Taxes and the Economy: An Economic Analysis of the Top Tax Rates Since 1945 (Updated)

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Summary

Income tax rates are at the center of many recent policy debates over taxes. Some policymakers argue that raising tax rates, especially on higher income taxpayers, to increase tax revenues is part of the solution for long-term debt reduction. For example, in the 112th Congress the Senate passed the Middle Class Tax Cut (S. 3412), which would allow the 2001 and 2003 Bush-era tax cuts to expire for taxpayers with income over $250,000 ($200,000 for single taxpayers). Other policymakers argue that maintaining low tax rates is necessary to foster economic growth. For example, the House passed the Job Protection and Recession Prevention Act of 2012 (H.R. 8), which would extend the 2001 and 2003 Bush-era tax cuts for one year. The Senate also considered legislation, the Paying a Fair Share Act of 2012 (S. 2230), that would implement the so-called "Buffett rule" by raising the tax rate on high-income taxpayers.

Advocates of lower tax rates argue that reduced rates would increase economic growth, increase saving and investment, and boost productivity (increase the size of the economic pie). Skeptics of this view argue that higher tax revenues are necessary for debt reduction, that tax rates on high-income taxpayers are too low (i.e., they violate the "Buffett rule"), and that higher tax rates on high-income taxpayers would moderate increasing income inequality (change how the economic pie is distributed across families). This report attempts to explore whether or not there is any evidence of an association between the tax rates of the highest income taxpayers and economic growth. The analysis in this report does not provide a comprehensive model to examine all the determinants of economic growth. Data are analyzed to illustrate the association between the tax rates of the highest income taxpayers and measures of economic growth. For an overview of the broader issues of these relationships see CRS Report R42111, *Tax Rates and Economic Growth*, by Jane G. Gravelle and Donald J. Marples, *Tax Rates and Economic Growth*, by Jane G. Gravelle and Donald J. Marples.

Throughout the late-1940s and 1950s, the top marginal tax rate was typically above 90%; today it is 35%. Additionally, the top capital gains tax rate was 25% in the 1950s and 1960s, 35% in the 1970s; today it is 15%. The real GDP growth rate averaged 4.2% and real per capita GDP increased annually by 2.4% in the 1950s. In the 2000s, the average real GDP growth rate was 1.7% and real per capita GDP increased annually by less than 1%. This analysis finds no conclusive evidence, however, to substantiate a clear relationship between the 65-year reduction in the top statutory tax rates and economic growth. Analysis of such data conducted for this report suggests the reduction in the top tax rates has had little association with saving, investment, or productivity growth. It is reasonable to assume that a tax rate change limited to a small group of taxpayers at the top of the income distribution would have a negligible effect on economic growth. For instance, the tax revenue projected from allowing the top tax rates to rise to their pre-2001 levels is $49 billion for 2013 or 0.3% of projected 2013 gross domestic product.

The top tax rate reductions appear to be associated with the increasing concentration of income at the top of the income distribution. The share of income accruing to the top 0.1% of U.S. families increased from 4.2% in 1945 to 12.3% by 2007 before falling to 9.2% during to the 2007-2009 recession. During a portion of that time period, however, the share of the tax burden borne by top taxpayers increased. For instance, the top 0.1% of taxpayers paid 9.4% of all income taxes in 1996 and 11.8% in 2006, but their share of income paid in taxes decreased from 33% in 1996 to 25% in 2006.

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I f current fiscal policies continue, the United States could be facing a debt level approaching 200% of gross domestic product (GDP) by 2037.[1] The current policy challenge is a trade-off between the benefits of beginning to address the long-term debt situation and risking damage to a still fragile economy by engaging in contractionary fiscal policy.[2] In the long term, many argue that debt reduction will eventually become the top priority. Ultimately, debt reduction would require increased tax revenues, reduced government spending, or a combination of the two. If increased tax revenue is part of long-term deficit reduction, expanding the tax base, raising tax rates, or a combination of the two would be required.

Income tax rates are at the center of many recent policy debates over taxes. On the one hand, some argue that raising tax rates, especially on higher income taxpayers, to increase tax revenues is part of the solution for long-term debt reduction. For example, in the 112th Congress the Senate passed the Middle Class Tax Cut Act (S. 3412), which would allow the 2001 and 2003 Bush-era tax cuts to expire for taxpayers with income over $250,000 ($200,000 for single taxpayers).[3] On the other hand, others argue that maintaining low tax rates is necessary to foster economic growth. For example, the House passed the Job Protection and Recession Prevention Act of 2012 (H.R. 8), which would extend the 2001 and 2003 Bush-era tax cuts for one year.[4] Additionally, some argue that higher income tax rates on high income taxpayers could make the overall tax system more progressive.[5] The Senate also considered legislation, the Paying a Fair Share Act of 2012 (S. 2230), that would implement a version of the "Buffett rule" by raising the tax rate on high-income taxpayers.[6]

Other recent budget and deficit reduction proposals would reduce tax rates. The President's 2010 Fiscal Commission recommended reducing the budget deficit and tax rates by broadening the tax base—the additional revenues from broadening the tax base would be used for deficit reduction and tax rate reductions.[7] The plan advocated by House Budget Committee Chairman Paul Ryan, the *Path to Prosperity*, also proposes to reduce income tax rates by broadening the tax base. Both plans would broaden the tax base by reducing or eliminating tax expenditures.[8]

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[1] Congressional Budget Office (CBO), *The 2012 Long-term Budget Outlook*, June 2012.

[2] See CRS Report R41849, *Can Contractionary Fiscal Policy Be Expansionary?*, by Jane G. Gravelle and Thomas L. Hungerford.

[3] See CRS Report R42020, *The 2001 and 2003 Bush Tax Cuts and Deficit Reduction*, by Thomas L. Hungerford for an analysis of the tax cuts, which are often referred to as the Bush-era tax cuts.

[4] These tax cuts were extended in 2010 for two years with the enactment of the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 (P.L. 111-312), which was signed by President Obama on December 17, 2010.

[5] Peter Diamond and Emmanuel Saez, "The Case for a Progressive Tax: From Basic Research to Policy Recommendations," *Journal of Economic Perspectives*, vol. 25, no. 4 (Fall 2011), pp. 165-190. The progressivity of a tax system refers to the degree the average tax rate changes as income increases. If the average tax rate increases as income increases, then the tax system is said to be progressive.

[6] See CRS Report R42043, *An Analysis of the "Buffett Rule"*, by Thomas L. Hungerford. Generally, the "Buffett rule" refers to a policy mandate that no household making over $1 million annually should pay a smaller share of its income in taxes than middle-class families pay.

[7] The National Commission on Fiscal Responsibility and Reform, *The Moment of Truth*, December 2010 available at http://www.fiscalcommission.gov/sites/fiscalcommission.gov/files/documents/TheMomentofTruth12_1_2010.pdf.

[8] For more information on tax expenditures, see CRS Report RL34622, *Tax Expenditures and the Federal Budget*, by Thomas L. Hungerford; and Thomas L. Hungerford, "Tax Expenditures: Good, Bad, or Ugly?," *Tax Notes*, vol. 113, no. 4 (October 23, 2006), pp. 325-334. Recent analysis suggests that there are impediments to base broadening by modifying tax expenditures, which would not allow for significant reductions in tax rates. See CRS Report R42435, *The Challenge of Individual Income Tax Reform: An Economic Analysis of Tax Base Broadening*, by Jane G. Gravelle (continued...)

Advocates of lower statutory tax rates argue that reduced rates would increase economic growth, increase saving and investment, and boost productivity. Skeptics of this view argue that higher tax revenues are necessary for debt reduction, that tax rates on high-income taxpayers are too low (i.e., they violate the "Buffett rule"), and that higher tax rates on high-income taxpayers would moderate increasing income inequality. This report examines top statutory individual income tax rates since 1945 in relation to these arguments and seeks to explore what, if any, association exists between the top statutory tax rates and economic growth.[9] The analysis examines the correlation between the top tax rates and economic growth rather than the causal relationship. The nature of these relationships, if any, is explored using statistical analysis.[10]

The analysis is limited to the post-World War II period. Using this period provides an adequate sample for the multivariate regression analysis that is used to examine correlation. The top statutory tax rates are examined because the current Congressional debate over the fate of the 2001 and 2003 Bush-era tax cuts focuses on the statutory tax rates affecting the highest income taxpayers. For an overview of the broader issues of these relationships see CRS Report R42111, *Tax Rates and Economic Growth*, by Jane G. Gravelle and Donald J. Marples.

Top Tax Rates Since 1945

Tax policy analysts often use two concepts of tax rates. The first is the marginal tax rate or the tax rate on the last dollar of income. If a taxpayer's income were to increase by $1, the marginal tax rate indicates what proportion of that dollar would be paid in taxes. The highest marginal tax rate is referred to as the top marginal tax rate. How much an additional dollar is taxed depends on if it is ordinary income (e.g., wages) or capital gains. The second concept of tax rates is the average or effective tax rate, which is the proportion of all income that is paid in taxes. An examination of the trend in the average tax rate provides information on how the tax burden has changed over time.

Although the statutory top marginal tax rate was over 90% in the 1950s, the average tax rate for the highest income taxpayers was much lower. The average tax rates at five-year intervals since 1945 for the top 0.1% and top 0.01% of taxpayers are shown in **Figure 1**. The average tax rate for the top 0.01% (one taxpayer in 10,000) was about 60% in 1945 and fell to 24.2% by 1990. The average tax rate for the top 0.1% (one taxpayer in 1,000) was 55% in 1945 and also fell to 24.2% by 1990, following a similar downward path as the tax rate for the top 0.01%. Between 1990 and 1995, the average tax rate for both the top 0.1% and top 0.01% increased to about 31%. After 1995, the average tax rate for the top 0.01% was lower than that for the top 0.1%. The reductions in the average tax rates are likely due to both to reductions in the statutory tax rates and changes in the tax base.

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and Thomas L. Hungerford.

[9] The analysis in this report does not examine the effect of taxes on individual components of the economy and its growth, such as small businesses. For a discussion of how the expiration of the Bush-era tax cuts could effect small business see CRS Report R41392, *Small Business and the Expiration of the 2001 Tax Rate Reductions: Economic Issues*, by Jane G. Gravelle and Sean Lowry.

[10] Finding a correlation between two variables does not mean that a change in one variable causes the other variable to change.

Figure 1. Average Tax Rates for the Highest-Income Taxpayers, 1945-2009
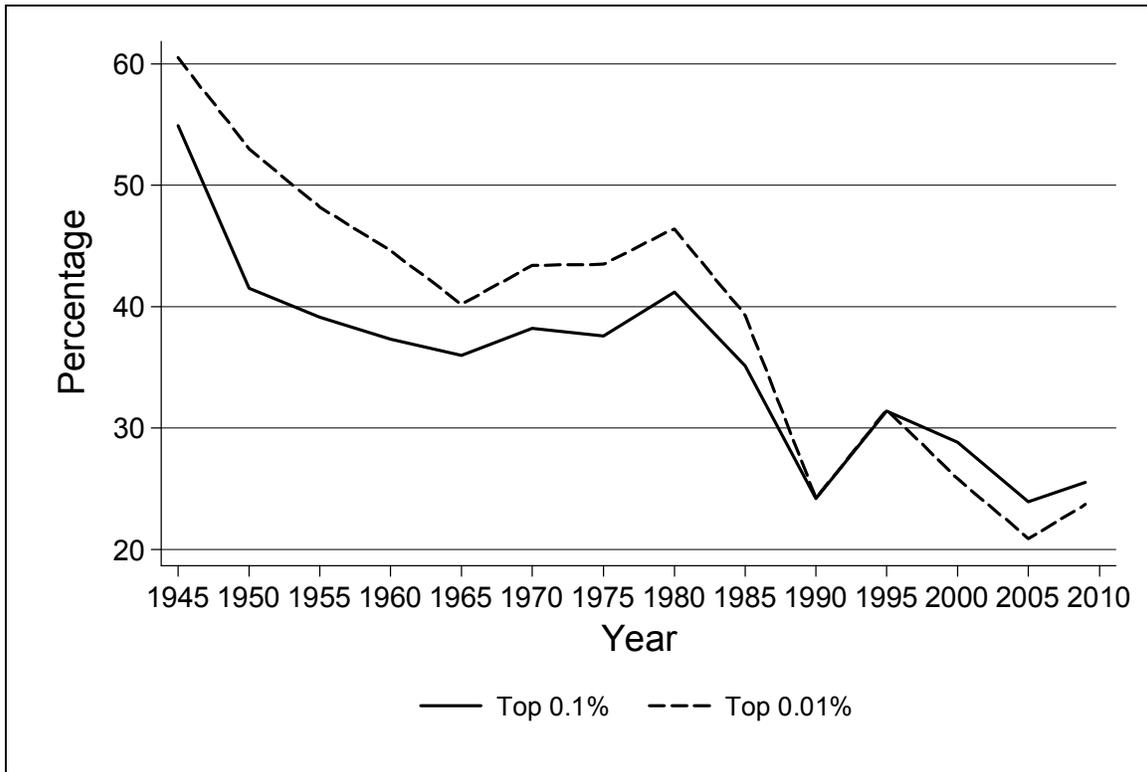
Note: The vertical axis is the average tax rate.

The trends in the statutory top marginal tax rate and the top capital gains tax rate are displayed in **Figure 2**. The general trend for the top marginal tax rate has been downward since 1945 (the higher, solid line in the figure). It fell from 94% in 1945 to 91% in the 1950s and 70% in the 1960s and 1970s to a low of 28% after the enactment of the Tax Reform Act of 1986 (TRA86; P.L. 99-514).[11] The top marginal tax rate subsequently increased to 39.6% in the 1990s, before being reduced to its current level of 35% by the Economic Growth and Tax Relief Reconciliation Act of 2001 (EGTRRA; P.L. 107-16).

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[11] In the 1970s, the top marginal tax rate on earned income was capped at 50%; only unearned income (e.g., interest and dividends) faced the 70% top marginal tax rate.

Figure 2. Top Marginal Tax Rate and Top Capital Gains Tax Rate, 1945-2010
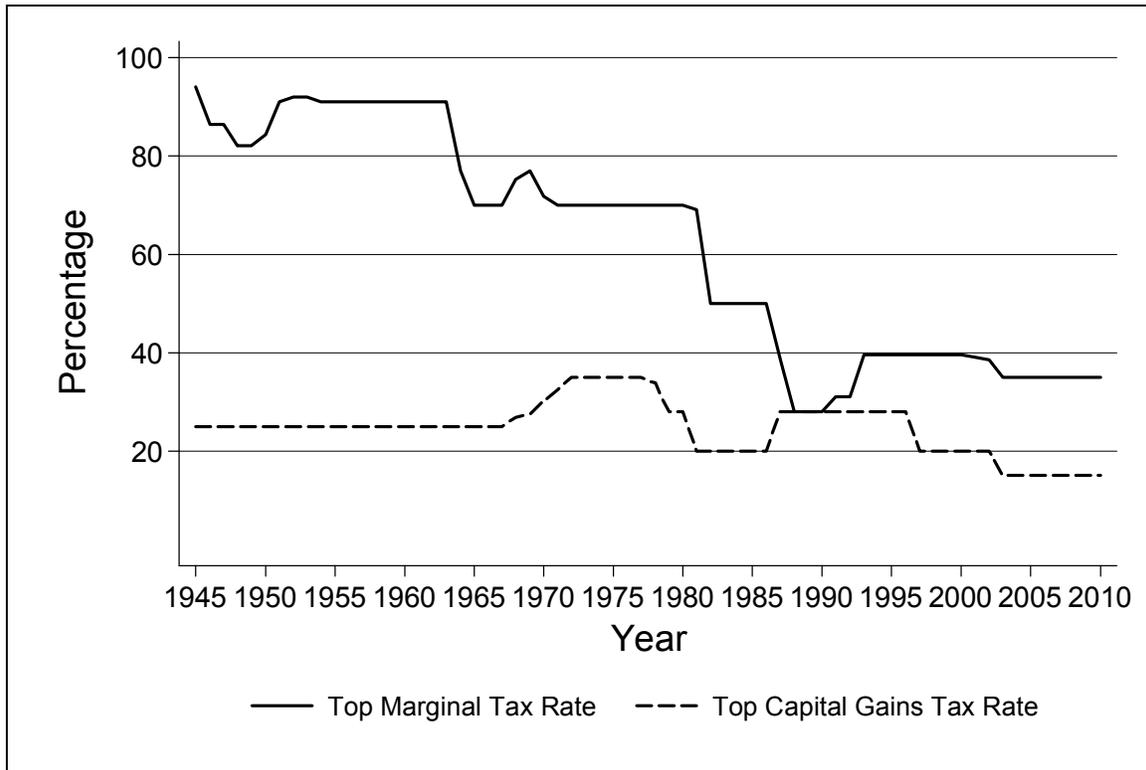
The variation in the top capital gains tax rate since 1945 has been much lower and there appears to be no distinctive trend (the lower, dashed line). The top capital gains tax rate was 25% before 1965, was raised to 35% in the 1970s, fell to 20% in the early 1980s, and rose to 28% after the enactment of TRA86. The rate was reduced to its current level of 15% (from 20%) by the Jobs and Growth Tax Relief Reconciliation Act of 2003 (JGTRRA; P.L. 108-27). The top capital gains tax rate is scheduled to return to 20% at the end of 2012.

Top Statutory Tax Rates and the Economy

Some economists and policymakers argue that reducing the top statutory marginal tax rates would spur economic growth.[12] This effect could work through several mechanisms. First, lower tax rates could give people more after-tax income that could be used to purchase additional goods and services.[13] This is a demand-side argument and is often invoked to support a temporary tax reduction as an expansionary fiscal stimulus. Second, reduced tax rates could boost saving and

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[12] See, for example, The National Commission on Fiscal Responsibility and Reform, *The Moment of Truth*, December 2010, p. 28. Support for this assertion often comes from theoretical textbook treatments, such as Robert J. Barro, *Macroeconomics*, 2nd ed. (New York: John Wiley & Sons, 1984).

[13] Recent research suggests that "the relationship between upper income tax changes and growth is negligible in magnitude and substantially weaker than equivalently sized tax changes for the bottom 90%." See Owen Zidar, *Tax Cuts for Whom? Heterogeneous Effects of Income Tax Changes on Growth & Employment*, University of California, Berkeley, October 2012, p. 20, http://ssrn.com/abstract=2112482.

investment, which would affect the supply side of the economy by increasing the productive capacity of the economy.[14] Furthermore, some argue that reduced tax rates increase labor supply by increasing the after-tax wage rate. Some of the evidence, however, suggests that labor supply responses to wage and tax changes are small for both men and women in the United States; this evidence is reviewed by the Congressional Budget Office.[15] To the extent that these mechanisms are valid, it is expected that there would be an inverse relationship between the top tax rates and saving, investment, productivity growth, and real per capita GDP growth. These relationships provide the theoretical motivation for the empirical analysis discussed below.

Methods

Two methods are employed to examine the correlation between the top statutory tax rates and the various measures of economic growth. In both cases, the correlation between two variables is determined; causation, whether changes in one variable cause the other variable to change, is not determined. The top statutory tax rates are marginal tax rates—they indicate the proportion of an additional dollar of income that is paid in federal income tax. Economic theory posits that it is the marginal tax rate, not the average (effective) tax rate, that affects decisions regarding work, saving, and investment.[16] The average tax rate has not varied much from its mean of 14% since 1960 while economic growth has varied dramatically from year to year suggesting little relationship between the two.[17]

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[14] See CRS Report R42111, *Tax Rates and Economic Growth*, by Jane G. Gravelle and Donald J. Marples for a discussion of these issues.

[15] Robert McClelland and Shannon Mok, *A Review of Recent Research in Labor Supply Elasticities*, CBO working paper 2012-12, October 2012. The evidence comes from many studies using different data sources and different statistical specifications. See, for example, Costas Meghir and David Phillips, "Labour Supply and Taxes," in *Dimensions of Tax Design: The Mirrlees Review*, ed. Stuart Adams and others (Oxford: Oxford University Press, 2010), pp. 202-274; Robert A. Moffitt and Mark O. Wilhelm, "Taxation and the Labor Supply Decisions of the Affluent," in *Does Atlas Shrug? The Economic Consequences of Taxing the Rich*, ed. Joel B. Slemrod (Cambridge, MA: Harvard University Press, 2000), pp. 193-239; Francine D. Blau and Lawrence M. Kahn, "Changes in the Labor Supply Behavior of Married Women: 1980-2000," *Journal of Labor Economics*, vol. 25, no. 3 (2007), pp. 393-438; Bradley T. Heim, "The Incredible Shrinking Elasticities: Married Female Labor Supply, 1978-2002," *Journal of Human Resources*, vol. 42, no. 4 (Fall 2007), pp. 881-918; and Kelly Bishop, Bradley Heim, and Kata Mihaly, "Single Women's Labor Supply Elasticities: Trends and Policy Implications," *Industrial and Labor Relations Review*, vol. 63, no. 1 (October 2009), pp. 146-168. Some economists, however, argue that labor supply responses are much larger. These responses are often determined from a specific type of equilibrium macroeconomic model (such as the real business cycle model) parameter that is calibrated to match fluctuations in unemployment over the business cycle. The size of the parameter depends on functional form assumptions. See, for example, Michael Keane, "Labor Supply and Taxes: A Summary," *Journal of Economic Literature*, vol. 49, no. 4 (December 2011), pp. 961-1075; and Michael Keane and Richard Rogerson, "Micro and Macro Labor Supply Elasticities: A Reassessment of Conventional Wisdom," *Journal of Economic Literature*, vol. 50, no. 2 (June 2012), pp. 464-476. For contrary evidence, see Raj Chetty, Adam Guren, and Dayanand S. Manoli, et al., *Does Indivisible Labor Explain the Difference Between Micro and Macro Elasticities? A Meta-Analysis of Extensive Margin Elasticities*, National Bureau of Economic Research, Working paper 16729, January 2011. Edward C. Prescott, "Why Do American Work So Much More Than Europeans?," *Federal Reserve Bank of Minneapolis Quarterly Review*, vol. 28, no. 1 (July 2004), pp. 2-13, using cross-national data, attributes differences in labor supply between Americans and Europeans to differences in marginal tax rates. However, Alberto F. Alesina, Edward L. Glaser, and Bruce Sacerdote, "Work and Leisure in the United States and Europe: Why So Different?," in *NBER Macroeconomics Annual 2005*, ed. Mark Gertler and Kenneth Rogoff, vol. 20 (Cambridge, MA: MIT Press, 2006), pp. 1-64 attribute the cross-national labor supply differences mainly to differences in unionization and labor market regulations.

[16] See, for example, Richard A. Musgrave, *The Theory of Public Finance: A Study in Public Economy* (New York: McGraw-Hill Book Company, Inc., 1959).

[17] The standard deviation of the average tax rate is 1.2. The average marginal tax rate (the average of the marginal tax (continued...)

The first method is to estimate the simple bivariate correlation or relationship.[18] The simple bivariate relationship is illustrated with a series of scatter diagrams in which each point represents the top statutory tax rate and a measure of economic growth for a particular year (from 1945 to 2010).

The second method is multivariate time-series regression analysis, which estimates the relationship between two variables holding the values of other variables constant. The regression equations that are estimated have been used by other researchers and are described in the **Appendix**.

The research and analysis presented in this report seeks to explore what, if any, association exists between the top statutory tax rates and economic growth. The analysis in this report does not provide a comprehensive model to examine all the determinants of economic growth. The data used for the analysis includes information from 1945 to 2010 and contain 66 observations.[19] Common issues often associated with time-series analysis are addressed as described in the **Appendix**.

Saving and Investment

Some analysts caution against a low saving rate. They argue that high capital investment leads to higher economic growth and a higher future standard of living. But if capital investment is not financed by national saving it has to be financed by borrowing abroad.[20] Persistent borrowing from abroad builds up international liabilities and implies increasing flow of funds will be sent abroad as interest and dividends.

National saving is composed of two components: private saving and public saving. Private saving is the saving by households and businesses while public saving is the budget surpluses of local, state, and federal governments. If spending is greater than income, then saving is negative (i.e., people are reducing wealth or borrowing).

From a theoretic economic perspective, the effect of taxes on private saving is ambiguous. If taxes are reduced, the after-tax return on saving is larger; consequently, individuals may be able to maintain a target level of wealth and save less (wealth will grow due to the higher after-tax returns). This is the income effect and has lower taxes leading to less saving. However, the reduced after-tax return changes the relative price of consuming now (saving less) and future consumption (saving more) in favor of future consumption. This is the substitution effect and has lower taxes leading to more saving. The actual effect of a tax reduction depends on the relative magnitudes of the income and substitution effects.[21]

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rate of all taxpayers) has also varied within a narrow band around 15% since 1960 (standard deviation is 2.4). The average tax rate and average marginal tax rate are available at http://users.nber.org/~taxsim/allyup.

[18] Correlation, relationship, and association are used interchangeably in this report.

[19] The use of other data sets and methods may result in different conclusions. The results of the analysis in this report are generally consistent with some but not all of the literature in this area, which is cited throughout this report.

[20] Edward Gramlich, "The Importance of Raising National Saving," the Benjamin Rush Lecture, Dickinson College, PA., March 2, 2005.

[21] See Richard A. Musgrave, *The Theory of Public Finance: A Study in Public Economy* (New York: McGraw-Hill Book Company, 1959).

The simple relationships between the private saving ratio and the top tax rates are displayed in the top two charts in **Figure 3**.[22] Each point represents the private saving ratio and top tax rate for each year since 1945. The nature of the relationship is illustrated by the straight line in the figure, which graphically represents the correlation (fitted relationship or fitted values) between the two variables.[23] The slope of the fitted values line indicates how one variable changes when the other variable changes. For both the top statutory marginal tax rate and the top statutory capital gains tax rate there seems to be a positive relationship—the higher the tax rate, the higher the saving ratio. The observed correlation between the tax rates and the saving ratio, however, could be coincidental or spurious. To explore these relationships further, CRS conducted a regression analysis (see **Table A-1**) controlling for other factors affecting saving and paying particular attention to the statistical properties of the variables. Results of the regression analysis suggest that the relationship observed in **Figure 3** is likely coincidental (and not statistically significant)—suggesting the top statutory tax rates are not associated with private saving.[24] Other research suggests that taxes generally have had a negligible effect on private saving.[25] But public saving can be reduced if tax revenue is reduced due to tax rate reductions. The overall effect of tax reductions on national saving could be negative—that is, national saving falls.[26]

Taxes can affect investment not only through the income and substitution effects related to saving, but also through a risk-taking effect. The capital gains tax rate has been singled out as being important to investment. For risk-averse investors, the capital gains tax could act as insurance for risky investments by reducing the losses as well as the gains—it decreases the variability of investment returns.[27] Consequently, a rise in the capital gains top rate could increase investment because of reduced risk.

The bottom charts in **Figure 3** show the observed relation between the private fixed investment ratio (investment divided by potential GDP) and the top tax rates. The fitted values suggest there is a negative relationship between the investment ratio and top tax rates. But regression analysis does not find the correlations to be statistically significant (see **Table A-1**) suggesting that the top statutory tax rates do not necessarily have a demonstrably significant relationship with investment.[28]

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[22] The saving ratio is the ratio of private saving to potential GDP (the level of GDP attainable when resources are fully employed). Potential GDP is used rather than actual GDP so variation in the saving ratio is due mostly to changes in private saving rather than to changes in private saving and/or GDP.

[23] The fitted values are the points on the straight line that best characterize the relationship between two variables.

[24] The regression results are reported in **Table A-1**. Also see CRS Report R42111, *Tax Rates and Economic Growth*, by Jane G. Gravelle and Donald J. Marples.

[25] Eric Engen, Jane Gravelle, and Kent Smetters, "Dynamic Tax Models: Why They Do the Things They Do," *National Tax Journal*, vol. 50, no. 3 (September 1997), pp. 631-656; Organisation for Economic Co-operation and Development, *Tax and the Economy: A Comparative Assessment of OECD Countries*, Tax Policy Studies No. 6, 2001; and B. Douglas Bernheim, "Taxation and Saving," in *Handbook of Public Economics*, ed. Alan J. Auerbach and Martin Feldstein, vol. 3 (Amsterdam: Elsevier, 2002), p. 1173-1249.

[26] See Edward F. Denison, *Trends in American Economic Growth, 1929-1982* (Washington: The Brookings Institution, 1985); and CRS Report RL33482, *Saving Incentives: What May Work, What May Not*, by Thomas L. Hungerford.

[27] Leonard F. Burman, *Labyrinth of Capital Gains Tax Policy: A Guide for the Perplexed* (Washington: Brookings Institution Press, 1999).

[28] For further evidence see CRS Report R42111, *Tax Rates and Economic Growth*, by Jane G. Gravelle and Donald J. Marples; and Christina D. Romer and David H. Romer, *The Incentive Effects of Marginal Tax Rates: Evidence from the Interwar Era*, National Bureau of Economic Research, Working Paper 17860, February 2012.

**Figure 3. Private Saving, Investment, and the Top Tax Rates, 1945-2010**
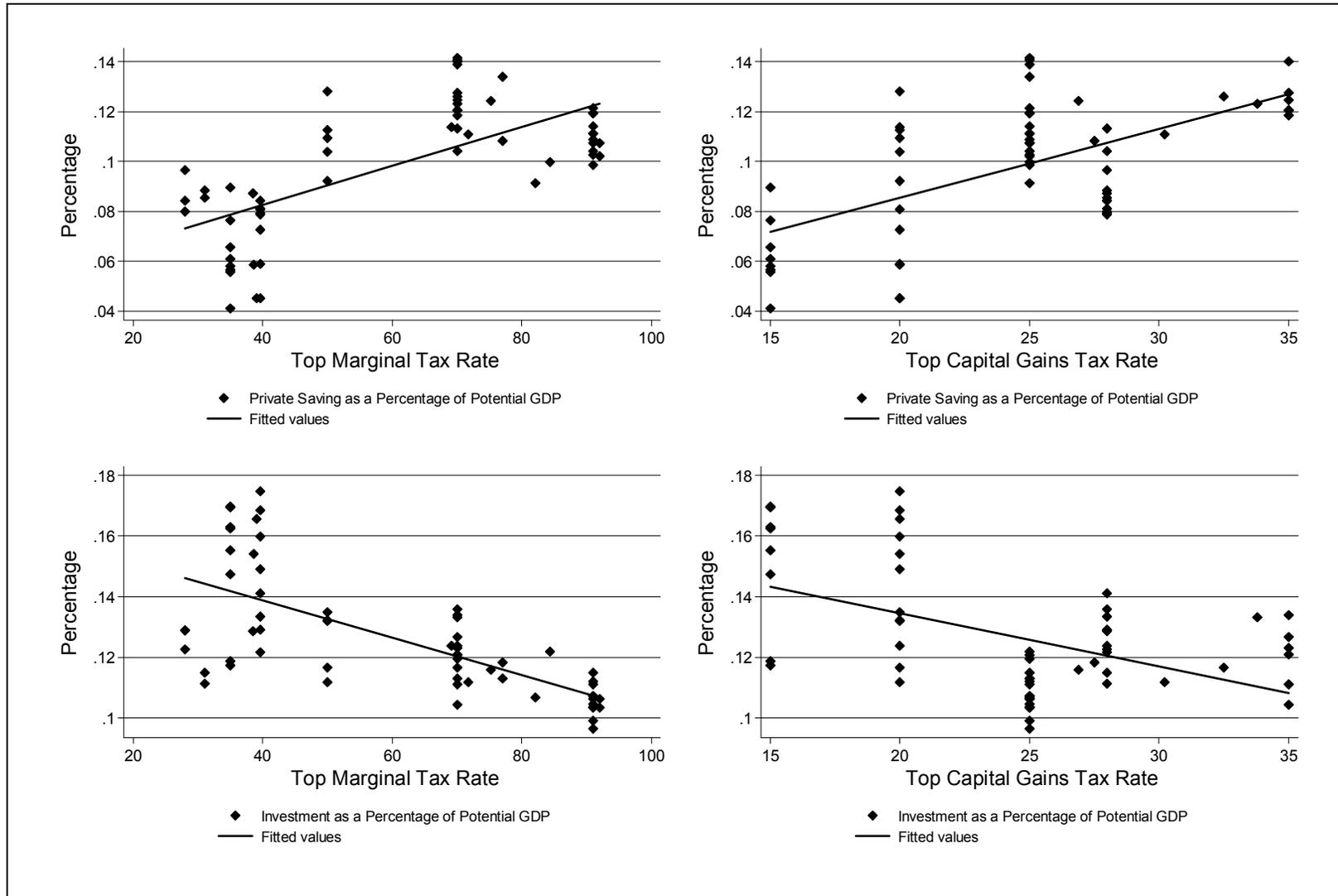
Source: CRS analysis.

Productivity Growth

Productivity can increase due to investment, innovation, improvement in labor skills, increases in entrepreneurship, and enhanced competition.[29] It is often argued that lower tax rates have a positive effect on all of these factors. Consequently, it would be expected that lower tax rates enhance productivity growth. **Figure 4** displays the relationship between labor productivity growth and the top tax rates. The fitted values suggest that the top marginal tax rate has a slight positive association with productivity growth while the top capital gains tax rate has a slight negative association with productivity growth. The regression analysis, however, does not find either relationship to be statistically significant (see **Table A-1**), suggesting the top tax rates are not necessarily associated with productivity growth.

Figure 4. Labor Productivity Growth Rates and the Top Tax Rates, 1945-2010
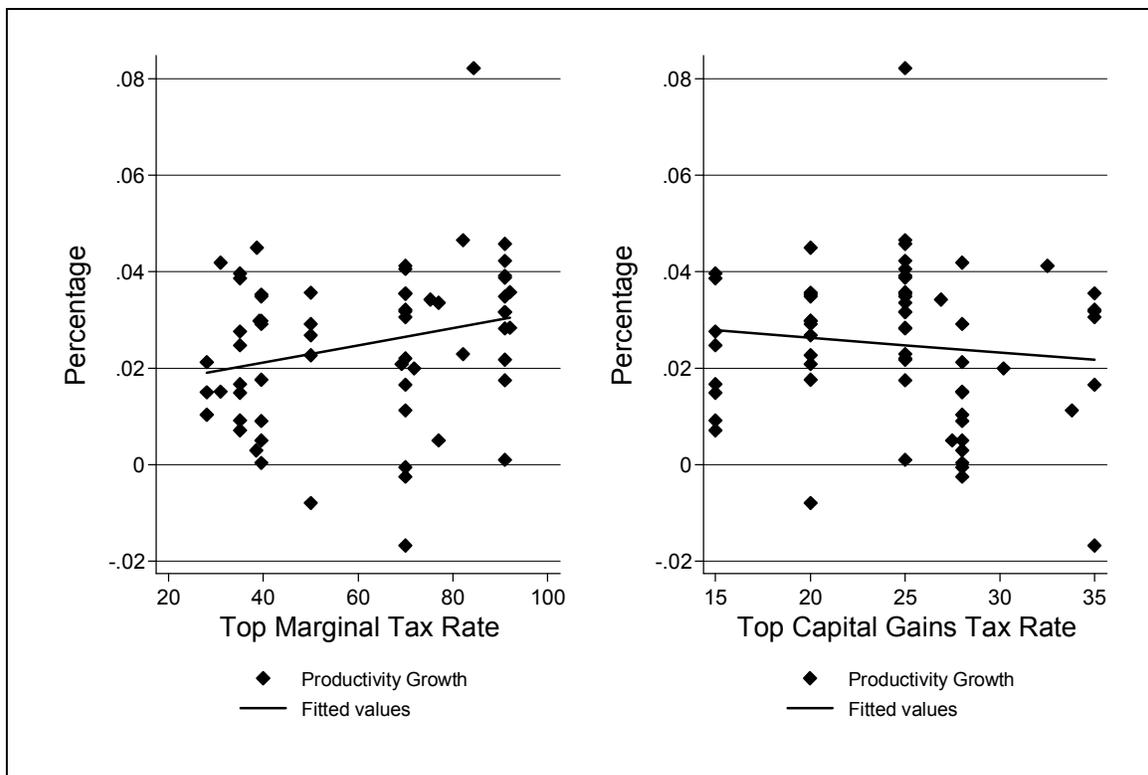
Source: CRS analysis.

Note: The vertical axis is the labor productivity growth rate.

Real Per Capita GDP Growth

The annual real per capita GDP growth rate plotted against the top marginal tax rate and top capital gains tax rate is shown in **Figure 5**. Each point represents the real per capita GDP growth

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[29] Office of National Statistics, *The ONS Productivity Handbook*, Basingstoke, Hampshire, UK, 2007, Ch. 3, http://www.ons.gov.uk.

rate and tax rate for each year since 1945. The fitted values seem to suggest that higher tax rates are associated with slightly higher real per capita GDP growth rates. The top marginal tax rate in the 1950s was over 90%, and the real GDP growth rate averaged 4.2% and real per capita GDP increased annually by 2.4% in the 1950s. In the 2000s, the top marginal tax rate was 35% while the average real GDP growth rate was 1.7% and real per capita GDP increased annually by less than 1%.

The scattered points, however, generally are not close to the fitted values line indicating that the association between GDP growth and the top tax rates is not strong.[30] Furthermore, the observed positive association between real GDP growth and the top tax rates shown in the figure could be coincidental or spurious because of changes to the U.S. economy over the past 65 years.[31] The statistical analysis using multivariate regression (reported in **Table A-1**) does not find that either top tax rate has a statistically significant association with the real GDP growth rate.[32]

These results are generally consistent with findings in other current research on tax cuts. Some studies find that a broad based tax rate reduction has a small to modest, positive effect on economic growth.[33] Other studies have found that a broad based tax reduction, such as the Bush-era tax cuts, has no effect on economic growth.[34] It would be reasonable to assume that a tax rate change limited to a small group of taxpayers at the top of the income distribution would have a negligible effect on economic growth.[35] For instance, the tax revenue projected from allowing the top tax rates to rise to their pre-2001 levels is $49 billion for 2013 or 0.3% of projected 2013 gross domestic product.[36]

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[30] Also see CRS Report R42111, *Tax Rates and Economic Growth*, by Jane G. Gravelle and Donald J. Marples.

[31] Immediately after World War II, the U.S. was the dominant world economy. This dominant position was gradually reduced as the European and Asian economies recovered and U.S. current account deficits grew.

[32] Statistical significance provides information on the likelihood a result occurs by chance.

[33] Eric Engen and Jonathan Skinner, "Taxation and Economic Growth," *National Tax Journal*, vol. 49, no. 4 (December 1996), pp. 617-642; and Charles W. Calomiris and Kevin A. Hassett, "Marginal Tax Rate Cuts and the Public Tax Debate," *National Tax Journal*, vol. 55, no. 1 (March 2002), pp. 119-131.

[34] Martin Feldstein and Douglas W. Elmendorf, "Budget Deficits, Tax Incentives, and Inflation: A Surprising Lesson from the 1983-1984 Recovery," in *Tax Policy and the Economy*, ed. Lawrence H. Summers, vol. 3 (Cambridge, MA: MIT Press, 1989), pp. 1-23; William G. Gale and Samara R. Potter, "An Economic Evaluation of the Economic Growth and Tax Relief Reconciliation Act of 2001," *National Tax Journal*, vol. 55, no. 1 (March 2002), pp. 133-186; and William G. Gale and Peter R. Orszag, "Economic Effects of Making the 2001 and 2003 Tax Cuts Permanent," *International Tax and Public Finance*, vol. 12 (2005), pp. 193-232.

[35] It has been suggested that, as more income was concentrated among high-income taxpayers after 1980, changes in the top statutory tax rates may have affected more income and consequently had an effect on economic growth. As a part of the data analysis conducted for this report, multivariate regression analysis that allows the coefficient estimates of the tax rate variables to be different before and after 1980 produces no evidence that the relation between the top tax rates and economic growth was different before and after 1980.

[36] CRS calculations based on revenue estimates prepared by the Joint Committee on Taxation and economic projections prepared by the Congressional Budget Office.

Figure 5. Real Per Capita GDP Growth Rate and the Top Tax Rates, 1945-2010
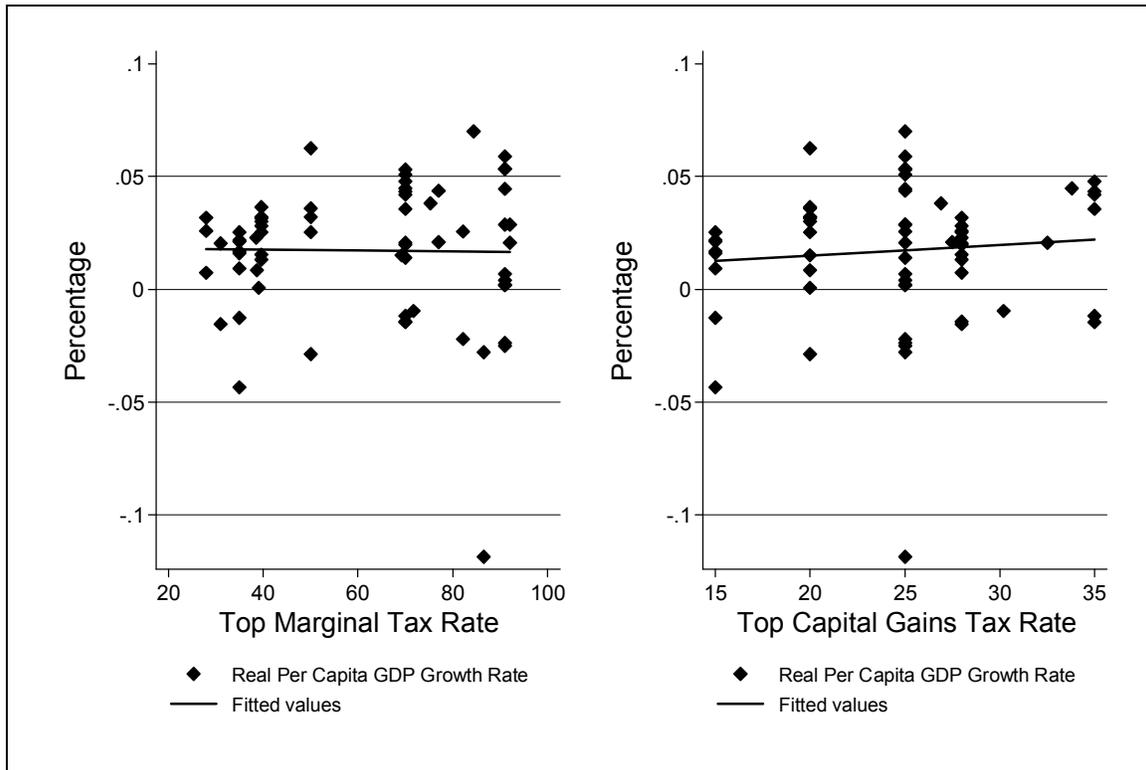
Source: CRS analysis.

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

Top Statutory Tax Rates and the Distribution of Income

It is recognized that measures of U.S. income disparities have increased over the past 35 years.[37] According to income tax data, average inflation-adjusted or real income increased by 116% (that is, about doubled) since 1945.[38] Average real income increased by 395% for the top 0.1% and by 692% for the top 0.01% over this period. Average real income for the balance of the top 1% in the income distribution (i.e., all but the top 0.1%) increased by about 165%. The share of income going to the top 1% increased from 12.5% in 1945 to 19.8% in 2010. Three-quarters of this increase in income share went to the top 0.1%. Since the major changes in the distribution of income were largely due to changes in the top 0.1% of the income distribution, the focus of the analysis is on the top 0.1%.

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[37] CBO, *Trends in the Distribution of Income Between 1979 and 2007*, October 2011; CRS Report R42131, *Changes in the Distribution of Income Among Tax Filers Between 1996 and 2006: The Role of Labor Income, Capital Income, and Tax Policy*, by Thomas L. Hungerford; and CRS Report R42400, *The U.S. Income Distribution and Mobility: Trends and International Comparisons*, by Linda Levine.

[38] Thomas Piketty and Emmanuel Saez, "Income Inequality in the United States, 1913-1998," *Quarterly Journal of Economics*, vol. 118, no. 1 (February 2003), pp. 1-39, with updated tables available at http://elsa.berkeley.edu/~saez/.

The tax burden has shifted slightly in recent years. Between 1996 and 2006, the average inflation-adjusted tax paid by taxpayers in the top 0.1% increased by 33% (from $1,398,857 to $1,860,790) while their average before-tax income increased by 75% (from $4,275,339 to $7,512,538). Overall, the top 0.1% of taxpayers paid 9.4% of all income taxes in 1996 and 11.8% in 2006.[39] Thus, the share of the tax burden borne by these top taxpayers has increased while their share of income paid in taxes decreased from 33% in 1996 to 25% in 2006.

Some argue that the rise in income inequality has been exaggerated. For example, Robert Gordon argues that by some measures the rise in inequality may have been overstated because (1) the increase in inequality has not been steady, with most of the post-1970 rise in income inequality occurring before the mid-1990s, and (2) the use of a common price index across income groups overstates income growth at the top of the distribution and understates income growth at the bottom.[40] He further argues that there was little change in inequality after 1993 in the bottom 99% of the population and the increase in income inequality can be explained by the behavior of income in the top 1%. Recent research shows that most measures of income inequality generally show an increasing trend since the 1970s, but the extent of the increase varies from measure to measure.[41]

Arguments are offered for and against reducing income inequality. The classic argument against rising income inequality is often summarized as "the rich get richer and the poor get poorer." This can increase poverty, reduce well-being, and reduce social cohesion. Consequently, some argue that reducing income inequality may reduce various social ills. Some research has found that large income and class disparities adversely affect health and economic well-being.[42]

In contrast, others point out that average real income has been rising, so while the rich are getting richer, the poor are not necessarily getting poorer. In addition, many argue that some income inequality is necessary to encourage innovation and entrepreneurship—the possibility of large rewards and high income are incentives to bear the risks.[43] Many argue that income or social mobility (i.e., movement within the income distribution) is indicative of a dynamic society and equality of opportunity—income inequality thus reflects temporary short-term income disparities rather than long-term social status.[44]

Using data obtained from one team of researchers, **Figure 6** displays the trend in the income (before taxes) share of the top 0.1% (the top solid line in the figure) and the top 0.01% (the lower

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[39] CRS analysis of the data contained in the 1996 and 2006 Internal Revenue Service Statistics of Income Public Use Files. The year 2006 was the year before the start of 2007-2009 recession; both 1996 and 2006 were at similar points in the business cycle.

[40] Robert J. Gordon, *Misperceptions about the Magnitude and Timing of Changes in American Income Inequality*, National Bureau of Economic Research, Working Paper 15351, Cambridge, MA, September 2009.

[41] See, for example, Richard V. Burkhauser, Shuaizhang Feng, and Stephen P. Jenkins, "Using the P90/P10 Index to Measure U.S. Inequality Trends with Current Population Survey Data: A View from Inside the Census Bureau Vaults," *Review of Income and Wealth*, vol. 55, no. 1 (March 2009), pp. 166-185.

[42] Michael Marmot, *The Status Syndrome: How Social Standing Affects Our Health and Longevity* (New York: Henry Holt and Co., 2004); Richard G. Wilkinson, *Unhealthy Societies: The Afflictions of Inequality* (New York: Routledge, 1996); Robert Frank, *Falling Behind: How Rising Inequality Hurts the Middle-Class* (Berkeley, CA: University of California Press, 2007); and Gopal K. Singh and Mohammad Siahpush, "Widening Socioeconomic Inequalities in US Life Expectancy, 1980-2000," *International Journal of Epidemiology*, vol. 35 (May 2006), pp. 969-979.

[43] Donald Deere and Finis Welch, "Inequality, Incentives, and Opportunity," *Social Philosophy and Policy*, vol. 19, no. 1 (2002), pp. 84-109.

[44] Milton Friedman, *Capitalism and Freedom* (Chicago: University of Chicago Press, 1962), p. 171.

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dashed line) since 1945.[45] Under both definitions of the top of the income distribution (i.e., high-income taxpayers), the income shares were relatively stable until the late 1970s and then started to rise. In 1945, the income share of the top 0.1% was 4.2%, increased to 12.3% by 2007, fell during the 2007-2009 recession, and started to rise again in 2010.[46] The income share of the top 0.01% followed the same overall trend.

Figure 6. Shares of Total Income of the Top 0.1% and Top 0.01% Since 1945
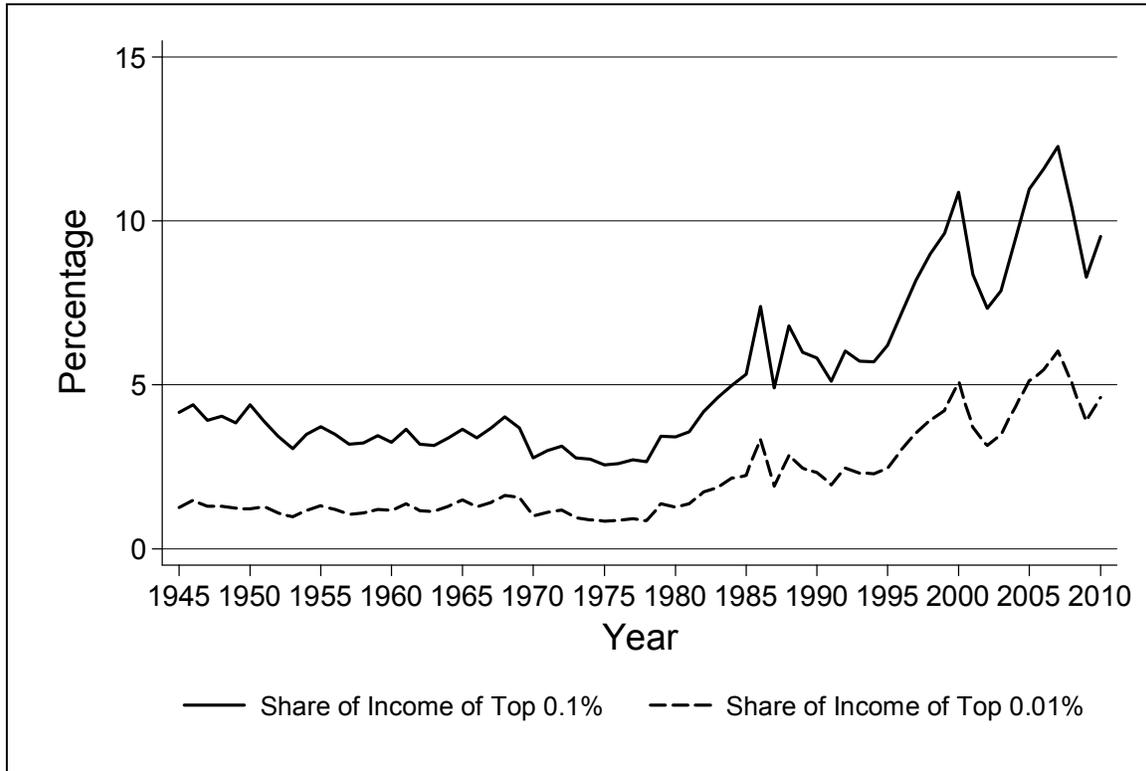
Source: Piketty and Saez.

**Note:** The vertical axis is the share of total income.

The observed relationship between the top tax rates and the income share of the top 0.1% and the top 0.01% are displayed in **Figure 7** (the top 0.1%) and **Figure 8** (the top 0.01%). Under both definitions of high-income taxpayers, the fitted values suggest that there is a strong negative relationship between the top tax rates and the income shares accruing to families at the top of the income distribution. These results suggest that as the top tax rates are reduced, the share of income accruing to the top of the income distribution increases—that is, income disparities increase. The regression analysis results reported in **Table A-2** show that these relationships are

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[45] Note that the top 0.1% in the income distribution includes the top 0.01%. These are two different definitions of high-income taxpayers. The top 0.1% represents one family in 1,000 and the top 0.01% represents one in 10,000.

[46] These trends are consistent with evidence that the income of high-income households has become more cyclical since 1980. See Jonathan A. Parker and Annette Vissing-Jorgensen, "The Increase in Income Cyclicality of High-Income Households and Its Relation to the Rise in Top Income Shares," *Brookings Papers on Economic Activity*, Fall 2010, pp. 1-55.

statistically significant. Similar results by other researchers have been obtained for other countries.[47]

Figure 7. Share of Total Income of Top 0.1% and the Top Tax Rates, 1945-2010
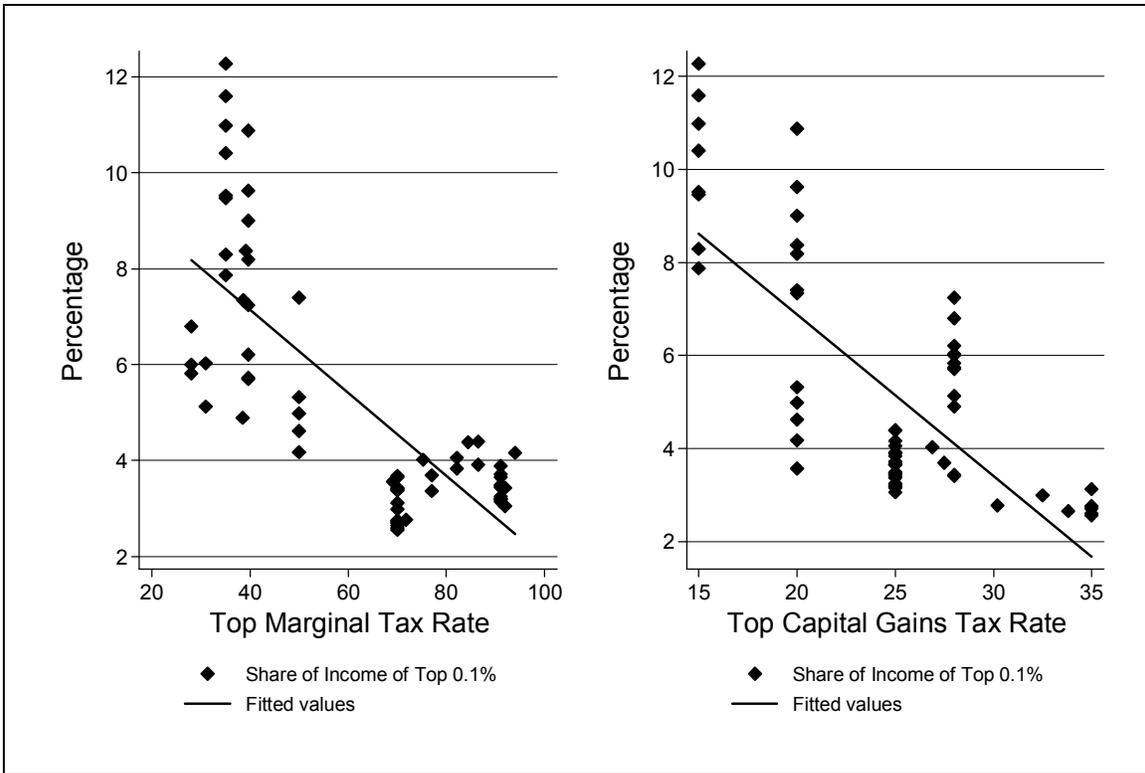
Source: CRS analysis of Piketty and Saez data.

Note: The vertical axis is the share of total income.

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[47] A. B. Atkinson and Andrew Leigh, "Top Income in New Zealand 1921-2005: Understanding the Effects of Marginal Tax Rates, Migration Threat, and the Macroeconomy," *Review of Income and Wealth*, vol. 54, no. 2 (June 2008), pp. 149-165; and Thomas Piketty, Emmanuel Saez, and Stefanie Stantcheva, *Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities*, National Bureau of Economic Research, Working Paper 17616, November 2011.

Figure 8. Share of Total Income of Top 0.01% and the Top Tax Rates, 1945-2010

Note: The vertical axis is the share of total income.

Research has shown that changes in capital gains and dividends were the largest contributor to the increase in income inequality since the mid-1990s.[48] Capital gains and dividends have become a larger share of total income over the past decade and a half while earnings have become a smaller share.[49] This suggests that labor's share of income could also be related to the top tax rates.[50] **Figure 9** displays this relationship. The fitted values show that the labor share of income is higher with higher top marginal tax rates and higher top capital gains tax rates. This relationship is statistically significant (see **Table A-2**).[51]

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[48] CBO, *Trends in the Distribution of Income Between 1979 and 2007*, October 2011; CRS Report R42131, *Changes in the Distribution of Income Among Tax Filers Between 1996 and 2006: The Role of Labor Income, Capital Income, and Tax Policy*, by Thomas L. Hungerford; and Jon Bakija, Adam Cole, and Bradley T. Heim, *Jobs and Income Growth of Top Earners and the Causes of Changing Income Inequality: Evidence from U.S. Tax Return Data*, Williams College, working paper, November 2010.

[49] Ibid.

[50] National income is split into the share going to labor (wages) and the share going to capital (capital income).

[51] There is a body of economic literature that examines the underlying causes of income inequality, such as technological change and trade, that is beyond the scope of this report. For a discussion of these issues, see CRS Report R42400, *The U.S. Income Distribution and Mobility: Trends and International Comparisons*, by Linda Levine.

Figure 9. Labor Share of Income and the Top Tax Rates, 1945-2010
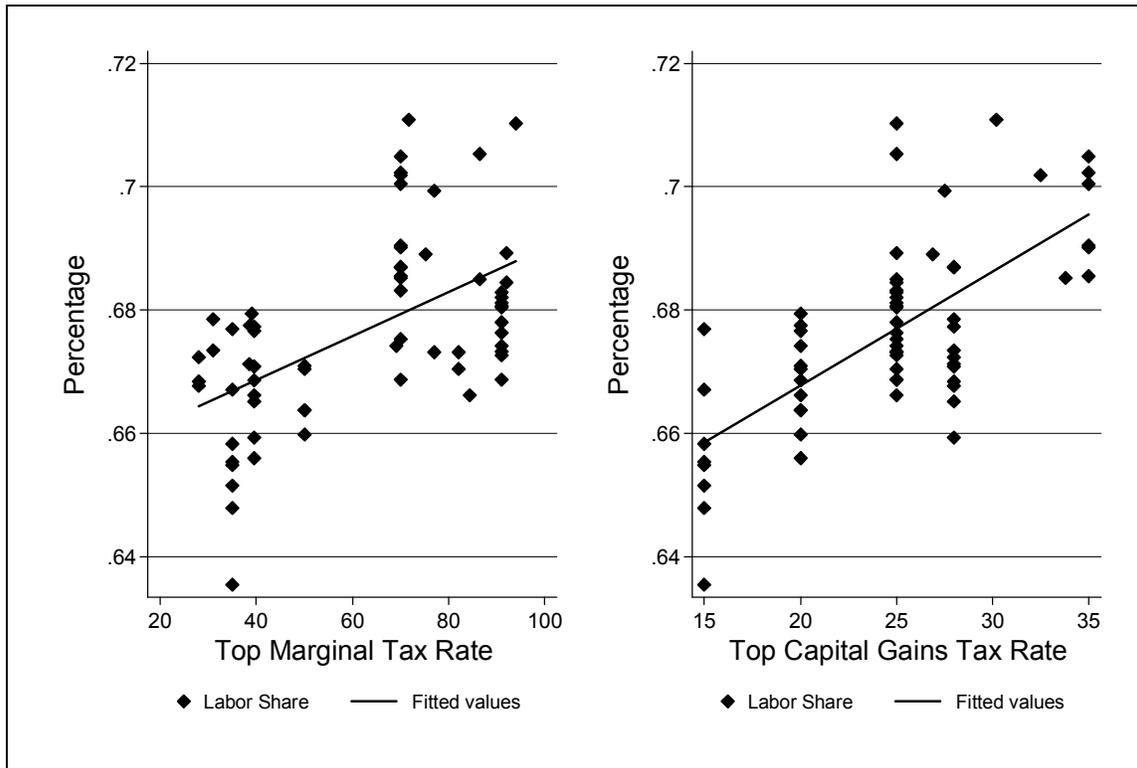
Note: The vertical axis is the share of national income accruing to labor.

Tax policy affects after-tax income. Since the U.S. individual income tax is a progressive tax system, after-tax incomes tend to be more equally distributed than before-tax income.[52] Changes in tax policy would change the distribution of after-tax income. Research has demonstrated that tax policy has a less equalizing effect now than it did in the mid-1990s and in 1979.[53]

The results suggest that pre-tax incomes tend to be more equally distributed and labor's share of income larger when the top tax rates are higher. Thomas Piketty, Emmanuel Saez, and Stefanie Stantcheva argue that high top tax rates were part of the institutional structure that restrained top income by reducing gains from bargaining or rent extraction by CEOs and managers.[54] For example, a CEO has less incentive to bargain hard over additional compensation when he keeps 9 cents of every additional dollar (a 91% top tax rate) than when he keeps 65 cents of every additional dollar (a 35% top tax rate). A study by Jon Bakija, Adam Cole, and Bradley Heim provides additional support for this mechanism—60% of taxpayers in the top 0.1% are in

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[52] CBO, *Trends in the Distribution of Household Income Between 1979 and 2007*, October 2011.

[53] Thomas Piketty and Emmanuel Saez, "How Progressive in the U.S. Federal Tax System? A Historical and International Perspective," *Journal of Economic Perspectives*, vol. 21, no. 1 (Winter 2007), pp. 3-24; CBO, *Trends in the Distribution of Household Income Between 1979 and 2007*, October 2011; and CRS Report R42131, *Changes in the Distribution of Income Among Tax Filers Between 1996 and 2006: The Role of Labor Income, Capital Income, and Tax Policy*, by Thomas L. Hungerford.

[54] Thomas Piketty, Emmanuel Saez, and Stefanie Stantcheva, *Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities*, National Bureau of Economic Research, Working Paper 17616, November 2011.

occupations that provide some bargaining power over compensation (executives, managers, supervisors, and financial professions).[55]

Concluding Remarks

The top statutory income tax rates have changed considerably since the end of World War II. Throughout the late-1940s and 1950s, the top marginal tax rate was typically above 90%; today it is 35%. Additionally, the top capital gains tax rate was 25% in the 1950s and 1960s, 35% in the 1970s; today it is 15%. Statutory tax rates affecting taxpayers at the top of the income distribution are currently at their lowest levels since the end of the second World War. Whether or not the top statutory tax rates should be raised at the end of 2012, as scheduled under current law, is currently an issue before Congress.

The results of the analysis in this report suggest that changes over the past 65 years in the top marginal tax rate and the top capital gains tax rate do not appear correlated with economic growth. The reduction in the top statutory tax rates appears to be uncorrelated with saving, investment, and productivity growth. The top tax rates appear to have little or no relation to the size of the economic pie. But as a small proportion of taxpayers are affected by changes in the top statutory tax rates, this finding is not unexpected.

However, the top tax rate reductions appear to be correlated with the increasing concentration of income at the top of the income distribution. As measured by IRS data, the share of income accruing to the top 0.1% of U.S. families increased from 4.2% in 1945 to 12.3% by 2007 before falling to 9.2% due to the 2007-2009 recession. At the same time, the average tax rate paid by the top 0.1% fell from over 50% in 1945 to about 25% in 2009. The statistical analysis in this report suggests that tax policy could be related to how the economic pie is sliced—lower top tax rates may be associated with greater income disparities.

The top statutory tax rates are but one part of a broader debate on the design of the overall tax system, which may be taken up in the future. House Ways and Means committee Chair Dave Camp reportedly has said his committee will move a tax reform bill in 2013.[56] Many tax reform proposals include changes to the tax base, often through the elimination of tax expenditures, as well as changes in the tax rates. Broad-based changes to the tax system that significantly affect the level of total tax revenues could have short-term and long-term effects on the economy.

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[55] Jon Bakija, Adam Cole, and Bradley T. Heim, *Jobs and Income Growth of Top Earners and the Causes of Changing Income Inequality: Evidence from U.S. Tax Return Data*, Williams College, working paper, November 2010.

[56] Meg Shreve, "Camp Promises Tax Reform Bill in 2013," *Tax Notes Today*, November 16, 2012.

Appendix. Data and Supplemental Analysis

For this analysis, data were gathered from a variety of publicly available sources:

- Top marginal tax rates and top capital gains tax rates: IRS, Statistics of Income, various tables available at http://www.irs.gov/taxstats/indtaxstats/0,,id= 98123,00.html.

- Real per capita GDP, private saving, real private fixed investment, income tax revenue, real federal current expenditures, real federal transfers, disposable personal income, population: Dept. of Commerce, Bureau of Economic Analysis, National Income and Product Account tables, various tables available at http://www.bea.gov/iTable/index_nipa.cfm.

- Labor share of income: calculated from National Income and Product Account tables, various tables using method of José-Víctor Ríos-Rull and Raul Santaeulalia-Llopis, "Redistributive Shocks and Productivity Shocks," *Journal of Monetary Economics*, vol. 57, no. 8 (November 2010), pp. 931-948.

- Labor productivity: Dept. of Labor, Bureau of Labor Statistics, available at http://www.bls.gov/lpc/.

- Income shares of top 0.1% and top 0.01%: Thomas Piketty and Emmanuel Saez, "Income Inequality in the United States, 1913-1998," *Quarterly Journal of Economics*, vol. 118, no. 1 (February 2003), pp. 1-39, with updated tables available at http://elsa.berkeley.edu/~saez/.

- Potential GDP: CBO, available at http://www.cbo.gov/publication/42912.

- S&P annual stock returns, real home price index: Robert Shiller, Yale University, available at http://www.econ.yale.edu/~shiller/data.htm.

- AAA Bond yield: St. Louis Federal Reserve Bank, available at http://research.stlouisfed.org/fred2/categories/119.

- College graduates: Census Bureau, available at http://www.census.gov/hhes/ socdemo/education/data/cps/historical/index.html.

Multivariate time-series regression techniques were used to determine the statistical significance of the estimated relation between the top statutory tax rates and the various indicators of economic growth. The standard errors were corrected allowing for heteroskedastic and autocorrelated error-term using the Newey-West procedure with 5 lags. All variables were tested for the presence of a unit root. Most variables were found to have a unit root and these variables were first differenced for the analysis (i.e., the one year change in the variable is used in the analysis); none of the variables appear to be cointegrated.[57] The specifications and the other explanatory variables included in the analyses (which are thought to affect the dependent variables) have been used by other researchers in empirical research and are cited in the description of the regression equations below.

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[57] The variables with a unit root exhibit strong trends—they are not trend stationary. Regressions of variables with a unit root could find a relationship between two variables that is due to the strong trends rather than to an economic relationship (called a spurious regression). Thus, the variables were first differenced.

The right-hand side variables of interest are the statutory top tax rates for ordinary income and capital gains. The statutory tax rates are determined in legislation passed by Congress and signed by the President, and become effective in future tax years. The top statutory marginal tax rate is denoted by MTR and the top statutory capital gains tax rate is denoted by KTR. The top tax rate variables are entered into the regressions as the after-tax or net-of-tax shares, which are equal to 1 minus the top tax rates (1-MTR and 1-KTR). Consequently, a negative coefficient estimate indicates a positive relationship between the top tax rate and the indicator of economic growth. The regression results are reported in **Table A-1**.

The four regression equations are:

- *Saving ratio and investment ratio*. Private saving and private fixed investment are expressed as a percentage of potential GDP (the level of GDP attainable when resources are fully employed).[58] In addition to the tax variables, other right-hand side variables in both regressions include the real S&P stock return and the real AAA corporate bond return, which reflect the yield or return on saving and investment decisions. The percentage change in the house price index and the growth rate of disposable personal income are included in the saving ratio regression.[59] The investment ratio regression also includes the one-year lagged change in investment ratio as a right-hand side variable, which represents "investment inertia."[60]

- *Productivity growth*. Labor productivity is an index of output per hour; it can be affected not only by taxes but also by the quantity and quality of the labor force. The indicators of the quantity and quality of the labor force include the change in the proportion of the population of the population with at least a four-year college degree, and the change in federal transfer payments (as a percentage of potential GDP) to capture work disincentive effects of government programs.[61]

- *Real per capita GDP growth*. In addition to the tax rate variables, right-hand side variables include the population growth rate, the change in the proportion of the population with at least a four-year college degree, and the change in federal current expenditures as a percentage of potential GDP.[62]

The results reported in **Table A-1** suggest that neither the top marginal tax rate nor the top capital gains tax rate are strongly correlated with saving, investment, labor productivity, and GDP growth controlling for other covariates. In addition, alternative specifications that included (1) the five-year lag or (2) the three-year lag of the tax rate variables were estimated. The coefficient

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[58] Saving and investment are divided by potential GDP rather than actual GDP because potential GDP provides a more exogenous normalization than actual GDP—that is, it is less likely to be affected by the explanatory variables. The estimation results, however, are similar when saving and investment are normalized by actual GDP.

[59] See Michael L. Walden, "Will Households Change Their Saving Behavior After the "Great Recession"? The Role of Human Capital," *Journal of Consumer Policy*, vol. 35 (2012), pp. 237-254.

[60] Robert J. Gordon and John M. Veitch, "Fixed Investment in the American Business Cycle, 1919-83," in *The American Business Cycle: Continuity and Change*, ed. Robert J. Gordon (Chicago: University of Chicago Press, 1986), pp. 267-357.

[61] Supachet Chansarn, "Labor Productivity Growth, Education, Health and Technological Progress: A Cross-Country Analysis," Economic Analysis and Policy, vol. 40, no. 2 (September 2010), pp. 249-278.

[62] Young Lee and Roger H. Gordon, "Tax Structure and Economic Growth," *Journal of Public Economics*, vol. 89 (June 2005), pp. 1027-1083.

estimates of the five-year lag and the three-year lag of the tax variables were not statistically significant and the estimates of the other coefficients were little changed from those reported in **Table A-1**.

A parsimonious model runs the risk of omitting relevant variables from the estimation. If the omitted variables are correlated with an explanatory variable and the omitted variable has a nonzero effect on the dependent variable, then the coefficient estimate of the explanatory variable could be biased.[63] It is unlikely that any omitted variables are correlated with the top statutory tax rates. For example, measures of monetary policy, such as changes in the growth rate of the monetary base, and the average tax rate (two variables that arguably could affect GDP) are uncorrelated with the top statutory tax rates.[64] Furthermore, the coefficient estimates of these two variables when included in the regression for real per capita GDP are not statistically different from zero; the other coefficient estimates are little changed from those reported in **Table A-1**.

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[63] William H. Greene, *Econometric Analysis*, 5th ed. (Upper Saddle River, NJ: Prentice Hall, 2003).

[64] The correlation of the change in the growth of the monetary base with the top statutory tax rate is 0.031 and with the top capital gains tax rate is 0.003. The correlation of the average tax rate with the top statutory tax rate is -0.023 and with the top capital gains tax rate is -0.003.

Table A-1. Regression Results: Economic Growth

Standard Errors in Parentheses

	Change in Private Saving Ratio	Change in Private Fixed Investment Ratio	Change in Labor Productivity Growth Rate	Real Per Capita GDP Growth Rate
Constant	-0.0025	-0.0002	-0.0044	0.0219
Δ(1-MTR)	0.0442	-0.0079	-0.0139	-0.0992
	(0.0366)	(0.0280)	(0.0633)	(0.1026)
Δ(1-KTR)	0.0277	0.0334	0.1119	-0.0369
	(0.0341)	(0.0241)	(0.0697)	(0.0661)
Log of Disposable Personal Income	0.0325			
	(0.0759)			
ΔAAA Bond Rate	0.0357	-0.0053		
	(0.0603)	(0.0968)		
S&P Stock Return	0.0035	0.0033		
	(0.0097)	(0.0058)		
Percent Change in Real Home Price Index	-0.0485			
	(0.0295)			
1-year lag of Change in Private Fixed Investment Ratio		0.2652***		
		(0.0979)		
ΔCollege Graduates as Percent of Population			0.4952	-0.2650
			(0.8292)	(0.7916)
ΔReal Federal Transfers Ratio			1.6150***	
			(0.2767)	
ΔPopulation Growth Rate				-5.9978
				(3.6830)
ΔReal Federal Current Expenditures Ratio				-0.6445
				(0.5753)
F-statistic	1.02	2.47	9.12	1.14

Source: CRS analysis.

Note: Δ - indicates the one-year change in the variable; *** statistically significant at 1% level.

Time-series regression techniques were also used to determine the statistical significance of the correlation between the top tax rates and the measures of income shares. The income shares of the top 0.1% and top 0.01% were converted to logarithms. In addition, following the specifications of

other researchers, the one-year lagged real GDP growth rate was included as an explanatory variable.[65] The results are reported in **Table A-2**.

Table A-2. Regression Results: Income Inequality

Standard Errors in Parentheses

	Change in Log Top 0.1% Share	Change in Log Top 0.01% Share	Change in Labor Share
Constant	0.0068	0.0073	-0.0055
Δ(1-MTR)	0.6241*	0.4756*	-0.0168*
	(0.3601)	(0.2483)	(0.0084)
Δ(1-KTR)	3.7512***	2.5991***	-0.0510**
	(1.3076)	(0.9598)	(0.0198)
Lagged Real GDP Growth	0.0006	-0.0010	0.0016***
	(0.0046)	(0.0040)	(0.0001)
F-statistic	3.52	3.30	42.77

Source: CRS analysis.

Note: Δ - indicates the one-year change in the variable; *** statistically significant at 1% level; ** statistically significant at 5% level; * statistically significant at 10% level.

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[65] The specification was the same as that used by other researchers and similar results were obtained. See A. B. Atkinson and Andrew Leigh, "Top Income in New Zealand 1921-2005: Understanding the Effects of Marginal Tax Rates, Migration Threat, and the Macroeconomy," *Review of Income and Wealth*, vol. 54, no. 2 (June 2008), pp. 149-165; and Thomas Piketty, Emmanuel Saez, and Stefanie Stantcheva, *Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities*, National Bureau of Economic Research, Working Paper 17616, November 2011.