII concludes.<sup>1</sup>

## **II. Framework<sup>2</sup>**

Not surprisingly, the overall relationship between tax changes and economic activity over the long term contains many pathways. In this section, we highlight the main channels through which income taxes affect economic growth.

### **A. Reductions in Income Tax Rates**

Reductions in income tax rates affect the behavior of individuals and businesses through

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<sup>1</sup> There are a number of related issues that are both interesting and important, but beyond the scope of the paper – including, for example, the elasticity of taxable income, the relationship between inequality (especially as it is affected by the tax system) and growth, the effects of corporate income tax reform on growth and the detailed literatures on the effects of taxes on labor supply, saving, and investment.

<sup>2</sup> Gravelle (2014) provides extensive discussion of the channels through which tax changes affect economic growth, revenues, and other factors.

both income and substitution effects. The positive effects of tax rate cuts on the size of the economy arise because lower tax rates raise the after-tax reward to working, saving, and investing. These higher after-tax rewards induce more work effort, saving, and investment through substitution effects. This is typically the “intended” effect of tax cuts on the size of the economy. Another positive effect of pure rate cuts is that they reduce the value of existing tax distortions and induce an efficiency-improving shift in the composition of economic activity (even holding the level of economic activity constant) away from currently tax-favored sectors, such as health and housing. But pure rate cuts may also provide positive income (or wealth) effects, which reduce the need to work, save, and invest.

An across-the-board cut in income tax rates, for example, incorporates all of these effects. It raises the marginal return to work – increasing labor supply through the substitution effect. It reduces the value of existing tax subsidies and thus would likely alter the composition of economic activity. It also raises a household’s after-tax income at every level of labor supply, which in turn, reduces labor supply through the income effect. The net effect on labor supply is ambiguous. Similar effects also apply to the impact of tax rate cuts on saving and other activities.<sup>3</sup>

The initial tax rate will affect the impact of a tax cut of a given size. For example, if the initial tax rate – on wages, say – is 90 percent, a 10 percentage point reduction in taxes doubles the after-tax wage from 10 percent to 20 percent of the pre-tax wage. If the initial tax rate is 20 percent, however, the same 10 percentage point reduction in taxes only raises the after-tax wage by one-eighth, from 80 percent to 90 percent of the pre-tax wage. Although income effects

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<sup>3</sup> Many authors have examined the taxable income elasticity (TIE) (see, for example, Saez, Slemrod, and Giertz 2012). The TIE combines a taxpayer’s labor supply and avoidance responses to tax changes and thus is typically larger than the labor supply elasticity. The avoidance response, however, does not have a direct effect on economic growth.

would be the same in the two cases, the substitution effect on labor supply and saving would be larger when tax rates are higher, so that the net gain in labor supply from a tax cut would be larger (or the net loss would be smaller in absolute value) when tax rates are high. In addition, because the economic cost of the tax rises with the square of the tax rate, the efficiency gains from reducing tax rates are larger when tax rates are higher to begin with.

## B. Tax Reform

Tax reform, as defined above, involves reductions in income tax rates as well as measures to broaden the tax base; that is, to reduce the use of tax expenditures or other items that narrow the base.<sup>4</sup> By removing the special treatment for various types of income or consumption, base-broadening will tend to raise the average effective marginal tax rates on labor supply, saving and investment. This has two effects: the average substitution effect will be smaller from a revenue-neutral tax reform than from a tax rate cut, because the lower tax rate raises incentives to work, etc., while the base-broadening reduces such incentives; and the average income effect from a truly revenue-neutral reform should be zero.

Base-broadening has an additional effect that should help expand the size of the economy. Specifically, it would also reduce the allocation of resources to sectors and industries that currently benefit from generous tax treatment. A flatter-rate, broader-based system would encourage resources to move out of currently tax-preferred sectors and into other areas of the economy with higher pre-tax returns. The reallocation would increase the size of the economy.

## C. Financing

Besides their effects on private agents, tax changes also affect the economy through

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<sup>4</sup> Personal exemptions, the standard deduction, and lower marginal tax rates at low incomes are not considered tax expenditures.



changes in federal finances. If the tax change is revenue-neutral, there is no issue with financing effects, since the reformed system would raise the same amount of revenue as the existing system.

However, any tax cut must be financed by some combination of future tax increases or current or future spending cuts – with borrowing to bridge the timing of spending and receipts. The associated, necessary policy changes are often not specified in the original tax cut legislation, but they have to be present in some form in order to meet the government’s intertemporal budget constraint. Because fiscally unsustainable policies cannot be maintained forever, the financing of a tax cut must be incorporated into analyses of the effect of the tax cut itself.

In the absence of current spending changes, tax cuts are likely to raise the federal budget deficit.<sup>5</sup> The increase in federal borrowing will likely reduce national saving and hence the capital stock owned by Americans and future national income. In most economic environments, the increase in the deficit is also likely to raise interest rates. These changes – lower national saving and the associated increase in interest rates – create a fiscal drag on the economy’s ability to grow (Congressional Budget Office 2013; Economic Report of the President 2003; Gale and Orszag 2004a; Engen and Hubbard 2004; Laubach 2009). The financing of tax cuts turns out to be extremely important in the simulation studies of tax rate changes discussed in Section VI below.

Of course, changes in one tax can be financed by changes in other taxes, too. A related literature considers the relationship between economic growth and the mix of taxes used. Arnold

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<sup>5</sup> There are potentially important differences on the size of the economy in the form of spending cuts that could finance tax reductions, but they are beyond the scope of this paper.

et al. (2011) use a panel dataset of 21 OECD countries over the 1971 – 2004 period and find that corporate and personal income taxes have the most negative consequences for growth, while consumption taxes and property taxes are less harmful. Acosta-Ormaechea and Yoo (2012) use similar methods and a broader dataset of 69 countries over the 1970 – 2009 period and obtain similar results. As in the case discussed above of income tax cuts that are financed by reductions in government spending rather than budget deficits, the growth potential of income tax cuts is higher when the income tax cuts are financed by increases in other taxes that have lesser disincentives for work, saving, and investment.

#### D. Other Governmental Entities

Federal tax cuts can also generate responses from other governmental entities – including the central bank, state governments, and foreign governments. The Joint Committee on Taxation (2014), for example, examines how different Federal Reserve Board policies would affect the impact of Representative Camp’s tax reform proposals on economic growth.

The potential responses of foreign governments are often overlooked. Cuts in U.S. taxes that induce capital inflows from abroad, for example, may encourage other countries to reduce their taxes to retain capital or attract U.S. funds. To the extent that other countries respond, the net effect of income tax cuts on growth will be smaller than otherwise.

#### E. Summary

The popular discussion of the link between tax cuts and economic growth often starts with the presumption that tax cuts will boost growth. While substitution effects of tax cuts will boost labor supply and saving, it is not at all clear that this will translate into a stronger supply side of the economy because of several other effects. The first is the income effect, which will at least partially offset the substitution effect. The second is, in the case of tax reform, the higher

taxes on the other activities that are now included in the broadened tax base. The third is, in the case of tax cuts not paid for by reduced government spending, the offsetting effects of higher budget deficits and thus interest rates on economic activity.

For individuals on the supply side of the economy, there are two key elasticities – labor supply and saving. Most of the literature finds small effects of taxes on labor supply, but Keane (2011) challenges the presumption that the elasticity of labor supply for males is small. He shows that modeling human capital investment – a positive effect of the current period’s labor supply on later periods’ wages – allows for labor supply elasticities sufficient to generate large efficiency costs of taxation. He further shows that for women, labor supply elasticities that allow for the dynamic effects of wages on fertility, marriage, education, and work experience are generally quite large. Thus, there remains the potential for some tax cuts to generate behavioral responses on labor supply that lead to higher economic activity.<sup>6</sup>

Bernheim (2002) surveys the literature on the response of savings to generic changes in the after-tax return and concludes that there is little evidence for a large effect. In the case of savings, there must also be a link between the behavioral response of higher savings to the tax cut and economic activity. Chetty et al. (2014) review the uncertain literature on saving incentives and present new evidence that the incentives do not raise overall saving. Many studies have considered the causal link between savings and growth. The general conclusion in the literature, well-articulated by Carroll and Weil (1994), is that the observed positive relationship reflects a causal pathway from growth to savings, rather than savings to growth.

### **III. An Empirical Starting Point**

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<sup>6</sup> See also Keane and Rogerson (2012) and Chetty, Guren, Manoli, and Weber (2011, 2013) on reconciliations of the (small) micro elasticities with (larger) macro labor supply elasticities.

There are at least three concepts to which the term “economic growth” might refer. The narrowest concept is that economic growth is the steady-state rate of growth that emerges from an economic model of supply and demand over time. This concept is too narrow for our purposes, as it ignores all growth that may occur in the (possibly quite lengthy) transition between a steady-state under one tax regime and the steady-state to which the economy converges after some tax policy has been changed. The broadest concept is any change in the level of economic activity over any period of time. This concept implicitly, if not explicitly, underlies analyses of the role of tax changes in stabilization policy, to smooth out economic fluctuations at business cycle frequencies. This concept is too broad, given our focus on the supply side of the economy, as over some short periods of time the level of economic activity may increase because, for example, tax cuts boost demand to align actual and potential GDP rather than increase potential GDP.

A third concept, intermediate between the first two, considers any change in the level of economic activity for periods longer than the business cycle. This could include something that boosts the economy on a one-time, permanent basis, something that alters the steady state growth rate of the economy, or something that does both. Restricting attention to longer periods is appropriate for several reasons. First, looking at longer periods averages out the impact of tax policy over the business cycle. Second, as discussed in the context of simulation analyses below, tax cuts might have positive effects on economic activity in the short-run but negative effects over the long-run as higher interest rates from the ensuing deficits crowd out other economic activity. Third, focusing on a longer period helps ensure that the full impact of tax changes can be considered.

Using this concept of economic growth, a first cut at the U.S. historical data and the

cross-country data on growth rate differences across countries suggest no strong relationship between economic growth and income tax policy.

#### A. Historical Trends

U.S. historical data show huge shifts in taxes with virtually no observable shift in growth rates. From 1870 to 1912, the U. S. had no income tax, and tax revenues were just 3 percent of GDP. From 1913 to 1946, the economy experienced an especially volatile period, including two World Wars and the Great Depression, along with the introduction and expansion of the income and payroll taxes and expansion of estate and corporate taxes.

By 1947, the economy had entered a new period with permanently higher taxes and government spending. From 1947 to 2000, the highest marginal income tax rate averaged 66 percent, and federal revenues averaged about 18 percent of GDP (Gale and Potter 2002). In addition, estate and corporate taxes were imposed at high marginal rates and state-level taxes rose significantly over earlier levels.

The vast differences between taxes before 1913 and after World War II can therefore provide at least a first-order sense of the importance tax policy on growth. However, the growth rate of real GDP per capita was identical – 2.2 percent – in the 1870-1912 period and between 1947 and 1999 (Gale and Potter 2002).

More formally, Stokey and Rebelo (1995) look at the significant increase in income tax rates during World War II and its effect on the growth rate of per capita real Gross National Product (GNP). Figure 1 shows the basic trends they highlight – namely, a massive increase in income tax and overall tax revenues during World War II that has persisted and since proven to be more or less permanent. There is, as shown in Figure 1, no corresponding break in the growth rate of per capita real GNP before or after World War II (though it is less volatile). A variety of

statistical tests confirm formally what Figure 1 shows; namely, the finding that the increase in tax revenue around World War II had no discernible impact on the long-term per-capita GNP growth rate.<sup>7</sup>

Hungerford (2012) plots the annual real per-capita GDP growth rate against the top marginal income tax rate and the top capital gains tax rate from 1945 to 2010 (see Figure 2), a period that spanned wide variation in the top rate. The fitted values suggest that higher tax rates are not associated with higher or lower real per-capita GDP growth rates to any significant degree. In multivariate regression analysis, neither the top income tax rate nor the top capital gains tax rate has a statistically significant association with the real GDP growth rate. An obvious caveat to this result is that the share of households facing the top rate is generally quite small. However, historically, the highest several marginal tax rates were moved together, so that changes in the top rate per se proxy for changes in a broader set of higher tax rates that do affect many taxpayers.

To be clear, many factors affect economic growth rates. Nonetheless, if taxes were as crucial to long-term growth as is sometimes claimed, the large historical increases in tax burdens and marginal tax rates that occurred between World War I and the end of World War II, as well as the historic reduction in top marginal income tax rates that has occurred since then, might be expected to affect the aggregate growth rate of the economy.

## B. Cross-Country Evidence

Cross-country studies generally find very small long-term effects of taxes on growth

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<sup>7</sup> GNP growth did spike downward immediately after the war, but that was related to a massive demilitarization effort. Overall, the economy grew massively during World War II (for reasons other than taxes, of course) and then maintained its former growth rate in the relatively-high-tax post-WWII period.

among developed countries (Slemrod 1995).<sup>8</sup> Countries vary, of course, not just in their level of revenues and spending, but also in the composition of taxes and outlays. Nevertheless, a large literature has developed aiming to compare tax effects across countries.

Evidence shows that pooling data from developed and developing countries is inappropriate because the growth processes differ (Garrison and Lee 1992; Grier and Tullock 1989) and that taxes have little or no effect on economic growth in developed countries. Mendoza et al. (1997) and Garrison and Lee (1992) find no tax effects on growth in developed countries. Padovano and Galli (2001) find that a 10 percentage point reduction in marginal tax rates raises the growth rate by 0.11 percentage points in OECD countries. Engen and Skinner (1992) find significant effects of taxes on growth in a sample of 107 countries, but the tax effects are tiny and insignificant when estimated only on developed countries.

Piketty, Saez, and Stantcheva (2014) look at evidence from 18 OECD countries on tax rates and economic growth for the 1960-2010 time period. Figure 3, taken from their study, conveys the idea that there is little correlation between growth in real GDP per capita and the drop in the top marginal rate for the 1960-2010. Their regression analysis confirms this result.

Thus, a reasonable summary from the simple correlations of economic growth and income tax policy over long periods is that the presence of strong tax effects on economic growth is hard to reconcile with observations from the U.S. historical record and international comparisons.<sup>9</sup>

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<sup>8</sup> In his comments on Slemrod (1995), Easterly (1995) concludes, “the data mock attempts to discern the growth effects of taxes.”

<sup>9</sup> That the weak relationships between economic growth and tax rates in these simple correlations inform the current literature is evident from recent theoretical contributions. Consider Jaimovich and Rebelo (2015), who derive an endogenous growth model in which, over a broad range of tax parameters (including those chosen by the median voter), there is no important relationship between the rate of growth and the tax structure. Only when tax rates get to

## IV. Empirical Analyses of Particular Tax Reforms

Ultimately, the impact of specific tax changes on the size of the economy is an empirical question. Rigorous empirical studies of actual U.S. tax changes are relatively rare, however, for several reasons. First, the U.S. has only had a few major tax policy changes over the past 50 years. Second, most major tax changes alter many features of the code simultaneously. Third, it is difficult to isolate the impact of tax changes relative to other changes in policy and the economy, an issue addressed directly in the following section.

In this section, we review studies of specific tax policy changes.<sup>10</sup> It is worth noting that historical reforms do not represent “pure” textbook tax reform efforts, since they all took place in the real world, subject to the compromises that the political process imposes. However, future tax reforms will also be affected by political factors, so the history of reform efforts and their effects is relevant.

### A. Effects of Tax Cuts and Tax Increases

Several studies have aimed to disentangle the impact of the major tax cuts that occurred in 1981, 2001, and 2003, as well as the tax increases that occurred in 1990 and 1993. The Economic Recovery Act of 1981 (ERTA) included a 23 percent across-the-board reduction in personal income tax rates, a deduction for two-earner families, expanded IRAs, numerous reductions in capital income taxes, and indexed the income tax brackets for inflation. Many features of ERTA, particularly some of the subsidies for capital income, were trimmed back in the 1982 and 1984 tax acts.

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extremely high levels does the negative effect of taxes on growth appear. The original insight that changes in taxes might have little effect on growth is attributed to Harberger (1964).

<sup>10</sup> See McBride (2012) and Huang and Frentz (2014) for recent surveys that reach different conclusions on the effects of taxes on economic growth.



Feldstein (1986) provides estimates indicating that all of the growth of nominal GNP between 1981 and 1985 can be explained by changes in monetary policy. Of the change in real GNP during that period, he finds that only about 2 percentage points of the 15 percentage point rise cannot be explained by monetary policy. But he also notes that the data do not strongly support either the traditional Keynesian view that the tax cuts significantly raise aggregate demand or traditional supply-side claims that they significantly increase labor supply. He finds, rather, that exchange rate changes and the induced changes in net exports account for the small part of growth not explained by monetary policy.

Feldstein and Elmendorf (1989) find that the 1981 tax cuts had virtually no net impact on economic growth. They find that the strength of the recovery over the 1980s could be ascribed to monetary policy. In particular, they find no evidence that the tax cuts in 1981 stimulated labor supply.

A Center on Budget and Policy Priorities study looks at the relationship between the 1993 tax hikes and the 2001 tax cuts with respect to employment and GDP growth over the periods following the respective reforms (Huang 2012). As Figure 4 shows, job creation and economic growth were significantly stronger in the years following the marginal income tax increases enacted in 1993 (the top marginal tax rate went up from 31 percent to 39.6 percent) than they were following the 2001 tax cuts (described below). While correlation does not imply causation, and while the 1993 and 2001 tax changes occurred at different times in the business cycle, making comparisons between the two of them more difficult, the evidence presented above at the very least discredits the argument that higher growth cannot take place during a period of higher tax rates.

The tax cuts in 2001 (The Economic Growth and Tax Relief Reconciliation Act of 2001,

or EGTRRA) reduced income tax rates, phased out and temporarily eliminated the estate tax, expanded the child credit, and made other changes. The 2003 tax cut (The Jobs and Growth Tax Relief Reconciliation Act of 2003, or JGTRRA) reduced rates on dividends and capital gains.

A variety of forms of evidence suggest that the impact on growth of these changes was negligible. A cursory look at growth between 2001 and 2007 (before the onset of the Great Recession) suggests that overall growth rate was both mediocre – real per-capita income grew at an annual rate of 1.5 percent during that period, compared to 2.3 percent from 1950 to 2001 – and was concentrated in housing and finance, two sectors that were not favored by the tax cuts. There is, in short, no first-order evidence in the aggregate data that these tax cuts generated growth.

Careful microeconomic analyses give similar conclusions. Eissa (2008) tabulates the unconditional distribution of hours worked over the 2000 – 2006 period using the March Current Population Surveys. Her results, displayed in Figure 5, show that hours worked by prime-age males did not change over this period, while the distributions of hours worked for women – married women and particularly single mothers – shifted lower. This is reflected in the second and third panels of Figure 5 by the increase in the probability mass at zero hours of work. This lower likelihood of labor force participation is inconsistent with the view that lower tax rates encourage labor supply. The lack of a positive shift in the years following the Bush tax cuts occurred despite the economic recovery from the recession in the early part of the period, suggesting that any impact of tax cuts on average hours worked was minimal.

Gale and Potter (2002) estimate that the 2001 tax cut would have little or no net effect on GDP over the next 10 years and could have even reduced it; that is, they find that the negative effect of higher deficits and the decline in national saving would outweigh the positive effect of

reduced marginal tax rates. The intuition behind these results is noteworthy. Gale and Potter (2002) do not show that reductions in tax rates have no effect, or negative effects, on economic behavior. Rather, the improved incentives of reduced tax rates – analyzed in isolation – increase economic activity by raising labor supply, human capital, and private saving. Indeed, these factors are estimated to increase the size of the economy in 2011 by almost 1 percent. But EGTRRA and JGTRRA were sets of tax incentives financed by increased deficits. The key point is that the tax cut reduced public saving (through higher deficits) by more than it increased private saving. As a result, national saving fell, which reduced the capital stock, even after adjusting for international capital flows, and lowered GDP and GNP. Thus, the effects on the deficit are central to the findings.<sup>11</sup>

Based on analysis in Gale and Potter (2002) and Gale and Orszag (2005), the 2001 tax cut raised the cost of capital for investments in residential housing, sole proprietorships, and corporate structures because the higher deficits raised interest rates. By contrast, the cost of capital for corporate equipment fell slightly because the tax act also contained provisions for bonus depreciation that more than offset the rise in interest rates.

It might also be thought that the 2003 tax cut would have more beneficial effects on investment, since it focused on dividend and capital gains tax cuts, but Desai and Goolsbee (2004) argue that the effects were likely to be small and Yagan (2015) presents empirical evidence that the 2003 tax cuts had little impact on investment or employment.

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<sup>11</sup> An earlier study by Engen and Skinner (1996) simulates that a generic 5 percentage point reduction in marginal tax rates would raise annual growth rates by 0.2-0.3 percentage points for a decade. But the tax cut that Engen and Skinner examine is financed by immediate reductions in government consumption, not deficits, and the 5 percentage point drop in effective marginal tax rates that they analyze is roughly 3 (10) times the size of the cut in effective economy-wide marginal tax rates on wages (capital income) induced by EGTRRA and JGTRRA. See Gale and Potter (2002) for additional discussion of the Engen and Skinner results and differences between the tax cuts they analyze and the 2001 and 2003 tax changes.

## B. Tax Reform

If “tax reform” is defined as base-broadening, rate-reducing changes that are neutral with respect to the pre-existing revenue levels and distributional burdens of taxation, then tax reform is a rare event in modern U.S. history. While virtually every commission that looks at tax reform suggests proposals along these lines – see, for example, the Bowles-Simpson National Commission on Fiscal Responsibility and Reform (2010), the Domenici-Rivlin Debt Reduction Task Force (2010), and President Bush’s tax reform commission (President’s Advisory Panel 2005) – policy makers rarely follow through. Indeed, only the Tax Reform Act (TRA) of 1986 would qualify, among all legislative events in the last fifty years. Representative Camp’s recent proposal would also qualify, but of course it has not been enacted.

Auerbach and Slemrod (1997) address numerous features of TRA on economic growth and its components. They suggest that, although there may have been substantial impacts on the timing and composition of economic activity – for example, a reduction in tax sheltering activity – there was little effect on the overall level of economic activity. They conclude that there were small impacts on saving, labor supply, entrepreneurship and other productive activities. Although they do not provide an overall estimate for the impact on economic growth, it seems clear from their conclusions about microeconomic impacts and from the lack of aggregate growth in the data that any growth impact of TRA was quite small. Evidence from one historical episode is always subject to qualification and one-time circumstances. Nevertheless, the Auerbach-Slemrod analysis is important to consider precisely because TRA considerably broadened the tax base and substantially reduced marginal income tax rates, consonant with the very notion of tax reform.

## **V. The Narrative Approach**

In a novel study, Romer and Romer (2010) use the narrative record from Presidential speeches, executive branch documents, and Congressional reports to identify the size, timing, and principal motivation for all major tax policy actions in the post-World War II United States. Focusing on tax changes made to promote long-run growth or to reduce an inherited budget deficit, rather than tax changes made for other reasons (such as to boost the economy in the short run), they find that tax changes have large and persistent effects, with a tax increase of 1 percent of GDP lowering real GDP by roughly 2 to 3 percent over the next several years. That is, they show that exogenous tax cuts can boost the economy in the short term. The impacts are rapid enough – with effects taking place over the first few quarters – to suggest an aggregate demand response, but they may also be long-lived enough – with the effects lasting through 20 quarters – to suggest that supply-side responses may be at work as well. As they note (page 799):

Our results are largely silent concerning whether the output effects operate through incentives and supply behavior or through disposable income and demand stimulus. The persistence of the effects is suggestive of supply effects. But other studies have found that monetary policy, which necessarily works through demand, also has highly persistent output effects (for example, Ben S. Bernanke and Ilian Mihov 1998 and Romer and Romer 2004). The speed of the effects is suggestive of demand effects. But rapid supply responses are not out of the question.

Subsequent work has nested the Romer and Romer framework in the more traditional vector autoregression (VAR) approach to studying the effect of policy changes (monetary and fiscal) on economic outcomes. Favero and Giavazzi (2012) show that when analyzed in a

multivariate VAR, the fiscal multiplier of shocks identified through the narrative method is not different from that obtained through the traditional approach. Using this framework and an average marginal tax rate series constructed by Barro and Redlick (2011), Mertens (2015) estimates that an unanticipated decrease in taxes (associated with an increase of 1 percentage point in the net-of-tax rate) leads to an increase in real GDP of 0.44 percent in the first year and 0.78 percent in the third year, after which it slowly declines in magnitude and loses statistical significance.<sup>12</sup>

This literature represents an important step forward in that it aims to identify tax policies that are exogenous to current economic circumstances, and the papers show convincingly that such tax policies can have short-term effects on the economy. But the literature is clear that it is not addressing long-term effects. Mertens and Ravn (2012), for example, find that “implemented tax cuts, regarding of their timing, have expansionary effects on output...Tax shocks are important impulses *to the U.S. business cycle*” (emphasis added). Hayo and Uhl (2014) use the same framework to study “the short-term macro-economic effects of legislated tax changes” in Germany. Cloyne (2013) follows a similar approach for the United Kingdom and focuses on business cycle issues. Zidar (2015) shows that, over a 4 year period, exogenous tax cuts for low-income households tend to boost subsequent employment growth but that exogenous tax cuts for high-income households tend to have small impacts on employment.

Mertens and Ravn (2010) find that the economy responds in same time frame as the other studies to changes in government spending, but one would not want to draw long-term conclusions about spending and growth from that study.

The same caveat applies to the tax studies. This is especially true because theory (and

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<sup>12</sup> Barro and Redlick (2011) find that taxes affect short-term growth, but they do not examine long-term issues.

simulation analyses, presented below) suggests that empirical findings of economically significant short-term impacts of tax changes on economic activity are not necessarily inconsistent with long-term impacts that are small, zero, or the opposite sign of the short-term effects. As noted above, a reduction in tax rates that increases the government's budget deficit will have negative effects on future economic growth as higher interest rates crowd out economic activity. Whether these future reductions in growth will ultimately outweigh the short-run increases can be considered in a simulation framework, which we discuss in the next section. Thus, the narrative approach, coupled with VAR methodology, represents an important advance in the econometrics of studying the short-term effects of tax policy changes, but the results are not dispositive with respect to the long-term impacts of tax changes on economic growth.

## **VI. Simulations**

Given the various difficulties of empirically estimating the impacts of tax cuts and tax reform using historical data, economists have often turned to simulation analyses to pin down the impacts. The advantage of simulation analysis is the ability to hold other factors constant. The disadvantage is the need to specify a wide variety of features of the economy that may be tangential to tax policy or for which little reliable evidence is available.

### **A. Tax Cuts or Increases**

Formal analyses confirm the intuition developed above that deficit-financed tax cuts are poorly designed to stimulate long-term growth and that tax cuts financed by spending cuts are more likely to have a positive impact on economic growth.

A simple extrapolation based on earlier published results from the Federal Reserve Board model of the U.S. economy implies that a cut in income tax rates that reduces revenues by 1 percent of GDP will raise GDP by just 0.1 percent after 10 years if the Fed follows a Taylor

(1993) rule for monetary policy (Reifschneider et al. 1999).

Elmendorf and Reifschneider (2002) use a large-scale econometric model developed at the Federal Reserve and find that a reduction in taxes that is somewhat similar to the personal income tax cuts in the 2001 law reduces long-term output and has only a slight positive effect on output in the first 10 years.

Auerbach (2002) estimates that a deficit-financed tax cut similar in structure to the 2001 tax cut (which originally was slated to last only until 2010) would reduce the long-term size of the economy if it is financed by tax rate increases after it expires. Even if the deficits are eventually offset partially or wholly by reductions in federal outlays (government consumption in the model), the tax cuts would either reduce the size of the per-capita capital stock or slightly raise it by 0.5 percent in the long-term.

The Congressional Budget Office (CBO) (2001) projected that the 2001 tax legislation may raise or reduce the size of the economy, but the net effect was likely to be less than 0.5 percent of GDP in either direction in 2011, again depending primarily on how the deficit was financed in the long-run. Analysis of the 2003 capital gains tax cuts suggests that the net long-term growth effects are negative – that is, that the negative effects of deficits on capital accumulation outweigh the positive incentive effects of such policies (Joint Committee on Taxation 2003; Macroeconomic Advisers 2003). Similar effects for deficit-financed tax cuts have been found by the Congressional Budget Office (2010).

Diamond and Viard (2008) estimate the effects of a variety of deficit-financed tax cuts, concluding that even when the tax cuts do raise the size of the economy in the long-term, they nonetheless often lower the welfare of members of future generations. That combination can occur because deficit-financed tax cuts can shift fiscal burdens to future generations, who then



have to pay for the tax cuts via higher distortionary taxes. In addition, a switch in tax bases – say, from income to consumption – will impose different burdens on different generations, since the income and consumption have different timing patterns over the life-cycle.

The most comprehensive aggregate analysis of the long-term effects of deficit-financed tax cuts was undertaken by CBO (Dennis et al. 2004). This study examines the effects of a generic 10 percent statutory reduction in all income tax rates, including those applying to dividends, capital gains, and the alternative minimum tax.<sup>13</sup> As Dennis et al. (2004) note in their study, “the reduction in marginal tax rates is large compared with the overall budget cost.” Thus, the positive growth effects of better incentives are large relative the negative growth effects on higher deficits. The study uses three different models to examine the long-term effects: a closed-economy overlapping generations (OLG) model; an open economy OLG model; and the Ramsey model. The authors assume that the tax cuts are financed with deficits for 10 years; then the budget gaps are closed gradually with either by reductions in government consumption or increases in tax rates. Thus, deficits are allowed to build for the first decade of the tax cut and much of the second decade as well.

The results are reported in Table 1. In the three scenarios where the tax cuts are financed in the long run by increases in income taxes, the long-term effects are generally negative. In the Ramsey model and the closed economy overlapping generations (OLG) model, GDP (and GNP) falls significantly. In the open economy OLG model, GDP rises slightly, but GNP falls by even

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<sup>13</sup> The authors do not examine the 2001 and 2003 tax cuts per se. Because the CBO study focuses on “pure” rate cuts, rather than the panoply of additional credits and subsidies enacted in EGTRRA, the growth effects reported probably overstate the impact of making the 2001 and 2003 tax cuts permanent because in EGTRRA, many people did not receive marginal rate cuts and some received higher child credits, which should have induced reductions in labor supply via the income effect. In their analysis, every tax payer receives a reduction in marginal tax rates, so 100 percent of tax payers and taxable income is affected, whereas 20 percent of filers did not receive a tax cut under EGTRRA (Gale and Potter 2002).

more than in the other models. The chain of events creating this outcome is that the tax cuts reduce national saving and hence increase capital inflows. The inflow, in conjunction with increased labor supply, is sufficient to slightly raise (by 0.2 percent) the output produced on American soil. The capital inflows, however, must eventually be repaid and doing so reduces national income (GNP) even though domestic production rises.

Ultimately, of course, future living standards of Americans depend on GNP, not GDP (Elmendorf and Mankiw 1999). GNP represents income accruing to Americans, whereas GDP records production that occurs within the country. In the three scenarios where the tax cuts are financed with cuts in government consumption in the long run, the effects are less negative. In the closed-economy OLG model, there is virtually no effect on growth. In the open-economy OLG model, GDP rises by 0.5 percent in the long-run, but GNP falls by 0.4 percent.

A number of studies suggest that the greater the extent to which tax cuts are financed by contemporaneous spending cuts, the greater the likelihood that the policy change raises economic growth. Auerbach (2002) finds that the larger the share of a tax cut is financed by cuts in contemporaneous government purchases, the larger the impact is on national saving. Foertsch (2004) obtains similar results using Congressional Budget Office models. In the CBO (2004) study cited above, the sole exception to the result that tax cuts lower long-term size of the economy occurs when the tax cuts are financed by reductions in government purchases *and* the policy is run through the Ramsey model, in which case long-term GDP would rise by about 0.8 percent. However, as the authors note, the Ramsey model implies that the reduction in government saving due to the tax cuts in the first decade is matched one-for-one with increases in private saving (Dennis et al. 2004). Empirical evidence rejects this view (see Gale and

Orszag 2004b).<sup>14</sup>

The analysis of tax cuts financed by reductions in government purchases is subject to an important caveat. The models assume that government purchases either represent resources that are destroyed or that government purchases enter utility in a separable fashion from private consumption. For some purposes, like national defense, the latter assumption might be appropriate. In those cases, the cut in spending would reduce households' utility and thus impose welfare costs but would not affect choices at the margin. However, in all of the analyses, it is assumed that there is no investment component of the government purchases – so the analysis would not be representative of the effects of cuts in, for example, education, research and development, or infrastructure investment.

## B. Tax Reform

There is a cottage industry in economics of simulating the impact of broad-based income tax reform on growth. The analysis of tax reform can be broken up conceptually into two distinct parts – how the tax changes affect individual or firm choices regarding the level of work, saving, and investment, and how the changes affect the allocation of such activity across sectors of the economy. There is a long tradition of studies implying that the impact of tax reform on the changing sectoral allocation of resources can be important, starting from Harberger's (1962) classic analysis of the corporate tax and including Fullerton and Henderson (1987), Gravelle and

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<sup>14</sup> Jones et al. (1993) estimate that the removal of all taxes would raise growth substantially. However, Stokey and Rebelo (1995) show that the result is sensitive to a number of parameter choices and that the most defensible parameter values imply that flatter tax rates have little impact on growth. Lucas (1990) obtains a similar result to Stokey and Rebelo (1995).

Kotlikoff (1989), and Diamond and Zodrow (2008).<sup>15</sup>

Lim Rogers (1997) finds that a revenue-neutral shift to a flat-rate income tax with no deductions, exclusions, or credits other than a personal exemption of \$10,000 per filer plus \$5,000 per dependent would raise the long-term size of the economy by between 1.8 and 3.8 percent, depending on assumptions about the relevant behavioral elasticities.

Auerbach et al. (1997) find that moving to the same flat-rate income tax -- i.e., with the personal exemptions noted above -- would *reduce* the size of the economy by 3 percent in the long run. However, Altig et al. (2001) use a similar model to evaluate a more extreme policy reform -- a revenue-neutral switch to a flat income tax -- but with no personal deductions or exemptions. They find that this would raise output immediately by 4.5 percent, and then by another 1 percent over the ensuing 15 years, although it would hurt the poor in current and future generations. The model illustrates two interesting results. First, tax reform can raise the overall size of the economy with a one-time change that puts the economy on a new growth path even if it does not affect the long-term growth *rate*. In this model, the one-time effect of tax reform on the size of the economy dominates the effect on the overall growth rate.

Second, there is often a trade-off between growth and progressivity in that model. However, more recent work has highlighted the role of uncertainty in tax reform, noting that a progressive income tax system provides insurance against fluctuating income by making the percentage variation of after-tax income less than the percentage variation in pre-tax income (Kneiser and Ziliak 2002; Nishiyama and Smetters 2005). This finding may change the terms of

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<sup>15</sup> The Congressional Budget Office (2005; 2006) published estimates of how effective tax rates vary across types of capital assets. The studies do not report the welfare effects of tax reform, but do provide evidence that the tax code favors some sectors of the economy over others.

the trade-off between progressivity and growth effects.

The most recent example of simulation of comprehensive tax reform is the Joint Committee on Taxation's (2014) analysis of the Camp plan. The JCT offers eight different scenarios depending on how the Federal Reserve responds, the underlying model of the economy used, and assumptions about behavioral elasticities. They find that Camp's plan would raise the size of the economy from 0.1 percent to 1.6 percent over the next 10 years, with the results depending heavily on the model used and the assumptions made about monetary policy.

## **VII. Conclusion**

Both changes in the level of revenues and changes in the structure of the tax system can influence economic activity, but not all tax changes have equivalent, or even positive, effects on long-term growth.

The argument that income tax *cuts* raise growth is repeated so often that it is sometimes taken as gospel. However, theory, evidence, and simulation studies tell a different and more complicated story. Tax cuts offer the potential to raise economic growth by improving incentives to work, save, and invest. But they also create income effects that reduce the need to engage in productive economic activity, and they may subsidize old capital, which provides windfall gains to asset holders that undermine incentives for new activity. In addition, tax cuts as a stand-alone policy (that is, not accompanied by spending cuts) will typically raise the federal budget deficit. The increase in the deficit will reduce national saving -- and with it, the capital stock owned by Americans and future national income -- and raise interest rates, which will negatively affect investment. The net effect of the tax cuts on growth is thus theoretically uncertain and depends on both the structure of the tax cut itself and the timing and structure of its financing.

Several empirical studies have attempted to quantify the various effects noted above in different ways and used different models, yet mostly come to the same conclusion: Long-persisting tax cuts financed by higher deficits are likely to reduce, not increase, national income in the long term. By contrast, cuts in income tax rates that are financed by spending cuts can have positive impacts on growth, according to the simulation models. In modern United States history, however, major tax cuts (in 1964, 1981, and 2001/2003) have been accompanied by increases in federal outlays rather than cutbacks.

The effects of income tax *reform* – revenue- and distributionally-neutral base-broadening, rate-reducing changes – build off of the effects of tax cuts, but are more complex. The effects of reductions in rates are the same as above. Broadening the base in a revenue-neutral manner will eliminate the effect of rate cuts on budget deficits. It will also reduce the impact of the rate cuts on effective marginal tax rates and thus reduce the impact on labor supply, saving, and investment. However, broadening the base will have one other effect as well; by reducing the extent to which the tax code subsidizes alternative sources and uses of income, base-broadening will reallocate resources toward their highest-value economic use and hence will raise the overall size of the economy and result in a more efficient allocation of resources.

These effects can be big in theory and in simulations, especially for extreme policy reforms such as eliminating all personal deductions and exemptions and moving to a flat-rate tax. But there is little empirical analysis of broad-based income tax reform in the United States, in part because there has only been one major tax reform in the last fifty years. Still, there is a sound theoretical presumption – and substantial simulation results – indicating that a base-broadening, rate-reducing tax reform can improve long-term performance. The key, however, is not that it boosts labor supply, saving, or investment – since it raises the same amount of revenue

from the same people as before – but rather that it leads to be a better allocation of resources across sectors of the economy by closing off targeted subsidies.

An admittedly less than fully scientific source of evidence is simply asking economists what they think. In a survey of 134 public finance and labor economists, the estimated median effect of the Tax Reform Act of 1986 on the long-term size of the economy was 1 percent (Fuchs et al. 1998). Note that TRA 86 did not reduce public saving, so the growth effect was entirely due to changes in marginal tax rates and the tax base. The median response also suggested that the 1993 tax increases had no effect on economic growth. The 1993 act raised tax rates on the highest income households, but also reduced the deficit and thereby increased national saving.

One strong finding from all of the analysis is that not all tax changes will have the same impact on growth. Reforms that improve incentives, reduce existing subsidies, avoid windfall gains, and avoid deficit financing will have more auspicious effects on the long-term size of the economy, but in some cases may also create trade-offs between equity and efficiency.

These findings illustrate both the potential benefits and the potential perils of income tax reform on long-term economic growth.

Table 1. Long-Term Effects of a Deficit-Financed 10 Percent Cut in Income Tax Rates

(Percentage Change in GDP and GNP)<sup>a</sup>

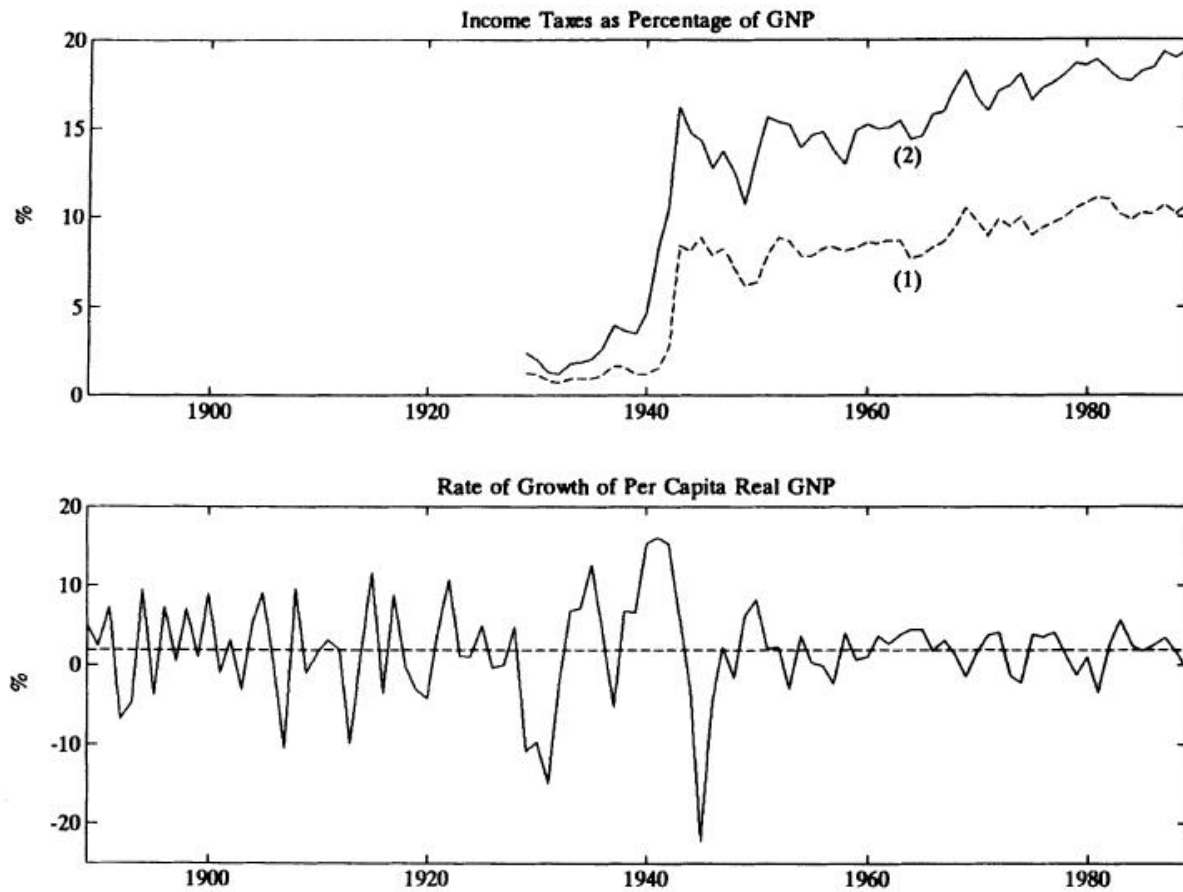
Model	Financed in the long-run by:			
	Cuts in Spending		Increase in Income Tax Rates	
	GDP	GNP	GDP	GNP
OLG-Closed <sup>b</sup>	-0.1	-0.1	-1.5	-1.5
OLG-Open	0.5	-0.4	0.2	-2.1
Ramsey <sup>b</sup>	0.8	0.8	-1.2	-1.2

<sup>a</sup> Source: Dennis et al. (2004).

<sup>b</sup> GNP and GDP are the same in these models



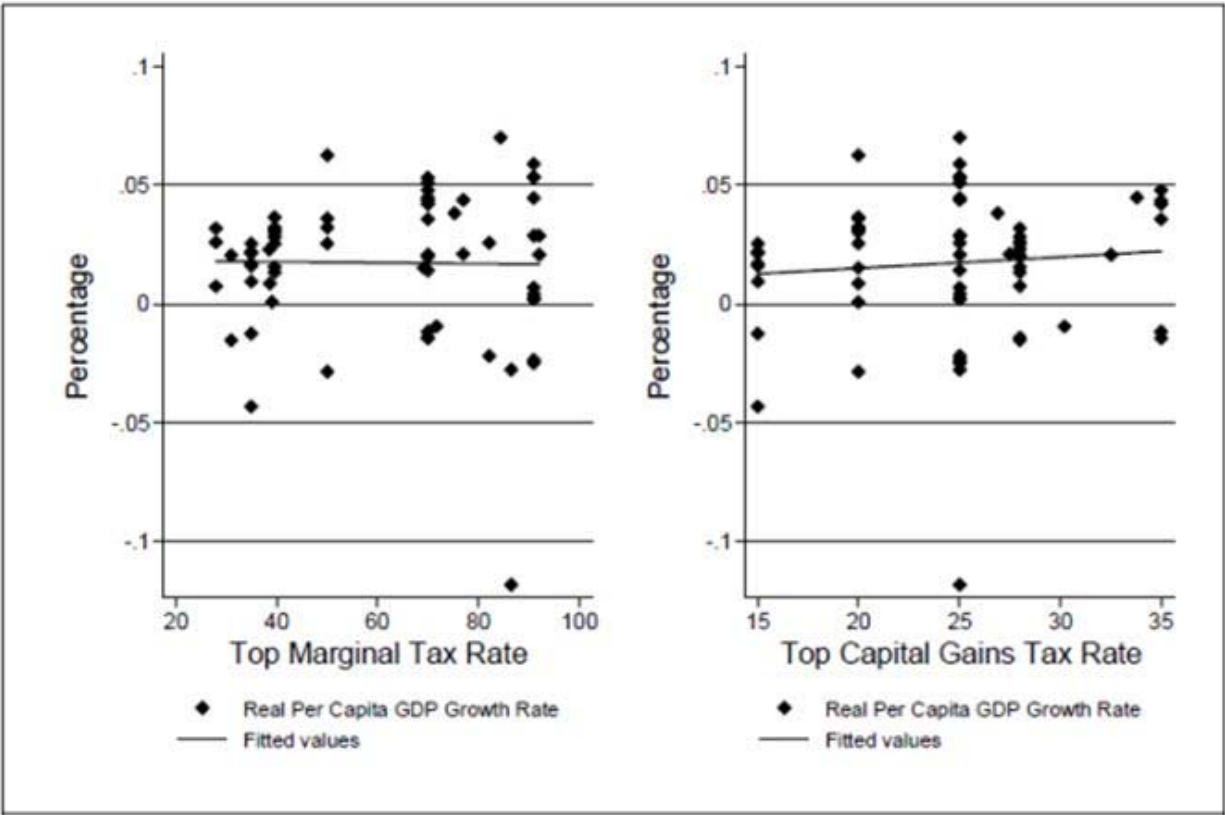
Figure 1. Taxes as a Share of GNP and Growth of Real GNP per Capita



Source: Stokey and Rebelo (1995)

Note: In the top graph, line 1 consists of federal, state, and local individual income taxes. Line 2 adds social security and retirement taxes as well as federal corporate taxes.

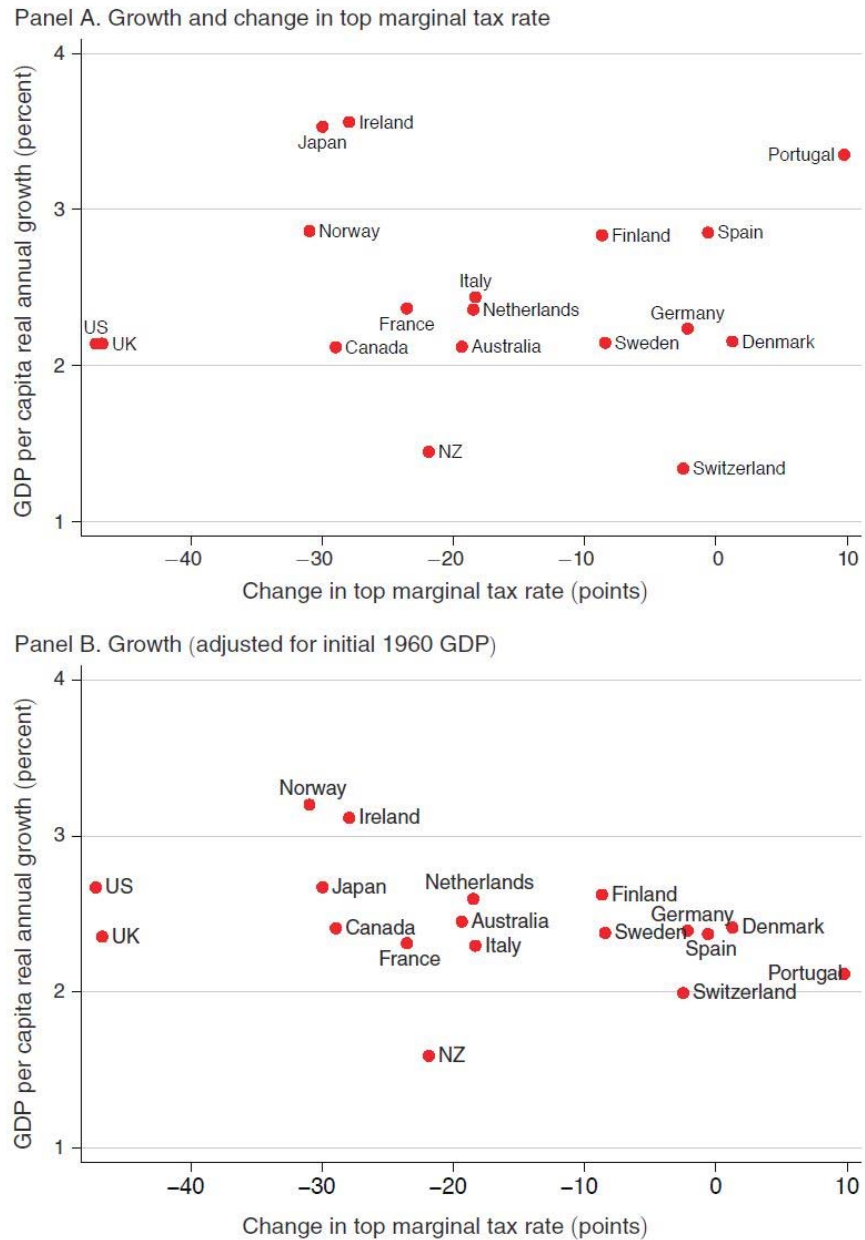
Figure 2. Real Per Capita GDP Growth Rate and Top Tax Rates, 1945-2010



Source: Hungerford (2012)

Note: The vertical axis is the real per capita GDP growth rate.

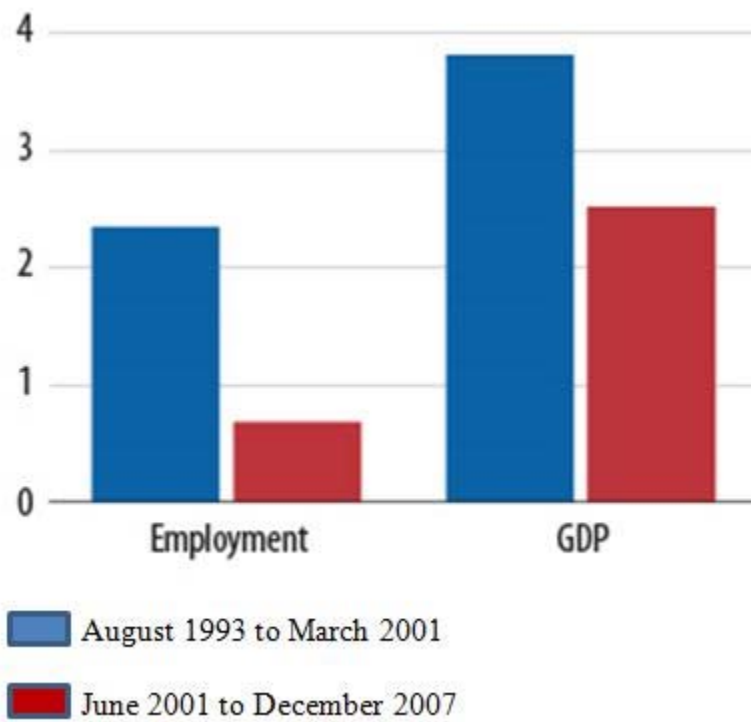
Figure 3. Economic Growth Rates and Top Marginal Tax Rates, 1960-2010



Source: Piketty, Saez, and Stantcheva (2014)

Note: The figure depicts the average real GDP per capita annual growth rate from 1960-1964 to 2006-2010 plotted against the change in the top marginal tax rate. Panel A considers the raw growth rate while panel B controls for initial real GDP per capita as of 1960.

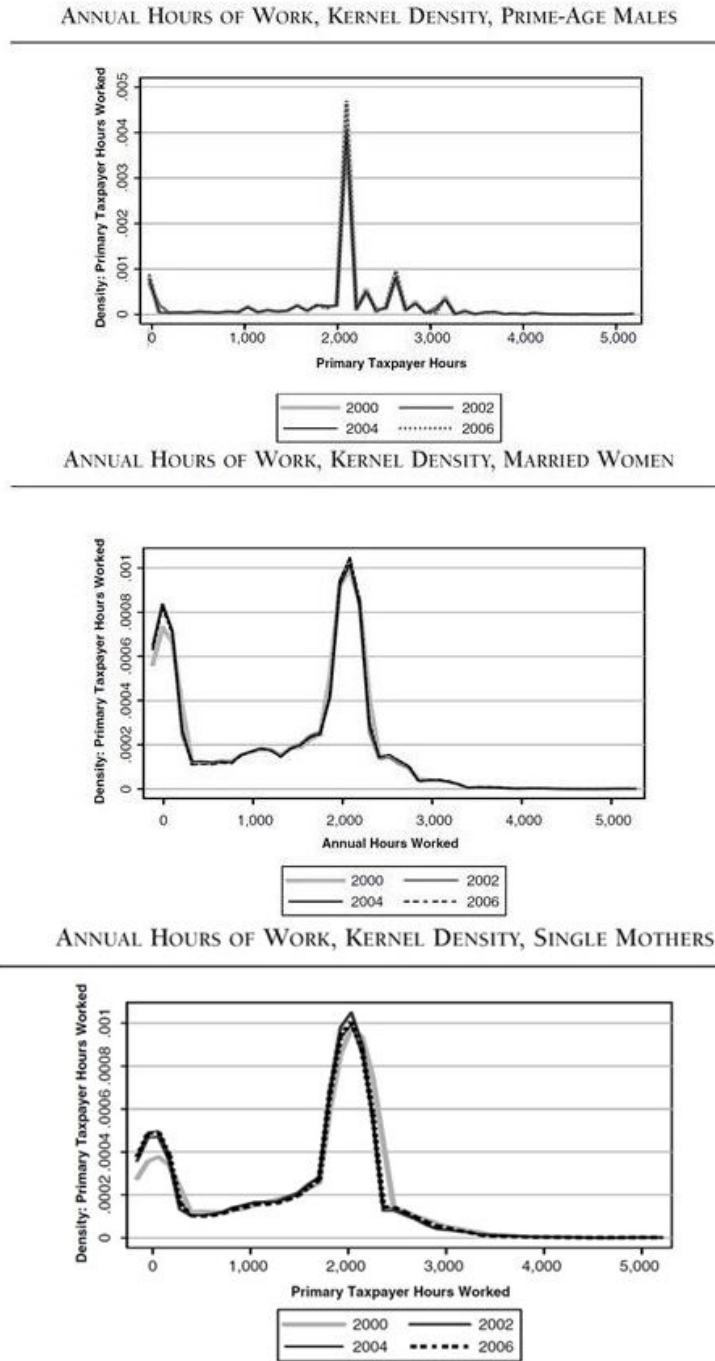
Figure 4. Employment and GDP Growth Following the 1993 Tax Increases and the 2001 Tax Cuts



Source: Huang (2012)

Note: The vertical axis is the average annual growth rate during the time period

Figure 5. Changes in Annual Hours of Work Around the Tax Cuts in 2001 and 2003



Source: Eissa (2008), using the March Current Population Surveys, 2001 – 2007.

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