Article

Public Finance Review
1-30

DOI: 10.1177/1091142117729435
journals.sagepub.com/home/pfr
SAGE

Millionaires or Job Creators: What Really Happens to Employment Growth When You Stick It to the Rich?

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Abstract

We provide empirical evidence on the consequences of relatively higher tax burdens on the rich for aggregate employment growth using a newly constructed time series for 1947 through 2011 derived from the US Statistics of Income. In response to shifts in the relative federal tax burden toward the rich, we find statistically significant positive effects on employment growth in the short run and some evidence of negative effects on employment growth in the long run. Among our robustness checks, we use the Romer and Romer narrative record analysis to restrict our sample to a period of exclusively exogenous tax changes. The results hold in the restricted

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sample and are also consistent across alternative specifications and estimation methods, including unrestricted and Bayesian vector autoregressive.

Keywords
fiscal policy, millionaire tax, income distribution, inequality, income tax, employment growth

The question of raising taxes on high-income individuals at the top of the income distribution remains controversial and continues to generate passionate debate among economists, lawmakers, and the public. This debate is particularly heated in the United States, where the growing concentration of income since the 1970s has become a major issue.[1] The Occupy movement that began in New York City in 2011 and quickly spread to many major cities around the world is simply one illustration of the scope of public concern over rising inequality. The recent success of the best-selling book *Capital in the Twenty-first Century* by Piketty (2014) demonstrates that these concerns have been sustained.

High-income taxpayers—the rich—are often a prime target of policy when more tax revenue is needed. However, significant uncertainty surrounds the consequences of taxing the rich, the so-called job creators. There is virtually no evidence on the economy-wide effects of imposing higher burdens on the rich to guide policy. The purpose of this article is to provide empirical evidence on this simple question: Does imposing higher taxes on high-income taxpayers help or hurt job creation?

Surprisingly, this important question has received scant attention in the empirical tax literature. Our work is informed by two strands of research. One focuses on the rich and examines how tax changes affecting them influence individual outcomes like taxable income, labor supply, or interstate migration. Goolsbee (2000), for example, uses detailed compensation data on corporate executives to evaluate the taxable income response to increased marginal tax rates in 1993. He finds a significant decline in taxable income among executives at the top of the income distribution in the short run, but very little responsiveness in the long run. Goolsbee concludes that the observed decline is more of a short-run shift in the timing of compensation rather than a permanent change in taxable income. Slemrod (2000) presents a review of the literature regarding the behavioral responses of the affluent when they are taxed more heavily (Piketty, Saez, and

Stantcheva, 2014; Saez, Slemrod, and Giertz, 2012). Our work differs from these studies in that our interest is in the economy-wide consequences of taxing the rich.

The second strand of the relevant fiscal policy literature examines the impact of general tax hikes (or tax cuts) on the macroeconomy. Most economists agree that, in general, tax increases have negative effects on macroeconomic measures like gross domestic product (GDP) via the conventional tax multiplier. However, there is little agreement on the tax (or spending) multiplier's magnitude, Favero and Giavazzi (2012). The endogenous nature of fiscal policy changes creates a challenge in empirically isolating the true impact of tax changes in economic activity.

A number of recent studies have addressed the issue of endogenous policy changes and growth using new approaches. Romer and Romer (2010) construct a new measure of exogenous tax changes based on analyses of narrative records, such as presidential speeches and congressional reports, and separate all legislated tax changes that occurred in the postwar period as endogenous and exogenous. Using their new measure of exogenous tax changes, they find that the negative effects of tax increases on economic activity are much larger than those obtained using broader measures. Barro and Redlick (2011) estimate the macroeconomic effects of government purchases and taxes using Ramey's (2009) defense news variable and a newly constructed measure of the average marginal tax rate (AMTR). They find statistically significant negative effects of tax increases in GDP, with an estimated tax multiplier around 1.1. More recently, Nakamura and Steinsson (2014) exploit the heterogeneity in changes in defense spending across states to estimate the effects of a relative increase in spending on relative output. They find that relative state GDP increases by 1.5 percent when relative spending increases by 1 percent of GDP.

Zidar (2015) uses the Romer and Romer (2010) narrative-based exogenous tax changes and constructs a measure that distinguishes which income groups received those tax changes. He finds that the negative relationship between tax changes and economic growth is mostly driven by lower-income groups. Specifically, tax cuts that benefit the bottom 90 percent have large positive effects on growth, while tax cuts that go to the top 10 percent have statistically insignificant effects. Unlike Zidar, we consider alternative thresholds for top taxpayers, including 0.1 percent, 0.5 percent, 1.0 percent, and 5 percent and exploit variation in relative federal tax burdens by income group across time to identify our models.

Other researchers have investigated this issue, including Alm and Rogers (2010), Auten, Carroll, and Gee (2008), Romer and Bernstein (2009), and Böhringer, Boeters, and Feil (2005). These studies are related to our application because they investigate economy-wide impacts of tax changes. However, we are more nuanced in our focus on tax increases for the rich, holding the economy's overall tax burden constant.

This article contributes to the literature by providing rare empirical evidence on the causal relationship between the relative tax burden of the rich and aggregate employment growth. Both short-run and long-run effects are investigated using a new time series on relative tax burden by income class constructed from the Internal Revenue Service (IRS) Statistics of Income (SOI). The empirical framework builds on Barro and Redlick (2011) and Romer and Romer (2010).

The results show that an increase in the relative share of tax paid by the rich has statistically significant positive effects on net job creation in the short run. In the baseline specification, a 1 percentage point increase in the share of tax paid by the top percentile of taxpayers is associated with a 0.05 percentage point increase in quarterly payroll employment growth. For example, with 132 million payroll employment jobs in the US economy, this means 22,000 additional jobs per month.[2] Findings also include evidence of negative long-run effects, though the cumulative net impact (across both the short run and long run) remains positive. These core results hold up to a wide number of robustness checks, including restricting the sample to a period of exclusively exogenous tax changes, based on the narrative record analysis in Romer and Romer (2010) and applying alternative specifications and estimation methods, including unrestricted and Bayesian vector autoregressives (VARs).

While the structural identification of the transmission mechanism is beyond the scope of this study, there are fundamental explanations for the findings. One possibility is a purely redistributive tax policy change (holding revenue constant) that increases the tax burden on the rich and lowers the burden on other taxpayers. Because the rich have a lower marginal propensity to consume (MPC), the net effect on short-run spending and employment growth should be positive. Another possibility arises if the tax hike on the rich is used to finance government spending. If the positive government spending multiplier effect outweighs the negative tax multiplier effect, growth would be stimulated in the short run. The negative effects we isolate in the long run are consistent with diminished effort, innovation, and/or investment on the part of high-income taxpayers.

The remainder of this article is structured as follows. The second section discusses methodological issues and identification strategies. The third section presents the newly constructed time series on relative tax burden by income group and briefly discusses the rest of the data. The fourth section presents results. The fifth section concludes the article.

Methodological Issues

Isolating the aggregate employment impacts arising from a tax hike on the rich is problematic in terms of identification and data availability. While showing a correlation between employment growth and an increase in the tax burden on the rich may be straightforward, establishing a causal relationship requires more care. In this section, we discuss the strategies used to identify the empirical models, and the following section addresses the data on tax burden by income group.

As a starting point, consider the following simple equation:

$$y_t = \alpha + \beta \Delta T_t + \varepsilon_t, \tag{1}$$

where $y_t = \frac{Y_t - Y_{t-1}}{Y_{t-1}}$ is a measure of employment growth, T_t is a measure of the relative tax burden on the rich, and ε_t represents all the other factors, both observed and unobserved, that affect the growth of employment. Changes in some of those factors cause the relative tax burden on the rich to change as well. A potentially serious problem arises when estimating macroeconomic tax effects if there is an endogenous relationship between fiscal policy changes and economic activity. For example, policy makers may react to economic fluctuations and make fiscal policy changes for stabilization purposes. To the extent that those tax changes equally affect all income levels, the measure of relative tax burden on the rich can be viewed as exogenous after controlling for the economy's overall tax burden. However, in practice, relative tax burdens can change by the intent of policy makers or simply because of the way unique structural provisions of the tax code affect certain income groups as incomes change. Estimating equation (1) would lead to a biased estimate of β under such conditions.

To address this problem, we use lags of relative tax burdens and make the identifying assumption that tax changes occurring one or more years earlier are not determined by the economy's current state. This assumption is based on evidence on the conduct of fiscal policy, as described by Blanchard and Perotti (2002). They note "Direct evidence on the conduct of fiscal policy suggests that it takes policymakers and legislatures more than a quarter to learn about a GDP shock, decide what fiscal measures, if any, to take in response, pass these measures through the legislature, and actually implement them" (p. 1334). Therefore, depending on the frequency of the data, even the contemporaneous tax variable could be treated as exogenous under certain conditions.[3] Similar discussions can be found in Barro and Redlick (2011), Bernanke and Mihov (1998), Favero and Giavazzi (2012), Gordon and Leeper (1994), and Perotti (2008).

Given the low frequency of some of the available data, we go one step further and exclude the contemporaneous tax variable altogether. Thus, the following alternative equation is posited:

$$y_t = \alpha + \sum_{j=1}^{J} \beta_j \Delta T_{t-j} + \delta_1 U_{t-1} + \delta_2 \mathrm{TP}_{t-1} + \varepsilon_t, \quad (2)$$

where T_{t-j} for $j = 1, ..., J$ are the lags of the relative tax burden on the rich, U_{t-1} is a lagged business cycle indicator (the unemployment rate in this case, which accounts for slack in the economy), and TP_{t-1} is a measure of the overall tax pressure in the economy. The measure of overall tax pressure used in the article is total income tax revenue as a percentage of pretax income. This is the effective average tax rate (ATR) for the economy. As argued by Barro and Redlick (2011) and Romer and Romer (2010), omitted variables that are orthogonal to the tax variable when a lagged business cycle indicator is added to the model are not a source of bias for the estimated fiscal effects. The business cycle indicator is particularly important here since we do not structurally model employment growth. Instead, we pursue a reduced-form strategy with the goal of identifying the partial effects of tax increases on high-income taxpayers on employment growth, controlling for other factors including the overall level of taxation in the economy.[4]

Another endogeneity concern is the possibility of heterogeneous income growth during certain expansions or recessions. For example, for a particular periodic boom, the rich could see their income grow faster than that of other taxpayers. Consequently, their relative share of tax burden would increase due to the economic expansion, rather than the other way around. Using lagged tax variables partially addresses this issue. However, without specifically modeling all of the dynamics of employment growth, there is still a risk of capturing correlation as causation in equation (2).

To address this issue, we exploit the heterogeneity in income composition across income groups. Examination of figure 1 reveals that taxpayers on the right tail of the income distribution receive predominantly capital

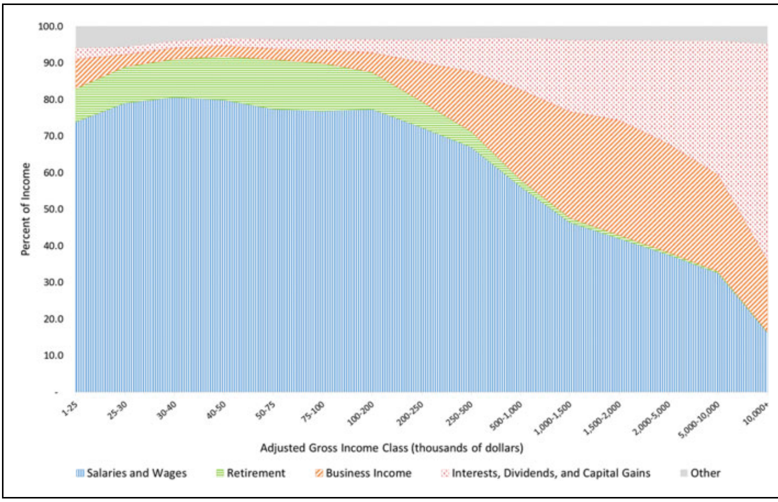

Figure 1. Composition of income by adjusted gross income class in 2010. The data are from the Internal Revenue Service Statistics of Income, 2010. Except for "Salaries and Wages," multiple columns were combined to make the different broad categories. For example, "Retirement" includes social security benefits and pensions and annuities. "Business income" includes Schedule C, S-corp, partnership, and farm income.

income (capital gains, interests, and dividends). On the other hand, labor income (salaries and wages) represents the bulk of income for the low- to middle-income classes.

To rule out reverse causation, the assumption is made here that an episode of economic expansion causing the relative tax burden of the rich to increase due to their relative income growth is captured by the difference in capital versus labor income growth. The variable difference in income growth (DIG) in equation (3) is a measure of the difference between the growth rate of capital income and that of labor income for all taxpayers. Since income taxes are paid on the previous period's income, the relevant DIG for the current period's tax burden must be based on last period's income growth. Therefore, $\mathrm{DIG}_t \equiv g^K_{t-1} - g^L_{t-1}$, where g^K_{t-1} and g^L_{t-1} are the growth rates of capital income and labor income in period $t-1$:[5]

$$y_t = \alpha + \sum_{j=1}^{J} \beta_j \Delta T_{t-j} + \delta_1 U_{t-1} + \delta_2 TP_{t-1} + \delta_4 DIG_{t-1} + \varepsilon_t. \qquad (3)$$

The regression analysis above is complemented by a reduced-form VAR(p) specified as follows:

$$\begin{aligned} y_t &= v_1 + \sum_{p=1}^{P} a_{1p} y_{t-p} + \sum_{p=1}^{P} b_{1p} \Delta T_{t-p} + \varepsilon_{1t} \\ \Delta T_t &= v_2 + \sum_{p=1}^{P} a_{2p} y_{t-p} + \sum_{p=1}^{P} b_{2p} \Delta T_{t-p} + \varepsilon_{2t} \end{aligned} . \quad (4)$$

The testable assumption is made that the errors in the system of equations (4) are not contemporaneously correlated. More generally, innovations in the employment equation are assumed to be independent of those in the tax equation.

The VAR approach complements the analysis in two important ways. First, including many lags of the dependent variables establishes a more general specification of employment growth dynamics without necessarily modeling all of its determinants. The second advantage is the possibility of analyzing longer-run employment effects of tax hikes on the rich, using orthogonalized impulse response functions (IRFs).

Data

Tax Data

We construct a time series on relative federal individual income tax burdens by income group, using data from the US SOI, published annually by the IRS and available back to 1913. The Online Appendix provides a detailed explanation on how the tax variables were constructed.

The preferred explanatory variable is the share of tax liability that falls on the *rich*, with the definition of *rich* based on pretax income. Alternative thresholds are considered in the analysis, including the top 0.1 percent, 0.5 percent, 1.0 percent, 5.0 percent, 10.0 percent, and 20.0 percent.[6] To obtain a given income group's relative share of tax liability, the tax liability of that group is divided by the total tax liability of all taxpayers for the year. Henceforth, this variable is referred to as *taxshare*.

Using the share of tax liability (taxshare) has many advantages over other commonly used measures, such as the marginal tax rate or the AMTR since it captures the full federal individual income tax burden, regardless of the income source. Given the US tax system's complexity (including itemized deductions, the alternative minimum tax, and various credits), determining an effective tax rate that truly reflects an individual taxpayer's tax burden can be problematic. This challenge is particularly true regarding the most affluent taxpayers because they are generally better equipped to take advantage of legal opportunities to minimize their tax liabilities. In 2013, for instance, more than half of the combined benefits of the top ten federal tax expenditures went to the top quintile; the top 1 percent received 17 percent of those benefits (Congressional Budget Office 2013). Many lawmakers advocate closing loopholes that bestow disproportionate benefits on the rich, but this would not be captured by marginal tax rates. By using the share of liabilities, we have the actual relative burden that falls on the wealthy after accounting for all possible federal tax parameters, without being specific about what tax expenditures or other components are being changed.

An alternative but less desirable measure of the tax pressure on the rich is their effective average tax rate (*ATR*). To obtain this measure, each income group's tax liability is divided by its corresponding total income.

Employment and Economic Activity Data

Our measure of job creation is the growth rate of seasonally adjusted payroll employment which captures the net change in employment arising from firm entry, expansion, contraction, and exit. Consistent monthly payroll employment data are available from the Bureau of Labor Statistics (BLS) starting in 1939. The unemployment rate (from the BLS) is used to measure the degree of slack capacity in the economy and unobservables that are correlated with the business cycle.

Data on GDP and its components are collected from the Bureau of Economic Analysis. We use the 2009 chained measures for GDP and its components. Finally, the income composition data used to compute the DIG variable *DIG* are from the SOI.

Frequency and Range of Data

The tax variables are constructed from annual federal tax return information while most of the economic activity variables are available at higher frequencies (monthly for employment growth and the unemployment rate and quarterly for GDP and its components). Each frequency has its advantages; so we exploit these data availability with two sets of regressions based on each frequency. The annual data eliminate seasonality issues in macroeconomic variables (Romer and Romer 2010). With quarterly data, the variation in employment can be better captured. Problematic are the tax liability variables, which are observed annually. We assume that taxpayer behavior is driven by the annualized burden despite within-year variation in effective liability. This assumption is supported by the observation that all tax laws applicable for a given year (including rates, brackets, and deductions) are typically known at the beginning of the year. In addition, most taxpayers have a reasonable expectation of their annual income for a given tax year. We implement this assumption by using tax burden variables that are constant within years, with the annual observations being replicated for each quarter of the year.

The sample covers the period from 1947Q1 to 2011Q4. Although annual data exist back to 1939 for most economic activity variables, including payroll employment, the tax distribution data for the World War II period are problematic. For some years between 1939 and 1945, close to half of the returns were not allocated to any income group (i.e., classified as "not distributed" in the SOI). In addition, important changes, including requirements to file, occurred between 1939 and 1947. The number of returns reported in the SOI went from 7 million in 1939 to close to 50 million by 1945. Significant changes in requirements to file and filing patterns can affect the income distribution and thus the definition of *rich*, so we omit the earlier data.

The summary statistics are presented in table 1. On average, the top 1 percent group was liable for approximately one-fourth of the federal individual income tax during the period from 1947 to 2011. As shown in figure 2, the top 1 percent group contributed the least in 1974 (15.6 percent) and the most in 2007 (39 percent).

Results

General Results

Equation (3) is estimated using quarterly data where the dependent variable is the quarterly growth rate of seasonally adjusted payroll employment. At first, only one lag of the independent variable of interest, *taxshare top 1 percent*, is considered, which measures the share of tax liability falling on the top 1 percent of the population. The results are reported in table 2. The estimated coefficients on the lagged tax burden variable taxshare top 1 percent are positive and statistically significant in all four specifications. In the equation with all controls (column 4), the estimated coefficient is .049 ($SE = .021$). This implies that a 1 percentage point increase in the share of federal individual income tax liability falling on the rich is associated with approximately 0.05 percentage point increase in quarterly payroll

Table 1. Summary Statistics.

	N	Mean	Standard Deviation	Min	Max
Payroll employment growth	260	0.433	0.679	−1.746	2.910
Taxshare top 0.1 percent	260	9.784	2.765	5.566	15.429
Taxshare top 0.5 percent	260	19.970	6.203	12.354	32.377
Taxshare top 1 percent	260	24.724	6.647	15.620	38.990
Taxshare top 5 percent	260	41.708	7.776	31.038	56.492
Taxshare top 10 percent	260	52.845	8.751	39.368	69.837
Taxshare top quintile	260	67.360	7.642	56.028	81.694
Taxshare fourth quintile	260	18.888	3.886	12.758	27.674
Taxshare middle quintile	260	9.881	3.272	4.428	14.003
Taxshare second quintile	260	3.656	1.328	0.705	5.476
Taxshare lowest quintile	200	0.281	0.221	0.008	1.082
Taxshare bottom 50 percent	260	7.987	2.754	2.895	12.198
ATR top 0.1 percent	260	35.324	7.846	22.128	51.054
ATR top 0.5 percent	260	31.169	4.756	22.296	41.527
ATR top 1 percent	260	28.814	3.518	22.262	36.481
ATR top 5 percent	260	22.668	1.699	19.745	26.699
ATR top 10 percent	260	19.991	1.446	16.493	23.406
ATR top quintile	260	17.447	1.335	13.732	20.739
ATR fourth quintile	260	10.350	1.628	6.495	13.844
ATR middle quintile	260	8.296	1.816	4.143	11.661
ATR second quintile	260	5.871	1.960	1.378	8.795
ATR lowest quintile	200	1.623	0.870	0.518	4.398
ATR bottom 50 percent	260	6.257	1.984	2.337	9.430
ATR total	260	13.190	1.177	9.009	15.761
GDP growth	259	0.805	0.982	−2.592	3.985
Consumption growth	259	0.840	0.845	−3.020	5.134
Investment growth	259	1.043	5.048	−16.112	23.723
Unemployment rate	256	5.769	1.653	2.567	10.667
DIG	260	1.701	13.905	−37.308	33.157

Note: The data are quarterly and cover the period from 1947Q1 to 2011Q4. The variable DIG is a measure of the relative income growth of capital versus labor income. ATR = average tax rate; GDP = gross domestic product; DIG = difference in income growth.

employment growth (or 0.2 percentage points annually).[7] To put this result in perspective, an annual growth rate of 0.2 percent means 22,000 additional jobs per month, assuming 132 million nonfarm payroll employment jobs in the country.[8]

The lagged unemployment rate is included to account for unobservables that are correlated with the business cycle. Generally, the

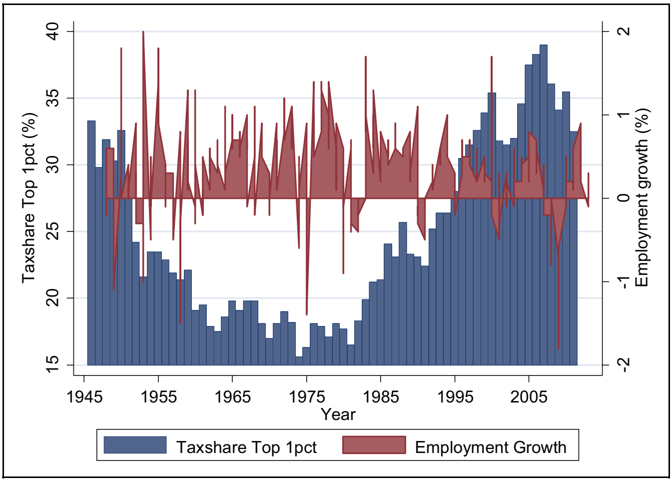

Figure 2. Evolution of taxshare top 1 percent and employment growth. Taxshare top 1 percent is the share of tax liability of the top 1 percent taxpayers—series constructed from the Internal Revenue Service Statistics of Income data. The employment growth series shows quarterly growth in total nonfarm payroll jobs (Bureau of Labor Statistics data).

unemployment rate is negatively related to economic growth. Since employment growth behavior is not being explicitly modeled, adding lagged GDP growth allows us to capture the effects of most determinants of the dependent variable that are orthogonal to the tax variable. In principle, omitting those orthogonal variables should not bias the estimates. However, using GDP helps improve the overall explanatory power of the model, especially given the limited time-series sample size.[9] As expected, the estimated coefficient on lagged GDP growth indicates a positive and statistically significant impact on job growth.

The economy's overall tax burden is controlled for by using the average tax rate for all taxpayers (i.e., total tax collected divided by total income for all taxpayers in a given year). As noted earlier, this control is a means of capturing the general effects of tax burden changes for the overall economy. With this control, the coefficient on taxshare top 1 percent and similar class-specific burdens isolates what happens when the relative tax burden on the rich is increased while holding the economy's overall tax burden constant, thus reflecting the effects of purely redistributive tax policy. Finally, the difference in growth rates between capital and labor income (DIG) is used to control for increases in the taxshare of the rich due to income growth less

Table 2. Effects of Increasing Taxshare of the Top 1 Percent on Payroll Employment Growth.

	(1)	(2)	(3)	(4)
Variables	Empl.	Empl.	Empl.	Empl.
Lagged taxshare top 1 percent	.0908***	.0913***	.0910***	.0490**
	(.0279)	(.0269)	(.0272)	(.0207)
Lagged unemployment rate		−.0204	−.0196	.00830
		(.0281)	(.0305)	(.0222)
Lagged ATR all		.0520	.0498	.0623
		(.0772)	(.0751)	(.0592)
Lagged DIG			.0005	.0030
			.0027	(.0021)
Lagged GDP growth				.442***
				(.0398)
Constant	.422***	.540***	.535***	.0182
	(.0429)	(.172)	(.187)	(.147)
Observations	252	252	252	252
Adjusted R^2	.050	.051	.047	.442

Note: Data are quarterly from 1947Q1 to 2011Q4. The dependent variable is the quarterly growth rate of nonfarm payroll employment. A four-period seasonal difference and one-year lag are used for variables that are only observed yearly (federal income tax variables). "ATR all" is total tax collected divided by total income for all taxpayers in a given year. DIG is the differential in capital versus labor income growth. Capital income includes capital gains, dividends, and interest; labor income includes wage and salary income. Robust standard errors are given in parentheses. GDP = gross domestic product; ATR = average tax rate; DIG = difference in income growth.
*$p < .1$.
**$p < .05$.
***$p < .01$.

wealthy taxpayers do not experience. The estimated coefficients for these two controls are typically insignificant.

The effects on employment growth from increasing other income groups' taxshare is considered with the results reported in table 3. The same equation is estimated but we use the taxshare for the five quintiles as well as the bottom 50 percent income group. Increasing the top quintile's taxshare has a statistically significant positive effect on quarterly employment growth. This effect is consistent with the previous results using narrower definitions of rich. The estimated coefficient of .072 (*SE* = .026) is 41 percent higher than that of the baseline regression for the top 1 percent.

Table 3. The Effects of Increasing the Taxshare of Other Income Groups.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Empl.	Empl.	Empl.	Empl.	Empl.	Empl.
Lagged taxshare top quintile	.0717*** (.0261)					
Lagged taxshare fourth quintile		−.105*** (.0296)				
Lagged taxshare third quintile			.0197 (.0666)			
Lagged taxshare second quintile				−.0770 (.118)		
Lagged taxshare bottom quintile					−.388 (.814)	
Lagged taxshare bottom 50 percent						−.0688 (.0607)
Lagged unemployment rate	.0047 (.0222)	.0021 (.0211)	.0092 (.0231)	.0104 (.0232)	.0025 (.0248)	.0069 (.0233)
Lagged ATR all	.0761 (.0602)	.0408 (.0574)	.0484 (.0565)	.0601 (.0586)	.160** (.0650)	.0654 (.0594)
Lagged DIG	.0038* (.0021)	.0037* (.0020)	.0036 (.0022)	.0039* (.0021)	−.0007 (.0021)	.0039* (.0021)
Lagged GDP growth	.439*** (.0404)	.439*** (.0402)	.457*** (.0393)	.452*** (.0400)	.457*** (.0500)	.445*** (.0416)
Constant	.0276 (.147)	.0541 (.141)	.0065 (.148)	−.0044 (.150)	.0616 (.160)	.0180 (.151)
Observations	252	252	252	252	184	252
Adjusted R^2	.448	.458	.426	.428	.439	.431

Note: See note in table 2. Robust standard errors are given in parentheses. GDP = gross domestic product; ATR = average tax rate; DIG = difference in income growth.
*$p < .1$.
**$p < .05$.
***$p < .01$.

Interestingly, increasing the fourth quintile's taxshare has a negative and statistically significant effect on employment growth, with an estimated coefficient of −.105 (*SE* = .030). To understand this result, it is important to determine which taxpayers fall into this income class. In 2011, the latest year in our sample, the fourth quintile, includes households with adjusted gross income between US$45,000 and US$85,000, meaning much of the middle class falls into the fourth quintile. Therefore, the results suggest that increasing the middle class's relative tax burden significantly harms job growth. Statistically significant effects are not found for lower-income groups. Results for the other variables are largely consistent with earlier specifications.

Short- versus Long-run Effects

The models presented so far capture only the short-run impacts of variations in relative burdens. To capture the effects of tax burden changes in both the short run and long run, equation (3) has been amended to include multiple lags of the taxshare variable. The results are shown in table 4. In columns 1 and 2, sixteen quarterly lags are included, while the contemporaneous variable is also included in column 1. Although none of the estimated coefficients is individually significant, they are jointly significant by groups of three or four consecutive lags. These results are not surprising, given the tax variable's frequency. As noted earlier, the tax variables are only observed annually, but the true values are assumed constant throughout the year. Thus, quarterly tax variables are obtained by replicating the yearly observations to all four quarters of the year. By construction, two consecutive quarterly lags are identical for three of the four quarters. Consequently, adding consecutive quarterly lags does not add much additional information to the model but does dilute the tax variables' effects.

To mitigate this problem, we include only one lag every four quarters for a four-year lag structure.[10] Columns 3 and 4 of table 4 show the results using this approach. Column 4 is the preferred specification because of potential endogeneity issues associated with using contemporaneous tax variables, as discussed in the second section. Positive and statistically significant effects are found for the first- and second-year lags (i.e., quarterly lags 4 and 8). In addition, negative and statistically significant effects are found for the third and fourth years (quarterly lags 12 and 16).[11] These results suggest that, although increasing the relative tax burden of the rich has positive effects on employment growth in the short run, it may hurt job growth in the long run. However, in terms of magnitude, the positive short-run effects slightly dominate the long-run effects. The estimated coefficients for the first- and second-year lags are .070 (SE = .019) and .072 (SE = .019), while the estimated coefficients for the third- and fourth-year lags are −.062 (SE = .016) and −.043 (SE = .018). Thus, the cumulative effect of all four lags is 0.026 ($p < .01$) which translates to approximately 34,320 additional jobs quarterly.[12]

Table 4. Short- versus Long-run Effects.

Variables	(1) Empl.	(2) Empl.	(3) Empl.	(4) Empl.
Taxshare top 1 percent	−.0161		.0264	
	(.0347)		(.0201)	
L1 taxshare top 1 percent	.0490	0.0347		
	(.0428)	(.0291)		
L2 taxshare top 1 percent	.00631	0.00628		
	(.0423)	(.0422)		
L3 taxshare top 1 percent	.0174	0.0173		
	(.0531)	(.0529)		
L4 taxshare top 1 percent	.0411	0.0501	.0671***	.0702***
	(.0578)	(.0524)	(.0192)	(.0191)
L5 taxshare top 1 percent	.00826	8.13e−05		
	(.0463)	(.0409)		
L6 taxshare top 1 percent	−.0204	−0.0203		
	(.0382)	(.0381)		
L7 taxshare top 1 percent	.0146	0.0146		
	(.0695)	(.0692)		
L8 taxshare top 1 percent	.0789	0.0848	.0681***	.0715***
	(.0694)	(.0685)	(.0196)	(.0189)
L9 taxshare top 1 percent	.000328	−0.00579		
	(.0429)	(.0421)		
L10 taxshare top 1 percent	−.0442	−0.0442		
	(.0422)	(.0420)		
L11 taxshare top 1 percent	.0337	0.0337		
	(.0470)	(.0468)		
L12 taxshare top 1 percent	−.0479	−0.0423	−.0618***	−.0623***
	(.0482)	(.0468)	(.0165)	(.0161)
L13 taxshare top 1 percent	.0184	0.0132		
	(.0454)	(.0445)		
L14 taxshare top 1 percent	−.0403	−0.0403		
	(.0425)	(.0425)		
L15 taxshare top 1 percent	−.0466	−0.0466		
	(.0508)	(.0507)		
L16 taxshare top 1 percent	.00422	0.00523	−.0452**	−.0433**
	(.0419)	(.0417)	(.0188)	(.0184)
Lagged unemployment rate	−.0256	−0.0262	−.0200	−.0168
	(.0204)	(.0203)	(.0195)	(.0194)
Lagged ATR all	.0376	0.0436	.0423	.0144
	(.0541)	(.0531)	(.0545)	(.0539)

Table 4. (continued)

	(1)	(2)	(3)	(4)
Variables	Empl.	Empl.	Empl.	Empl.
Lagged DIG	−.00445*	−0.00442*	−.00420*	−.00428*
	(.00250)	(.00249)	(.00238)	(.00238)
Lagged GDP growth	.346***	0.346***	.367***	.371***
	(.0360)	(.0357)	(.0369)	(.0368)
Constant	.315**	0.318**	.266**	.246*
	(.134)	(.133)	(.129)	(.129)
Observations	240	240	240	240
Adjusted R^2	.505	.507	.502	.500

Note: See note in table 2. Robust standard errors are given in parentheses. GDP = gross domestic product; ATR = average tax rate; DIG = difference in income growth.
*$p < .1$.
**$p < .05$.
***$p < .01$.

Transmission Mechanisms

Although we do not attempt to structurally model the behavior of employment growth in this article, we identify two possible channels that could explain the results.

The positive short-run impacts of an increase in the taxshare of the rich on employment can be explained by the difference in the MPC between the rich and everyone else. Because the tax multiplier is negative, increasing taxes hurts aggregate income and consumption while reducing taxes does the opposite. However, the magnitude of these effects increases with the MPC and lower-income earners tend to have a higher MPC (greater multiplier) than the rich. Hence, a purely redistributive policy that increases taxes on the rich while lowering taxes on everyone else leads to a net positive effect in the short run. The increase in aggregate income and consumption from lowering taxes on everyone else outweighs the negative effects from increasing taxes on the rich. By holding the overall tax pressure in the economy constant (ATR all), we are capturing the effects of a redistribution of the tax burden. That is, assuming the overall tax pressure in the economy remains the same, what happens when the rich are asked to pay relatively more (and implicitly, everyone else pays less)?

We test this channel by estimating the impact of an increase in the taxshare of various income groups on consumption in the short run. We consider the rich (top 1 percent and top 5 percent) as well as the bottom 80

Table 5. Transmission Mechanisms: Short Run.

	(1)	(2)	(3)	(4)
Variables	Cons.	Cons.	Cons.	Cons.
Taxshare top 1 percent	.116***			
	(.0317)			
Taxshare top 5 percent		.0985***		
		(.0311)		
Taxshare bottom 80 percent			−.0877**	
			(.0388)	
Taxshare bottom 90 percent				−.0848***
				(.0309)
Lagged unemployment rate	.00378	.00925	.00338	.00336
	(.0268)	(.0271)	(.0306)	(.0269)
Lagged ATR all	−.0625	−.0803	−.107	−.0889
	(.0831)	(.0822)	(.0661)	(.0842)
Lagged DIG	−.00101	−.000320	−.00126	−.000779
	(.00272)	(.00269)	(.00275)	(.00276)
Lagged GDP growth	.188**	.202**	.185***	.217***
	(.0783)	(.0801)	(.0684)	(.0812)
Constant	.672***	.623***	.605***	.641***
	(.167)	(.169)	(.199)	(.172)
Observations	252	252	184	252
Adjusted R^2	.122	.109	.097	.101

Note: See note in table 2. The dependent variable is the growth rate of consumption. Robust standard errors are given in parentheses. GDP = gross domestic product; ATR = average tax rate; DIG = difference in income growth.
*p < .1.
**p < .05.
***p < .01.

percent and bottom 90 percent. The results (table 5) are consistent with the explanation discussed above. Transferring more tax burden to the rich improves consumption growth while transferring more burden on everyone else hurts growth. The coefficient on the taxshare variables is statistically significant in all four regressions.

Regarding the long-run effects, a possible explanation is that higher tax burden on the rich could lead to diminished efforts and incentives from the segment of the population that possesses the resources to support investment and innovation. If this explanation holds, we should expect the increase in top earners' taxshare to have a negative longer-run effect on investment growth. We estimate the impact of an increase in taxshare on investment

Table 6. Transmission Mechanisms: Long Run.

	(1)	(2)	(3)	(4)	(5)
Variables	Inv.	Inv.	Inv.	Inv.	Inv.
Taxshare top 1 percent	0.540**				0.166
	(0.219)				(0.190)
L4 taxshare top 1 percent		−0.123			0.151
		(0.176)			(0.165)
L8 taxshare top 1 percent			0.281		−0.0260
			(0.203)		(0.170)
L12 taxshare top 1 percent				−0.426***	−0.405***
				(0.123)	(0.123)
L16 taxshare top 1 percent					−0.00462
					(0.138)
Lagged unemployment rate	0.509**	0.628***	0.423**	0.392**	0.354*
	(0.199)	(0.212)	(0.178)	(0.174)	(0.182)
Lagged ATR all	−0.127	−0.633	−1.330***	−1.004**	−0.398
	(0.629)	(0.587)	(0.488)	(0.485)	(0.528)
Lagged DIG	−0.00425	0.00554	−0.0300	−0.00243	−0.0102
	(0.0167)	(0.0178)	(0.0234)	(0.0156)	(0.0225)
Lagged GDP growth	1.289***	1.473***	1.225***	1.148***	1.182***
	(0.372)	(0.378)	(0.362)	(0.326)	(0.333)
Constant	−2.993**	−3.829***	−2.266**	−2.197**	−1.947*
	(1.237)	(1.353)	(1.081)	(1.061)	(1.098)
Observations	252	252	248	244	240
Adjusted R^2	.152	.125	.149	.168	.149

Note: See note in table 2. The dependent variable is the growth rate of investment. Robust standard errors are given in parentheses. GDP = gross domestic product; ATR = average tax rate; DIG = difference in income growth.
*$p < .1$.
**$p < .05$.
***$p < .01$.

growth contemporaneously, as well as one, two, three, and four years after the increase. The results reported in table 6 support the argument. The coefficient on the taxshare is negative and statistically significant for the third-year lag, while it is either positive or nonsignificant for shorter lags.

Robustness Checks

Romer and Romer exogenous tax policy changes. The second section discussed potential endogeneity issues due to economic conditions (including employment growth) causing tax changes instead of tax burden changes affecting the economy. To deal with this issue, the assumption was made that tax changes occurring one or more years earlier are not determined by the economy's current state. However, it is conceivable that policy makers forecast changes in economic conditions several periods ahead and initiate tax changes in anticipation. If so, even lagged tax variables may not be completely exogenous. To assess the robustness of the estimates, we consider the Romer and Romer (2010) analysis of all federal tax policy changes that occurred in the United States in the postwar period. Using narrative records such as presidential speeches and congressional reports, Romer and Romer separate all legislated tax changes that occurred in the postwar period into two broad categories: endogenous and exogenous tax changes. They classify as "endogenous" those tax changes made in response to factors likely to affect economic activity in the near future. Such changes include countercyclical tax policies and those driven by government spending. They classify as "exogenous" those tax changes that are not made to offset other factors causing output growth to deviate from normal. These include long-run growth and deficit-driven tax policy changes. A careful examination of the Romer and Romer narrative analysis reveals an opportunity to exploit their findings to test the robustness of our estimates. Figure 3 shows all legislated tax changes in the postwar period classified in the exogenous (panel A) and endogenous (panel B) categories. Almost all of the tax changes that occurred between 1976 and 2001 fall in the exogenous category.

Henceforth, the period from 1977Q1 to 2000Q4 is referred to as the *Romer and Romer exogenous tax change period*. The model is reestimated for this restricted sample and the results are shown in table 7. Regardless of the threshold definition of rich considered, positive and statistically significant coefficients are found in each of the four models. All models indicate that an increase in the relative tax burden of the rich positively affects employment growth in the short run. Moreover, the effects are larger than those found using the full sample and presented above. This finding is consistent with Romer and Romer's (2010) finding that the effects of exogenous tax increases are much larger than those found using broader measures of tax changes.[13]

Additional robustness checks. We perform a number of additional robustness checks that are not presented in the study for conciseness sake. We report these in the Online Appendix, including using the average tax rate instead of taxshare, substituting changes in tax burden for top earners and others for

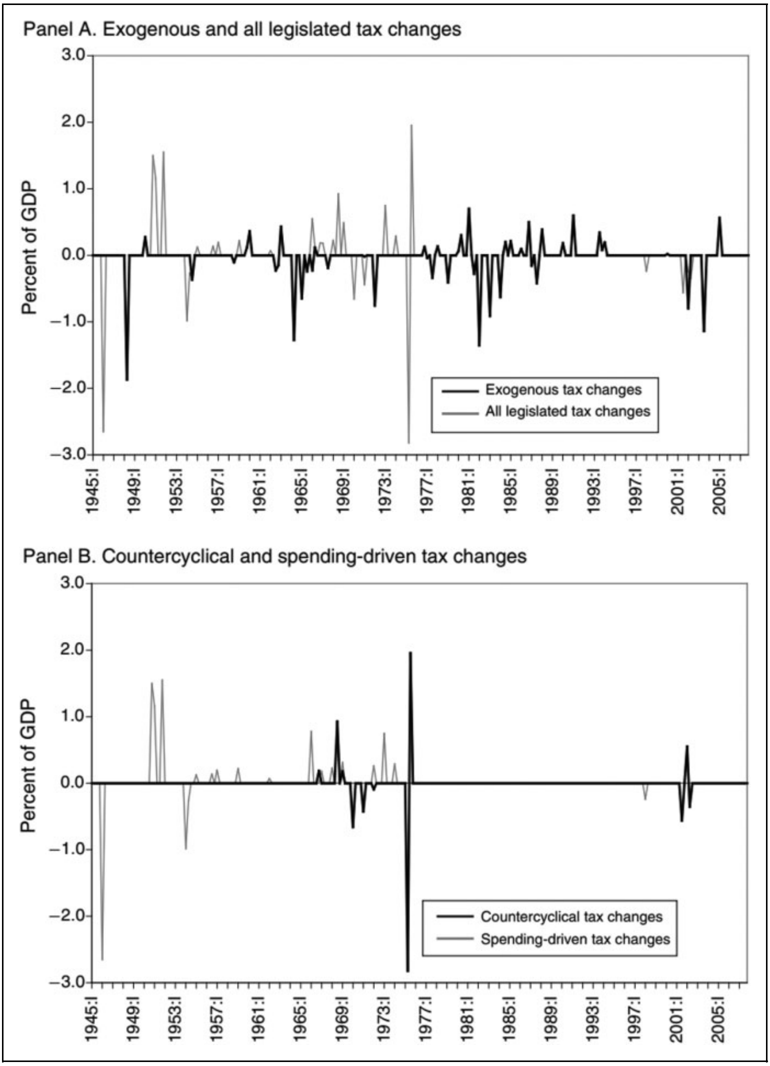

Figure 3. Romer and Romer's (2010) narrative analysis of tax changes. Panel A shows all legislated tax changes from 1945Q1 to 2005Q4. Panel B shows only tax changes classified as "endogenous" according to Romer and Romer's narrative record analysis. The period from 1977Q1 to 2000Q4 has practically no endogenous changes. *Source*: Data from Romer and Romer (2010).

Table 7. Using Romer and Romer's Exogenous Tax Change Period.

	(1)	(2)	(3)	(4)
Variables	Empl.	Empl.	Empl.	Empl.
Lagged taxshare top 0.1 percent	.119***			
	(.0338)			
Lagged taxshare top 0.5 percent		.0876***		
		(.0273)		
Lagged taxshare top 1 percent			.100***	
			(.0264)	
Lagged taxshare top 5 percent				.0804***
				(.0290)
Lagged unemployment rate	−.0520*	−.0130	−.0298	−.0267
	(.0313)	(.0277)	(.0273)	(.0296)
Lagged ATR all	−.175*	−.141	−.159*	−.142
	(.0900)	(.0864)	(.0862)	(.0901)
Lagged DIG	−.000906	−.00372	−.00334	−.00311
	(.00319)	(.00337)	(.00314)	(.00351)
Lagged GDP growth	.293***	.291***	.271***	.294***
	(.0469)	(.0463)	(.0425)	(.0448)
Constant	.595***	.329*	.439**	.403*
	(.210)	(.194)	(.190)	(.205)
Observations	96	96	96	96
Adjusted R^2	.375	.372	.395	.353

Note: The sample is restricted to the Romer and Romer's exogenous tax change period (from 1977Q1 to 2000Q4). Robust standard errors are given in parentheses. GDP = gross domestic product; ATR = average tax rate; DIG = difference in income growth.
*$p < .1$.
**$p < .05$.
***$p < .01$.

taxshare, addressing serial correlation issues, and using annual instead of quarterly data. In all of these alternatives, the results are consistent with the key findings reported in the article.

VAR Analysis

Unrestricted VAR. The VAR approach is used to complement the regression analysis of the short- and long-run effects of increasing taxes on the rich. With the VAR approach, the dynamics of employment growth can be systematically captured by including own lags. In addition, by using IRFs,

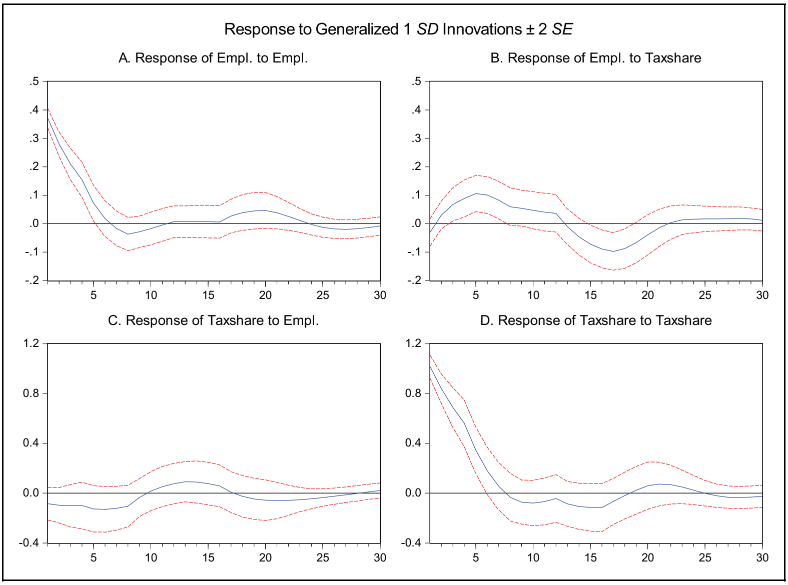

Figure 4. Unrestricted vector autoregressive, select lags.

the impact of tax variable innovations can be better tracked over time and short- and long-run effects can be better distinguished.

The system of equations (4) is first estimated as an unrestricted VAR with sixteen quarterly lags.[14] Next, we follow the same logic as with the single-equation regressions and exclude consecutive quarterly lags of the same year. Specifically, we only include lags 1, 4, 8, 12, and 16. The IRFs are shown in figure 4 for various pairwise combinations of employment growth and taxshare.[15] The general pattern of the IRFs is the same for the full and reduced models.

The IRF in panel B (figure 4) shows the response of employment growth to an exogenous change in the taxshare of the rich and how that response varies over time.[16]

Two interesting results appear. First, a positive and statistically significant impact appears in the short run (1–2.5 years after the shock), and second, a negative and statistically significant impact surfaces in the long run (approximately 4 years after the shock). The cumulative effect stays positive in both the short run and the long run.[17] These VAR results are consistent with the findings of the single-equation regression analysis presented above.

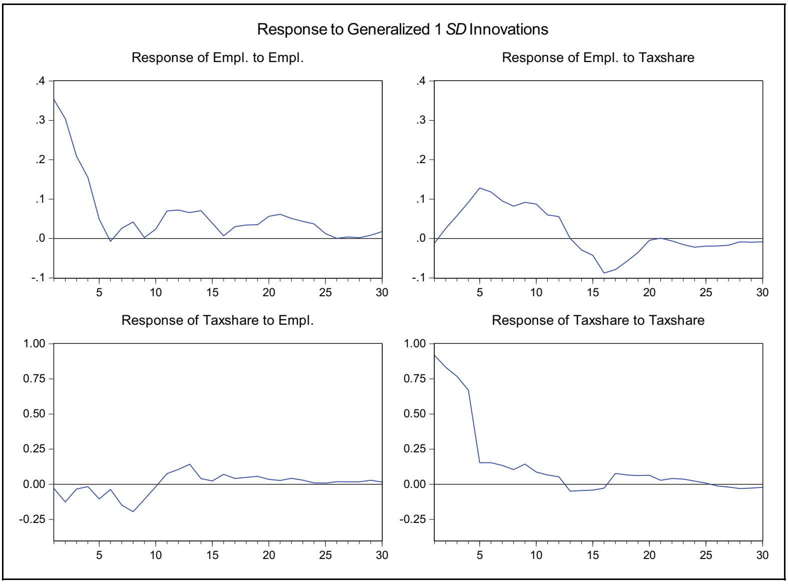

Figure 5. Bayesian vector autoregressive.

Importantly, panel C (figure 4) shows that the taxshare variable is not significantly affected by exogenous changes in employment growth. This finding eliminates concerns of potential reverse causation. Also, a Granger (non-)causality test was performed and the results suggest absence of causation from employment growth to taxshare. Conversely, the null hypothesis of absence of causation from taxshare to employment growth is rejected at the 1 percent level.[18]

Bayesian VAR. One natural problem with VAR estimation is the need for large samples because of the large number of coefficients to estimate. For example, in the system of equations (4) VAR with two endogenous variables, sixteen lags, and at least one exogenous variable, there are $2 \times (16 \times 2 + 1) = 66$ coefficients to be estimated. With three endogenous variables, the number of coefficients to estimate increases to 147. This large number of parameters to estimate is certainly an issue here given the limited sample size. One way to deal with this issue is to restrict some of the coefficients to zero by excluding some lags altogether. This step was taken in the selected lag unrestricted VAR specification discussed earlier. However, Bayesian VAR provides an alternative that does not require imposing these strong restrictions. In the Bayesian VAR specification, all the lags are included that would optimally be included if the sample size were not a concern (sixteen lags in this case). Coefficient-specific prior distributions are then specified to convey additional information about the model. A modified version of the Litterman-Minnesota priors is used.[19]

The modification pertains to the treatment of annually observed variables. As the taxshare variable only changes every four quarters, lags 4, 8, 12, and 16 are allowed to have diffuse priors. All other prior variances are calculated based on commonly used hyper-parameters for Minnesota priors. The Bayesian VAR's results are illustrated in figure 5. The general patterns are similar to what we obtained in the unrestricted VAR analysis. In particular, the results point to positive short-run effects of taxshare on employment growth and negative long-run effects.[20]

Conclusion

The impact on employment growth from increasing taxes on the rich has been empirically investigated using US time-series data from the IRS SOI. Positive and statistically significant short-run effects, negative and statistically significant long-run effects, and positive cumulative effects have been identified. An exhaustive number of alternative specifications and estimation methods have been used that produce consistent findings. For one of the robustness checks, the sample is restricted to a period of purely exogenous tax changes based on the Romer and Romer (2010) narrative record analysis. The results from the restricted exogenous sample point to even larger effects. This finding is consistent with that of Romer and Romer where estimated tax effects obtained using the restricted measure of exogenous tax changes are larger than those found using broader measures of tax changes.

One of the limitations of this study, similar to empirical analyses of government spending multipliers (e.g., Ramey 2011), is that we do not structurally identify the transmission mechanisms whereby tax burdens affect employment growth. Our regressions on aggregate consumption and investment suggest that some of the positive effects observed in the short run may be driven by redistribution effects, while adverse impacts on investment, innovation, and entrepreneurship may be driving the negative long-run effects. Although the short- and long-run impacts have been identified in this study, the question of what specifically drives these results is open for future research.

Acknowledgments

We thank Donald Bruce, William Fox, Seth Giertz, Laura Kawano, Mohammed Mohsin, Daniel Wilson, and anonymous referees for providing helpful comments and suggestions on earlier drafts of this article.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Supplementary Material

Supplementary material for this article is available online.

Notes

1. See, for example, Atkinson, Piketty, and Saez (2011), Autor, Katz, and Kearney (2008), Bakija, Cole, and Heim (2012), Mankiw (2013), Piketty and Saez (2003), and Stiglitz (2012).
2. The number of nonfarm payroll employment jobs used in this example is the average for 2011, the last year in the sample. *Source*: Bureau of Labor Statistics.
3. The case could be made that policy makers are forward thinking and make adjustments to tax laws in anticipation of future changes in economic conditions. We address this concern in our robustness check section.
4. As the behavior of employment growth is not explicitly modeled, we consider alternative specifications where lagged gross domestic product (GDP) growth is added to capture some of the effects of the determinants of the dependent variable.
5. We also experiment with alternative methods to control for the heterogeneity in income growth across income groups. We consider the lagged difference-in-difference of income growth rate across groups. None of the alternative specifications significantly affect the results discussed in the fourth section. One caveat to the difference in income growth (DIG) variable is that the rising concentration of income has increasingly taken the form of wage and salary income. We tried alternative measures of income growth for the rich, including changes in the income share of the rich and growth rate of income of the rich. In the fourth section, the overall short- and long-run results are discussed.
6. As argued by Slemrod (2000), there are some caveats in using annual income as the metric to define *rich*. For example, a household that receives a one-time

high income in a given year may be misleadingly classified as rich. Slemrod also discusses alternative affluence indicators, such as wealth, lifetime consumption, and lifetime income. In this study, annual income is used because it is the only measure for which data are available by group for multiple years.

7. It should be noted that this relationship is nonlinear. When a quadratic taxshare term is added, we find its coefficient to be negative and statistically significant. This suggests that the positive impact of increasing taxes on the rich on employment growth falls as the tax burden on the rich continues to increase.
8. See note 4.
9. The adjusted R^2 largely increases from less than .05 to more .50 once GDP growth is added.
10. That is, the coefficients are effectively restricted on all other quarterly lags to zero. This assumption is relaxed later on in the Bayesian vector autoregressive (VAR) analysis using informative priors.
11. In alternative specifications, we treat the DIG variable the same way we treat the taxshare variable, by adding up to four yearly lags. The results are mostly consistent with those presented in table 4.
12. Calculations based on 132 million payroll employment jobs in the economy.
13. We also replicate the short- versus long-run analysis that is presented in table 4 using the restricted samples. The estimated coefficients for the first- and second-year lags are still positive and strongly significant. The estimated coefficients for the long run (third- and fourth-year lags) keep their negative signs. However, the coefficient on the third lag is no longer statistically significant, and the coefficient on the fourth lag is significant only at the 10 percent level. The limited length of the *exogenous tax change period* (twenty-three years) likely contributes to the imprecise estimates of the long-run effects. The results are available in the Online Appendix.
14. Various VAR lag order selection criteria (including the Akaike's information criterion, the likelihood ratio test, and the Schwarz criterion) are used to determine the approximate lag length.
15. The impulse response functions (IRFs) shown are generalized impulses (GIRF) as described in Pesaran and Shin (1998). Because no contemporaneous correlation exists in the VAR residuals (tested), the GIRF results do not differ much from the simple nonorthogonalized IRFs or the Cholesky-orthogonalized IRFs.
16. Panels A and D show the response of each endogenous variable to its own shocks and are not of much interest in this study.
17. The cumulative IRF figure is available in the Online Appendix.
18. The Granger causality results are available in the Online Appendix.
19. This type of priors essentially adjusts the precision of a given coefficient's prior distribution based on how weak the effects are believed to be. As longer lags are

believed to have weaker effects than shorter lags, the prior's variance decreases with the lag length. For example, the distribution of lag 10's prior will be more concentrated around zero compared to that of lag 1 or 2. Detailed discussions of the Minnesota priors as well as other types of priors are provided in Koop and Korobilis (2010) and Lutkepohl (2007).

20. A Bayesian VAR is also estimated based purely on Minnesota priors (without special treatment of yearly taxshare lags) and the results are very similar.

References

Alm, J., and J. Rogers. 2010, September. "Do State Fiscal Policies Affect State Economic Growth?" *Public Finance Review* 39:483–526.

Atkinson, A. B., T. Piketty, and E. Saez. 2011. "Top Incomes in the Long Run of History." *Journal of Economic Literature* 49:3–71.

Auten, G., R. Carroll, and G. Gee. 2008. "The 2001 and 2003 Tax Rate Reductions: An Overview and Estimate of the Taxable Income Response." *National Tax Journal* 61:345–64.

Autor, D. H., L. F. Katz, and M. S. Kearney. 2008. "Trends in US Wage Inequality: Revising the Revisionists." *The Review of Economics and Statistics* 90:300–23.

Bakija, J., A. Cole, and B. T. Heim. 2012. "Jobs and Income Growth of Top Earners and the Causes of Changing Income Inequality: Evidence from US Tax Return Data." Working Paper, Williamstown, MA.

Barro, R. J., and C. J. Redlick. 2011. "Macroeconomic Effects from Government Purchases and Taxes." *The Quarterly Journal of Economics* 126:51–102.

Bernanke, B. S., and I. Mihov. 1998. "Measuring Monetary Policy." *The Quarterly Journal of Economics* 113:869–902.

Blanchard, O., and R. Perotti. 2002, November. "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output." *Quarterly Journal of Economics* 1329–68.

Böhringer, C., S. Boeters, and M. Feil. 2005, January. "Taxation and Unemployment: An Applied General Equilibrium Approach." *Economic Modelling* 22: 81–108.

Congressional Budget Office (CBO). 2013, May. "The Distribution of Major Tax Expenditures in the Individual Income Tax System." CBO Pub. No. 4308.

Favero, C., and F. Giavazzi. 2012. "Measuring Tax Multipliers: The Narrative Method in Fiscal VARs." *American Economic Journal: Economic Policy* 4:69–94.

Goolsbee, A. 2000. "What Happens When You Tax the Rich? Evidence from Executive Compensation." *Journal of Political Economy* 108:352–78.

Gordon, D. B., and E. M. Leeper. 1994. "The Dynamic Impacts of Monetary Policy: An Exercise in Tentative Identification." *Journal of Political Economy* 102: 1228–47.

Koop, G., and D. Korobilis. 2010. *Bayesian Multivariate Time Series Methods for Empirical Macroeconomics*. Delft, the Netherlands: Now.

Lutkepohl, H. 2007, May. *New Introduction to Multiple Time Series Analysis, Vol. 31*. New York: Springer.

Mankiw, N. G. 2013, August. "Defending the One Percent." *Journal of Economic Perspectives* 27:21–34.

Nakamura, E., and J. Steinsson. 2014. "Fiscal Stimulus in a Monetary Union: Evidence from US Regions." *American Economic Review* 104: 753–92.

Perotti, R. 2008. "In Search of the Transmission Mechanism of Fiscal Policy." In *NBER Macroeconomics Annual 2007*, Vol. 22, edited by D. Acemoglu, Kenneth Rogoff, and Michael Woodford, 169–226. Chicago: University of Chicago Press.

Pesaran, H. H., and Y. Shin. 1998. "Generalized Impulse Response Analysis in Linear Multivariate Models." *Economics Letters* 58:17–29.

Piketty, T. 2014. *Capital in the Twenty-first Century*. Cambridge, MA: Harvard University Press.

Piketty, T., and E. Saez. 2003. "Income Inequality in the United States, 1913–1998." *The Quarterly Journal of Economics* CXVIII.

Piketty, T., E. Saez, and S. Stantcheva. 2014, February. "Optimal Taxation of Top Labor Incomes: A Tale of Three Elasticities." *American Economic Journal: Economic Policy* 6:230–71.

Ramey, V. A. 2009. "Defense News Shocks, 1939–2008: Estimates Based on News Sources." Unpublished paper retrieved from http://econweb.ucsd.edu/~vramey/research/Defense_News_Narrative.pdf

Ramey, V. A. 2011. "Can Government Purchases Stimulate the Economy?" *Journal of Economic Literature* 49:673–85.

Romer, C., and J. Bernstein. 2009. "The Job Impact of the American Recovery and Reinvestment Plan." *Council of Economic Advisers Report* 1–13.

Romer, C. D., and D. H. Romer. 2010. "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks." *American Economic Review* 100:763–801.

Saez, E., J. Slemrod, and S. H. Giertz. 2012, March. "The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review." *Journal of Economic Literature* 50:3–50.

Slemrod, J. 2000. "The Economics of Taxing the Rich." In *Does Atlas Shrug? The Economic Consequences of Taxing the Rich*, edited by Joel B. Slemrod. Cambridge MA: Harvard University Press.

Stiglitz, J. E. 2012. *The Price of Inequality: How Today's Divided Society Endangers Our Future*. New York: W. W. Norton.

Zidar, O. M. 2015, March. “Tax Cuts for Whom? Heterogeneous Effects of Income Tax Changes on Growth and Employment.” Working Paper 21035, National Bureau of Economic Research, Cambridge, MA.

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