

THE ROLE OF TAXES IN MITIGATING INCOME INEQUALITY ACROSS THE U.S. STATES

Daniel H. Cooper, Byron F. Lutz, and Michael G. Palumbo

This paper examines the role that federal and especially state tax policies play in mitigating income inequality. The results show that the tax code reduces income inequality considerably in all states. All of this income compression is attributable to federal taxes, as state taxes, on average, widen the after-tax income distribution slightly. Nevertheless, there is very substantial cross-state variation in the impact of state tax policies. The paper further documents that the mitigating influence of taxes on income inequality has risen since the early 1980s, with the increase at the state level due mostly to changes to the tax code.

Keywords: income inequality, state tax policies

JEL Codes: H71, H24, J31

I. INTRODUCTION

Income inequality has been increasing in the United States since at least 1980 and possibly as far back as 1970 (Gottschalk and Smeeding, 2000). The tax policies of the federal and state governments are a potential compensating factor in the rise in income inequality, particularly as they relate to progressivity or the rate at which taxes rise with income.

This paper quantifies the role of taxes in mitigating income inequality. Our work complements past research on this question by focusing on the extent to which taxes — both federal and state — ameliorate income inequality and by considering all major elements of state tax systems, including sales tax exemptions, motor fuel taxes, and state earned income tax credit (EITC) programs. The influence of state tax systems on inequality is of considerable interest given their size — state taxes are equal to roughly

Daniel H. Cooper: Research Department, Federal Reserve Bank of Boston, Boston, MA, USA (daniel.cooper@bos.fed.org)

Byron F. Lutz: Division of Research and Statistics, Federal Reserve Board, Washington, DC, USA (byron.f.lutz@frb.gov)

Michael G. Palumbo: Division of Research and Statistics, Federal Reserve Board, Washington, DC, USA (michael.g.palumbo@frb.gov)

5 percent of U.S. GDP — and because of the significant heterogeneity across states in the redistributive capacity of their tax regimes. Our work is also relatively unique in that it isolates the impact of tax policy changes at both the federal and state level on inequality over an unusually long span of time.

Our analysis is based on data from the Current Population Survey (CPS) and has two components. The first component is cross-sectional in nature. Averaging over nearly the past 30 years, it compares before-tax and after-tax inequality among each of the 50 states and the District of Columbia. Overall, we find that the combined federal and state tax codes substantially mitigate income inequality. However, state tax systems, on average, tend to increase income inequality slightly. This average effect, though, obscures economically meaningful differences across the states. In a few states, such as Minnesota, Oregon, and Wisconsin, state taxes compress the income distribution about one-sixth as much as federal taxes do. In contrast, the tax systems in a handful of states, including Mississippi, Tennessee, and West Virginia, widen the income distribution sufficiently to reverse around one-third of the compression achieved by the federal tax code. In terms of specific tax instruments, we find that the state-levied gasoline tax tends to widen the after-tax income distribution by a moderate amount. In a number of states, though, it has a larger effect and reverses about one-tenth of the compression achieved by the federal tax code. Our analysis also shows that exemptions for food and clothing from some states' sales taxes play a quantitatively important role in narrowing the after-tax income distributions in these states. Finally, we document that state EITC programs meaningfully reduce income inequality in a number of states.

The second component of our analysis assesses the evolution over time of tax-induced income compression. We find that income compression brought about by federal and state taxes has increased significantly over the last 30 years, with a more pronounced increase in compression in the bottom half of the income distribution than in the top half. About two-thirds of this increase is due to the federal tax system and the remaining one-third is due to the state tax systems.

Our analysis concludes by decomposing this increase in tax compression into the portion attributable to legislated changes in the tax code and the portion attributable to changes in the pre-tax distribution of income. We conclude that at the state level the increase in compression is explained mostly by changes to the tax code. In contrast, at the federal level we find a majority of the increase is due to the widening of the before-tax income distribution interacting with the progressive nature of the federal personal income tax code.

Given data limitations with the CPS, our analysis focuses on inequality in what we term the "broad middle" of the income distribution and does not focus on the widely discussed increase in concentration at the extreme high end of the distribution. The remainder of the paper proceeds as follows. Section II discusses the past literature on taxes and inequality and highlights our contributions. Section III discusses our methodology. Section IV presents the data. Section V discusses the results, and Section VI concludes.

II. RELATED LITERATURE

This paper is closely related to two distinct literatures — the pre-tax income inequality literature and the literature on post-tax inequality and the redistribution of income through the tax system. There is a vast body of work in these areas and a comprehensive review is well beyond the scope of this paper. Instead, we provide a selective review that summarizes the general conclusions of related past work and highlights our contribution.

A large share of the pre-tax inequality literature has focused on wage, or earnings, inequality. This work suggests that there was a broad-based surge in wage inequality from 1979 through 1987 as lower incomes fell and upper incomes rose. Since 1988, the labor market has become “polarized” as upper-income inequality has continued to rise, while the increase in lower-income inequality has eased or even partially reversed. These stylized facts can be largely reconciled with changes in the supply of and demand for skilled workers and the erosion of labor market institutions, such as the minimum wage and labor unions, which had played an important role in supporting middle and low incomes.¹

Taking a broader focus by examining all income, including government transfers, and by expanding the unit of analysis from the individual to the household or family, past researchers who examined the very broad middle of the income distribution have mostly found that total income inequality grew rapidly in the 1980s and then slowed or even flattened in the 1990s (Gottschalk and Danziger, 2005; Burkhauser, Feng, and Jenkins, 2009; Burkhauser et al., 2011). Papers that examine all (or most) of the 2000s have generally concluded that inequality rose more quickly over this period than in the 1990s (Meyer and Sullivan, 2013; Attanasio, Hurst, and Pistaferri, 2012).

Most directly relevant for this paper is the previous research that explicitly explores the connection between income inequality and taxes. Most of this work compares pre-tax inequality to post-tax inequality to infer the effect of the tax system on inequality. Piketty and Saez (2007) and the Congressional Budget Office (2011) conclude that the tendency of the federal tax system to reduce income inequality has waned over time. In contrast, Debacker et al. (2013) find that the ability of the federal system to reduce inequality has increased very slightly with time. The differing conclusions may reflect that Debacker et al. (2013) consider only federal income and payroll taxes, while the other authors consider a larger set of federal tax instruments including the corporate income tax. Leigh (2008) adds state taxes to the mix, but only considers personal income taxes.

Similar and contemporaneous work to this paper includes Bargain et al. (2011, 2015) who examine the effect of legislated policy changes on the post-tax distribution of income, focusing primarily on the federal tax code. This paper, however, focuses substantially more on state tax systems and state-by-state analysis. In particular, we provide a thorough analysis of the influence of state taxes on income inequality. In addition to state personal income taxes, we also analyze the role of motor fuel taxes, sales taxes (including exemptions for food and clothing), and state EITC programs. Most previous

¹ This discussion draws heavily from Autor, Katz, and Kearney (2008).

examinations of after-tax inequality in the United States present results for the nation as a whole. To the best of our knowledge, the detailed analysis of multiple facets of state tax systems on a state-by-state basis makes this work by far the most comprehensive analysis of the connection between state taxation and income inequality to date. Finally, we analyze our data over nearly three decades — an unusually long time horizon.

III. METHODOLOGY

A. Measuring Income Inequality

Studies of income inequality vary along three primary dimensions — the inequality metric, the unit of analysis, and the income metric (Karoly, 1994). We use the 90/10 income differential (the difference between incomes at the 90th percentile of the income distribution and the 10th percentile, measured in natural logs). The 90/10 income split, which has been widely used in the recent literature on both income and wage inequality, can be viewed as capturing inequality over the “broad middle” of the income distribution.

Turning to the unit of analysis, we examine all non-elderly households (i.e., those whose head is between ages 16 to 64). We exclude elderly households because we are focusing on tax policy, not on transfers targeted at the elderly such as Social Security. To adjust for differences in family size we scale our income measures by $(A + 0.7C)^{0.7}$, where A is the number of adults in the household and C is the number of children. This scaling allows for differences in costs between adults and children and displays diminishing marginal costs with each additional adult equivalent (Meyer and Sullivan, 2013). For income, we use money income, which is fairly standard in the literature on income inequality. Money income is the sum of wages and salaries, business and farm income, capital income, and private and governmental transfers (e.g., disability payments). Note that money income does not include imputed rent on owner-occupied housing, unrealized capital gains, the value of fringe benefits including employer-provided health insurance, and employer-provided pension and retirement plan contributions. (Burkhauser, Larrimore, and Simon (2012) examine the effect on measured inequality of accounting for fringe benefits such as employer-provided health insurance.)

B. Interpreting the Income Compression Metric

We quantify the effect of taxes on income inequality by measuring their tendency to compress the income distribution — that is, by comparing before-tax measures of inequality to the corresponding after-tax measures. The primary income compression metric is the difference between the before and after-tax 90/10 income split

$$(1) \quad comp_{90/10} = [\log(Y_{90}) - \log(Y_{10})] - [\log(Y_{90}(1 - t_{90})) - \log(Y_{10}(1 - t_{10}))],$$

where Y_g is income at the g^{th} percentile of the before-tax income distribution and t_g is the average tax rate at the g^{th} percentile. The first term in brackets in (1) approximates

the percentage difference between before-tax incomes at the 90th and 10th percentiles, while the second term captures this percentage difference for after-tax incomes.

Simplifying the terms in (1) reveals that $comp_{90/10}$ is solely a function of the average tax rates at the different points in the before-tax income distribution,

$$(2) \quad comp_{90/10} = \log \left(\frac{1-t_{10}}{1-t_{90}} \right).$$

A system in which taxes are perfectly proportional to income will have a constant average tax rate: $t_{90} = t_{10}$. Such a system would produce no compression of the income distribution because $t_{90} = t_{10} \Leftrightarrow comp_{90/10} = 0$. A progressive tax system has average tax rates that increase with income (Musgrave and Thin, 1948): $t_{90} > t_{10}$. Such a system therefore produces compression because $t_{90} > t_{10} \Leftrightarrow comp_{90/10} > 0$. Thus, the $comp_{90/10}$ metric can be viewed as a measure of tax progressivity. A positive value indicates a progressive tax, 0 indicates a proportional tax, and a negative value indicates a regressive tax. See the online appendix for a further discussion of this metric.²

C. Tax Incidence Assumptions

The statutory incidence of a tax — i.e., the legal responsibility for paying the tax — may differ from the economic incidence of the tax. We generally follow the previous literature in our incidence assumptions. As in Musgrave, et al. (1951), Gramlich, Kasten, and Sammartino (1993), and numerous others, we assign the incidence of both the employee and employer portions of payroll taxes to workers, the incidence of personal income taxes to the individuals receiving the income, and the incidence of general sales and excise taxes to those who consume the taxed commodities. These assumptions render large-scale empirical incidence estimates feasible. Furthermore, they are generally quite consistent with recent empirical research.

Starting with the payroll tax, the assumption that the full incidence falls on workers has been “tested and confirmed repeatedly” (Fullerton and Metcalf, 2002, p. 1822). Although it has been almost universally assumed that the legal and economic incidence of the personal income tax are equal, this assumption has never been tested (Fullerton and Metcalf, 2002). However, as discussed below in Section III.D, recent research has concluded that individuals in the broad middle of the income distribution — the focus of this study — display little behavioral response to changes in income tax parameters. It is a “fundamental principle” of incidence analysis that the inelastic agent bears the incidence of a tax (Kotlikoff and Summers, 1987, p. 1047). The implication is that the individual being taxed bears the full incidence of the income tax.

There is an important caveat, though, to the above conclusion: it is possible that the incidence of the progressive element of state income taxation may not fall on the workers due to labor mobility. If an increase in the progressivity of a state’s income tax causes

² The online appendix is available at <http://byron.marginalq.com>.

high-wage workers to exit the state and low-wage workers to enter, then pre-tax wages will be pushed up for high-skilled workers and pushed down for low-skilled workers. This shift in the distribution of pre-tax wages will offset the increased progressivity of taxes. Feldstein and Wrobel (1998) find evidence in support of this hypothesis using a cross-sectional research design. More recent work, however, that exploits changes in state taxes over time finds much less support for the hypothesis. In particular, Leigh (2008) concludes that shifts in personal income tax progressivity do not affect the pre-tax wage distribution in a state (see also Thompson, 2011). Overall, we interpret the recent empirical evidence as supportive of our assumption that the incidence of the personal income tax falls on wage earners.

The assumption that the general sales tax falls on consumers is supported by results in Poterba (1996), although there is also evidence of overshifting (Besley and Rosen, 1999). Overshifting occurs when prices rise by more than the amount of the tax — a phenomenon consistent with models of tax incidence under imperfect competition. We test the robustness of our conclusions to overshifting of the sales tax. Turning to the gasoline tax, recent evidence strongly suggests that the tax is fully born by consumers at the state level (Marion and Muehlegger, 2011; Alm, Sennoga, and Skidmore, 2009).³

The incidence of the corporate income tax depends crucially on the extent of international capital mobility; in a small open economy the tax falls fully on labor, while in a closed economy it falls fully on capital (Fullerton and Metcalf, 2002).⁴ Although we do not account for the corporate income tax in our primary results, we provide sensitivity analysis that demonstrates our conclusions are robust to accounting for this tax under varying assumptions about its incidence. Finally, we do not account for the property tax in any of our results because it is primarily a local tax while our focus is on state and federal taxes.⁵

³ Federal gas tax receipts are a very small fraction of overall federal tax collections and have little effect on our conclusions.

⁴ Gravelle (2013) explores important caveats to the canonical view and concludes that, even in an open economy, capital potentially bears virtually the entire burden of the tax.

⁵ One view of property tax incidence suggests property taxes are not a tax at all but instead are a payment for local public goods consumption within a Tiebout-style economy. Inman (1994, p. 90) uses this logic to argue that the property tax is “irrelevant to matters of economic fairness and hence tax progressivity.” Under this view, it would be incorrect to include property taxes in a study of the distributional consequences of taxation. Other views of the property tax, though, suggest it is a tax on capital. Fischel (2001), Oates (2001), Nechyba (2001), and Zodrow (2001) provide an overview of this literature. The empirical evidence in Lutz (2015) points toward a synthesis of the two views, with an area’s housing supply elasticity playing a key role in determining which framework is *relatively* more appropriate: In dense areas with stringent land use regulation — i.e., areas with low housing supply elasticity — the benefit view is likely a relatively better characterization of the tax. In contrast, in less dense areas with less land use regulation — i.e., areas with high housing supply elasticity — the capital tax view is likely the relatively better characterization.

D. Limitations

There are two important limitations to the methodology employed in this paper that deserve mention. First, measuring income in the far tails of the distribution is quite challenging. Particularly relevant for this study is the top-coding of income in the CPS micro-data. That is, the CPS assigns income values above a certain threshold (by income component) to that threshold in order to protect the confidentiality of the CPS respondents. Although we carefully adjust our data to reflect this top-coding, it remains inappropriate for analysis of the very high end of the income distribution. Such analysis is best left to studies focused on the very top earners and undertaken with income tax-filing data (Piketty and Saez, 2003; Saez and Veall, 2005) or specialized data such as executive compensation records (Frydman and Saks, 2010). Our inability to measure top incomes is an important limitation because a significant portion of the rise in inequality in recent years is due to rapid gains at the extreme top of the distribution (Piketty and Saez, 2003). Turning to the lower end of the distribution, transfer income from the government is a critical component of total income for the poor. Unfortunately, measuring transfer income has become increasingly difficult. In particular, reporting rates for transfer income in the CPS have deteriorated in recent years for programs such as TANF and food stamps (Meyer, Mok, and Sullivan, 2009).

As a result of the difficulties faced in using the CPS to measure income in the tails of the distribution, we focus on inequality as measured in the broad middle of the distribution using the 90/10 income differential.⁶ While our inability to measure inequality across the full breadth of the income distribution is a limitation, inequality in the broad middle of the distribution remains of substantial interest.

The second limitation involves the possibility of behavioral responses to taxation. Taxes may influence the after-tax income distribution through both a direct mechanical effect and an indirect behavioral response. For instance, if the top marginal rate of the personal income tax is lowered, but other tax brackets are left unchanged, high-earners may increase their supply of labor. This tax change would therefore increase inequality by both increasing before-tax income inequality (a behavioral response operating through labor supply) and lessening the compression of the after-tax distribution achieved by the tax code (a mechanical response). Our approach primarily captures the direct, mechanical response. Any behavioral responses to taxes are captured in before-tax income inequality.⁷

Behavioral responses to taxation, however, are likely of only limited relevance for our examination of broad middle-income inequality. Recent research has found evidence

⁶ Use of the 90/10 metric mitigates, but fails to eliminate, the problem of mismeasurement of transfer income; the households at the 10th percentile of the income distribution in our sample typically receive substantial transfers from governmental sources. We note, though, that the mismeasurement of transfer income is a limitation of virtually the entire literature that has examined income inequality using the CPS (Gottschalk and Danziger, 2005; Heathcote, Perri, and Violante, 2010).

⁷ See Gramlich, Kasten, and Sammartino (1993) for further details.

of a substantial behavioral response to income taxes at the high end of the distribution, but it has generally concluded that there is little evidence of a behavioral response in the broad middle of the distribution.⁸ However, there is substantial evidence of a labor supply response to the EITC at the lower end of the income distribution; see the surveys by Eissa and Hoynes (2006) and Hotz and Scholz (2003). We therefore conduct sensitivity analysis that incorporates a behavioral response to the EITC into our income compression metrics and find that our conclusions are not substantially altered.

Finally, we acknowledge that we rely on annual incidence estimates, which can differ substantially from lifetime tax incidence calculations (Metcalf, 1994). For example, certain individuals, such as students and retirees, may have low annual income but high lifetime income. Thus, “static,” point-in-time incidence calculations can differ from “dynamic” incidence calculations based on a person’s lifetime tax liabilities and income. An earlier version of this paper (Lutz, Cooper, and Palumbo, 2012) included an exercise that suggested that lifetime tax compression was little different from static tax compression.

IV. DATA

The main data source for this paper is the March CPS, which we accessed through IPUMS-USA (King et al., 2010). The March CPS contains detailed information on annual earnings for U.S. households in all 50 states and the District of Columbia, allowing us to evaluate the impact of state tax policies across every state.⁹ Percentile and other distributional analysis use the CPS household weights to ensure that the analysis is representative of the overall U.S. population.

In order to address the top-coding of income in the CPS, we use cell means developed by Larrimore et al. (2008). These cell means are based on internal CPS data and provide the mean value of all income values that fall above the top-code amount. By using these cell means, it is possible to replicate closely the inequality trends found in the internal

⁸ For example, Saez (2010) finds no evidence of bunching at kink points in the tax schedule beyond the first income tax bracket, suggesting no behavioral response to taxes through much of the income distribution. Similarly, Saez, Slemrod, and Giertz (2010) note that the economics profession has settled on a value near zero for the compensated labor supply elasticity, suggesting little labor supply response to taxes. However, they note that estimates of the elasticity of taxable income suggest taxpayers are somewhat more prone to adjust behavior on other margins (e.g. engage in tax avoidance) and that such responses are particularly prevalent at the upper end of the income distribution. In terms of additional evidence on the upper end of the distribution, Saez (2004) finds substantial evidence of behavioral responses for the top 1 percent of earners. Auerbach (1988) documents that capital gains, which accrue mostly to very high-income individuals, are quite responsive to changes in marginal tax rates. Chetty and Saez (2005, p. 792) document that dividend income, which “accrues very disproportionately to wealthy individuals,” is also quite sensitive to tax changes.

⁹ The March CPS also contains information on households’ transfer receipts, including disability benefits, veterans benefits, welfare payments, unemployment compensation, social security, and supplemental security income. We include these data in our income measure but do not analyze the effect of transfers on income inequality given our focus on taxes.

CPS data (which are subject to much less severe top-coding than the public version). However, addressing the top-coding in this manner has almost no effect on our results.

Households' federal and state income tax burdens are estimated using the NBER's TAXSIM module, which takes a variety of inputs and returns an estimate of each tax unit's federal and state tax liabilities. The TAXSIM module applies stylized but reasonably accurate algorithms to reflect the personal income tax codes at the federal level and for each state. Federal tax estimates include employee and employer contributions to social insurance (Social Security and Medicare). Our sample runs from 1984 through 2011 — the last year for which TAXSIM was capable of producing state tax liabilities (as of July 2014).¹⁰

Sales and gas tax liabilities are inferred based on expenditure data in the *Consumer Expenditure Survey* (CEX) and separate data on state sales tax rates and state and federal gas tax rates. Data on households' expenditures on food, clothing, and other taxable goods are merged with the CPS data based on households' age and income group. These data are combined with data on state sales tax rates and exemptions to estimate households' sales tax burden. To estimate a household's gas tax burden, we impute the household's gasoline consumption using additional CEX data and state-specific fuel tax data. The CEX sample and the specifics of these matching and imputation procedures are discussed in the online appendix.

Overall, we account for the three largest taxes applied to individuals at the state level: general sales, personal income, and motor fuels. There are other taxes that we ignore, such as alcohol excise taxes. These taxes are relatively minor, and the taxes that are analyzed in this paper capture much of the variation in tax burdens across states.

V. RESULTS

A. Cross-Sectional Approach

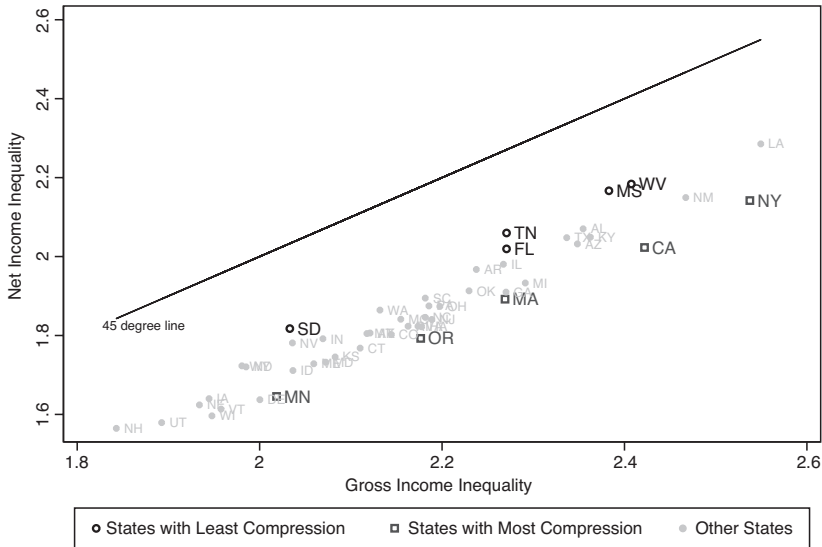
Figures 1 and 2 examine the variation in tax-based income compression across states.¹¹ As noted above, the underlying data are annual observations from 1984 to 2011. Percentiles of gross and net income for each state are identified separately by year and averaged over time. These state averages are then used as inputs to calculate $comp_{90/10}$. Nominal income data are converted to real income using the personal consumption expenditure (PCE) deflator in the National Income and Product Accounts (using 2000 as the base year). The figures, tables, and text use the terms "gross income" and "before-tax income" interchangeably and "net income" and "after-tax income" interchangeably.

Figure 1 compares gross income (before-tax) inequality to net income (after-tax) inequality across states. The vertical distance between a state and the 45-degree line is

¹⁰ The online appendix includes details of how we implemented TAXSIM for the March CPS.

¹¹ The pattern of before-tax income inequality in our data based on the 90/10 income split is consistent with the findings of other researchers, particularly Meyer and Sullivan (2013). These results are available upon request.

Figure 1
Differences Among U.S. States
(90/10 Split Across States)



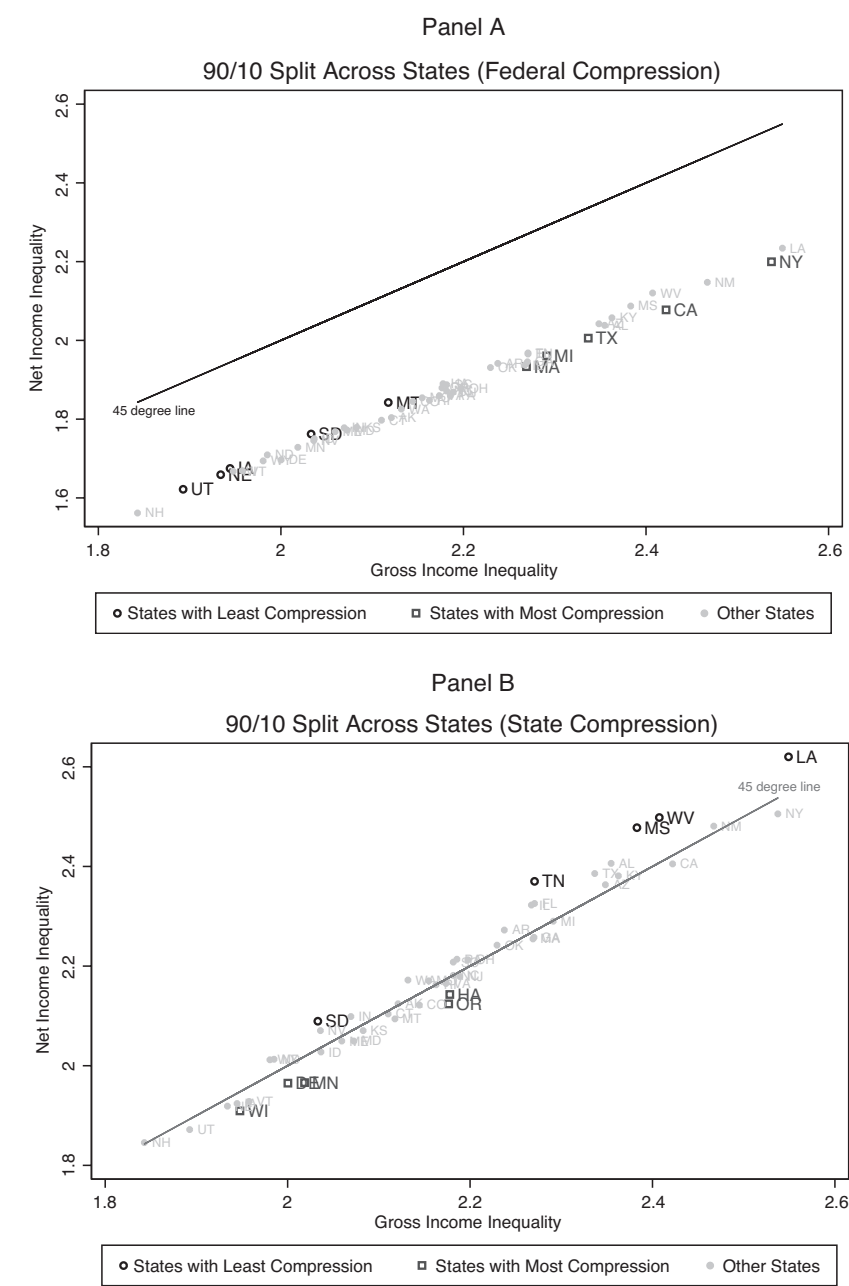
Source: Authors' calculations using CPS data

equal to the $comp_{90/10}$ metric. All of the states fall beneath the 45-degree line, indicating overall progressive tax systems in every state — that is, their after-tax distributions of income are compressed relative to their before-tax distributions. States with relatively progressive personal income taxes, such as California, Minnesota, New York, and Oregon, have the highest tax compression, while states without a broad-based income tax, such as Florida, New Hampshire, South Dakota, and Tennessee, are in the group of states with the least overall tax compression. The effect of taxes on income inequality can be decomposed into the impact of federal versus state tax policies. This breakdown is shown in Figure 2, which distinguishes federal tax compression (compression excluding state taxes) in Panel A from state tax compression (compression excluding federal taxes) in Panel B.¹²

The results demonstrate that federal taxes are, on average across the states, responsible for all of the compression of the net income distribution relative to the gross income distribution. Furthermore, despite significant heterogeneity across states in the extent of before-tax inequality, there is almost no variation across states in terms

¹² The deductibility of state taxes on federal tax returns, which could reasonably be assigned to either the federal or state tax codes, is assigned to the federal tax code.

Figure 2
Compression from Federal and State Tax Systems Among States



Source: Authors' calculations using CPS data

of the amount of federal compression; the states are very tightly bunched around an almost parallel downward shift in the 45-degree line. Panel B reveals that about one-half of the states have progressive tax systems that compress income inequality. States such as Oregon, Minnesota, and Wisconsin obtain the greatest degree of compression. In contrast, one-half of the states have tax structures that appear to increase income inequality and effectively offset some of the progressive nature of the federal tax code. The tax systems in Mississippi, Louisiana, Tennessee, and West Virginia are among the most regressive. Notably, the states with the most progressive tax systems tend to have below average pre-tax income inequality (these states are displayed with hollow square markers and appear on the left-hand side of Panel B). Similarly, the states with the most regressive tax systems have above average pre-tax inequality (these states are displayed with hollow circles and mostly appear on the right-hand side of Panel B). Finally, the panel shows greater dispersion in the extent to which state taxes influence inequality compared with federal taxes.

Tables 1 and 2 provide more detailed analysis. These tables show results for the United States as a whole, as well as for select states. (The online appendix includes a full set of state-by-state compression results.) Table 1 displays gross versus net income at the 90th percentile of the distribution and at the 10th percentile of distribution averaged across all states, with the final column showing compression as quantified by the *comp*_{90/10} metric. (The *comp*_{90/10} metric is multiplied by 100 for ease of exposition in this and all subsequent tables.) The results show that, for the United States as a whole (final row), taxes reduce income inequality by about 32 percentage points. To place this figure into perspective, 90/10 before-tax wage inequality rose roughly 1.1 percentage points per year, on average, over our sample period (not shown). Thus, taxes undo nearly 30 years worth of income inequality growth. The reduction in inequality ranges from almost 40 percentage points in states such as California and Oregon to about 21 percentage points in less progressive states such as Mississippi, South Dakota, and Tennessee.

Table 2 reports the *comp*_{90/10} metric measure separately for federal taxes (Column 1) and state taxes (Column 2). The table also compares the relative magnitude of state versus federal compression (Column 3). The results show that, on average, the influence of state taxes on inequality is small relative to federal taxes. In particular, state tax systems *widen* the income distribution by 0.9 percentage point as measured by the *comp*_{90/10} metric (final row). The federal tax system, in contrast, *compresses* the income distribution by about 30 percentage points. Thus, state systems on average undo about 3 percent of the compression achieved by the federal system.¹³

The average, though, masks extreme variation across the states. Tax policies in Minnesota and Oregon achieve a reduction in income inequality that is nearly one-fifth the size of federal compression within the same state. In contrast, the tax policies of Tennessee and Mississippi reverse around one-third of the compression caused by federal

¹³ The federal and state compression measures are each calculated as if the given sets of taxes (federal or state) are the only taxes in place. The federal and state metrics therefore do not add to the total tax compression metric in Table 1.

Table 1					
Total Compression in Select States					
	90 th Percentile		10 th Percentile		Gross 90/10 –Net 90/10 (Percentage Points)
	Gross Income	Net Income	Gross Income	Net Income	
CA	70.3	43.0	6.2	5.7	39.9
MS	45.9	30.9	4.2	3.5	21.6
OR	57.2	36.4	6.5	6.1	38.4
SD	48.1	34.0	6.3	5.5	21.5
TN	50.3	34.8	5.2	4.4	21.1
Total	58.0	37.7	6.6	5.9	31.5
Note: A full set of state results can be found in the online appendix.					
Source: Authors’ calculations using CPS data					

Table 2			
Federal and State Compression (Select States)			
	Gross 90/10–Net 90/10 Federal (in Percentage Points)	Gross 90/10–Net 90/10 State (in Percentage Points)	State as Percent of Federal
MN	29.0	5.2	18.1
MS	29.5	–9.5	–32.2
OR	29.7	5.3	17.7
TN	30.5	–10.0	–32.7
Total	30.4	–0.9	–2.9
Note: A full set of state results can be found in the online appendix.			
Source: Authors’ calculations using CPS data			

taxes. Illinois and Florida, both top five states in terms of population, undo roughly one-sixth of the compression induced by the federal system (see the online appendix Table A.4). The state compression metric has a range of roughly 15 percentage points — from around –10 percentage points in Tennessee and Mississippi to 5 percentage points in Minnesota and Oregon — equal to nearly one-half of the compression achieved by the federal tax code.

The remainder of the cross-sectional analysis examines three aspects of state tax systems: motor fuel taxes, sales tax exemptions, and the EITC. Previous studies of overall state tax incidence have, for the most part, not singled out and analyzed the effect of state gas tax policies. However, as Table 3 shows, there are noticeable differences across states in the impact of gas taxes on income compression.¹⁴ Column 7 repeats the state compression measure from the middle column of Table 2. Column 8 shows the amount of state income compression assuming the counterfactual that state gas taxes equal zero in all states. The difference between Column 7 and Column 8 — displayed in Column 9 — is the estimated effect of the state gas tax on income compression.

Nationwide (bottom row), state tax systems widen the income distribution by 0.9 percentage point with gas taxes included but compress the income distribution by 0.6 percentage point when gas taxes are excluded. That is, state gas taxes are responsible for making state tax systems slightly regressive, whereas they would be slightly progressive if motor fuel taxes were abolished. A further examination of Table 3 shows that in some states, such as Alaska and New Hampshire, gas taxes have a small percentage effect on inequality. In contrast, gas taxes widen the distribution of after-tax income substantially in states such as Louisiana, Mississippi, and West Virginia. Overall, gas taxes play a moderate role in the extent to which states' tax policies influence income inequality.

Turning to sales tax exemptions, many states exempt clothing and/or food from their sales tax on equity grounds.¹⁵ Although these policies have a significant effect on sales tax revenues — the food exemption alone reduces revenue by as much as 20 percent, all else equal (Due and Mikesell, 2005) — there is little evidence on their distributional effect. We assess the policy's effectiveness at mitigating income inequality.

Table 4 reveals that these exemptions reduce income inequality.¹⁶ In total (bottom row), the 90/10 difference metric is equal to -0.9 percentage point when the exemptions are included (Column 9) and is -1.9 percentage points (more regressive) under the counterfactual of no exemptions in any state (Column 10). Thus, sales tax exemptions reduce the extent to which state tax systems widen the distribution of after-tax income by 1 percentage point (Column 12) — a relatively large effect given that 16 states had no exemptions (or no sales tax) over the period of our study and therefore contribute zeros to the average amount of compression caused by the exemptions.

A similar conclusion is reached by comparing the actual 90/10 differential (Column 9) to the counterfactual of all states having full tax exemptions for food and clothing (Column 11): full exemptions would narrow the post-tax income differential by about 1 percentage point (Column 13). As with the gas tax, there is significant variation across the states in the effect of the exemptions. In states such as Rhode Island and Kentucky that exempted food for the entire sample period, the exemptions reduce inequality by

¹⁴ A full set of state results can be found in the online appendix (Table A.5).

¹⁵ Some states reduce but do not eliminate the sales tax on food and clothing. Unfortunately, our analysis does not capture these reductions, and we also do not capture exemptions for items other than food and clothing (for example, books are sometimes exempt).

¹⁶ Again, a full set of state results can be found in the online appendix (Table A.6).

Table 3
State Compression: Gas Tax Analysis
(Selected States)

	90 th Percentile			10 th Percentile			90/10	90/10	(7) – (8) ²
	Gross Inc. (1)	Net Inc. (2)	Net Inc. × Gas ¹ (3)	Gross Inc. (4)	Net Inc. (5)	Net Inc. × Gas ¹ (6)	Compression ² (7)	Compression × Gas ^{1,2} (8)	
AK	68.2	68.2	68.3	8.2	8.1	8.2	-0.3	-0.0	-0.3
AL	50.8	48.5	48.6	4.8	4.4	4.5	-5.1	-2.7	-2.5
AR	46.1	43.4	43.6	4.9	4.5	4.6	-3.5	-1.0	-2.5
GA	57.5	54.1	54.2	5.9	5.7	5.7	1.2	2.0	-0.8
HA	65.1	60.0	60.1	7.4	7.0	7.1	3.5	4.3	-0.8
LA	52.0	49.9	50.1	4.1	3.6	3.8	-7.1	-4.0	-3.1
MS	45.9	43.5	43.6	4.2	3.6	3.8	-9.5	-6.6	-2.9
NH	63.3	63.1	63.3	10.0	10.0	10.1	-0.2	0.3	-0.6
WV	46.2	43.3	43.5	4.2	3.6	3.7	-9.1	-5.8	-3.3
Total	58.0	55.1	55.3	6.6	6.2	6.4	-0.9	0.6	-1.5

Notes: A full set of state results can be found in the online appendix.

¹ Post-tax income excludes state gas taxes.

² Compression is measured in percentage points. All income data values are in thousands of 2000 dollars.

Source: Authors' calculations using CPS data

Table 4
State Compression: Sales Tax Exemption Analysis
(Selected States)

90 th Percentile		10 th Percentile		90/10		90/10		90/10		(9) – (10) ³		(9) – (11) ³	
Gross Inc.	Net Inc.	No Ex. ¹	Full Ex. ²	Gross Inc.	Net Inc.	No Ex. ¹	Full Ex. ²	Compression ³		Compression No Ex. ^{1,3}		Compression Full Ex. ^{1,3}	
								(9)	(8)	(10)	(11)	(12)	(13)
AK	68.2	68.2	68.2	8.2	8.1	8.1	8.1	-0.3	8.1	-0.3	-0.3	0.0	0.0
AL	50.8	48.5	48.5	4.8	4.4	4.4	4.5	-5.1	4.5	-5.1	-2.2	0.0	-2.9
AR	46.1	43.4	43.4	4.9	4.5	4.5	4.6	-3.5	4.6	-3.5	-0.4	0.0	-3.1
CA	70.3	65.4	65.1	6.2	5.9	5.8	5.9	1.6	5.9	-0.4	2.1	2.0	-0.5
CO	65.6	62.3	62.2	7.7	7.5	7.4	7.5	2.2	7.5	1.5	2.4	0.7	-0.2
FL	57.8	57.2	56.9	6.0	5.6	5.4	5.6	-5.5	5.6	-7.7	-4.9	2.2	-0.6
KY	50.8	47.8	47.5	4.8	4.4	4.3	4.4	-1.9	4.4	-4.6	-1.2	2.8	-0.6
MN	61.7	57.2	56.8	8.2	8.0	7.8	8.0	5.2	8.0	3.4	5.2	1.8	0.0
MS	45.9	43.5	43.5	4.2	3.6	3.6	3.9	-9.5	3.9	-9.5	-4.3	0.0	-5.2
RI	61.5	57.8	57.5	7.1	6.7	6.4	6.7	0.0	6.7	-2.9	0.0	2.9	0.0
WV	46.2	43.3	43.2	4.2	3.6	3.5	3.7	-9.1	3.7	-9.8	-5.4	0.7	-3.7
Total	58.0	55.1	54.9	55.2	6.6	6.2	6.3	-0.9	6.3	-1.9	0.2	1.0	-1.1

Notes: All income data values are in thousands of 2000 dollars. A full set of state results can be found in the online appendix.

¹ Post-tax income excludes state sales tax exemptions.

² Post-tax income assumes food and clothing are exempt from sales taxes in all states.

³ Compression is measured in percentage points.

Source: Authors' calculations using CPS data

around 3 percentage points (Column 12) — equal to about 10 percent of the compression achieved by the federal tax code (see Table 2).

Finally, we examine the effect of state EITC programs on income inequality.¹⁷ To do so, we limit the period of analysis to 2003–2007. Seventeen states offered the credit continuously over this period — a much larger set of states than did so earlier in the sample. The state credits are typically equal to a percentage of the federal EITC credit received by the individual, with the amount ranging from 3.5 percent to 50 percent (Internal Revenue Service, 2015). (We end the analysis as of 2007 to mostly avoid the Great Recession.)

Table 5 displays the results of the analysis for these 17 states. Column 7 provides the compression caused by the state tax code over the 2003–2007 period, and Column 8 displays the same compression metric under the counterfactual of no state EITC programs. State-level EITC programs, on average across these 17 states, increase compression by 1 percentage point, equal to over one-third of total state tax compression in this period for this subset of states (the bottom row). In a few states with relatively generous credits, such as Maryland and New York (see Column 10 for a measure of generosity), the credit accounts for well over half of total state compression. On the other hand, the credit has little influence in less generous states such as Illinois and Oklahoma. Overall, the analysis suggests that state EITC programs have the potential to increase significantly the extent to which state tax systems reduce income inequality.

B. Time-Series Approach

In this subsection, we explore how the influence of taxes on income inequality has evolved over time. Panel A of Figure 3 displays pre-tax and post-tax upper tail income inequality. Upper tail tax compression, $comp_{90/50}$, is the difference between gross income inequality (black line with solid circles) and net income inequality (gray line with solid squares). This difference widens a bit over time, rising from 0.13 log points in 1984 to 0.17 log points in 2011. That is, upper tail tax compression rose 0.04 log points, an increase of nearly 25 percent.¹⁸

The changes over time at the bottom of the income distribution are more dramatic as shown by the $comp_{50/10}$ metric (Panel B). In particular, the difference between gross income inequality and net income inequality in the lower tail widens substantially over time, growing from around 0.15 log points in the mid-1980s to 0.22 log points in 2011 — an extremely large increase of 50 percent. Finally, Panel C displays total tax compression, $comp_{90/10}$. Tax compression of the broad middle of the income distribution increased a great deal over the sample period as it rose from 0.28 in 1984 to 0.39

¹⁷ The EITC is a refundable tax credit targeted at low-income working individuals — especially those with children.

¹⁸ Figure A.1 in the online appendix discusses and displays the evolution of the 90th, 50th, and 10th percentiles of the gross and net income distributions — including the role played in the bottom tail of the income distribution by the Federal EITC.

Table 5
State Compression: EITC TAX Analysis

	90 th Percentile			10 th Percentile			90/10 Compression ² (7)	90/10 Compression × EITC ^{1,2} (8)	(7) – (8) ² (9)	Percent of Federal EITC (10)
	Gross Inc. (1)	Net Inc. (2)	Net Inc. × EITC ¹ (3)	Gross Inc. (4)	Net Inc. (5)	Net Inc. × EITC ¹ (6)				
DC	99.4	90.3	90.3	5.3	5.0	4.9	3.8	1.7	2.1	31
IA	59.8	56.2	56.2	7.5	7.1	7.1	1.7	1.7	0.1	7
IL	67.6	64.5	64.5	6.9	6.3	6.3	-3.7	-4.2	0.4	5
IN	59.2	56.4	56.4	6.6	6.1	6.0	-3.2	-3.8	0.6	6
KS	60.3	56.4	56.4	6.7	6.4	6.4	1.8	0.9	0.9	15
MA	83.0	77.9	77.9	7.2	6.9	6.8	2.5	1.2	1.3	15
MD	82.1	77.6	77.6	8.6	8.4	8.2	2.8	0.6	2.2	20
ME	57.7	53.6	53.6	6.5	6.2	6.2	3.1	2.6	0.6	5
MN	69.3	64.6	64.6	9.6	9.6	9.4	6.6	4.6	1.9	33
NE	60.4	56.5	56.5	7.8	7.5	7.5	3.0	2.6	0.4	8
NJ	86.7	82.0	82.0	9.0	8.8	8.7	3.0	2.2	0.8	20
NY	73.8	69.1	69.1	5.5	5.4	5.3	5.6	2.3	3.3	30
OK	58.8	54.8	54.8	6.4	6.0	6.0	0.2	-0.1	0.3	5
OR	60.8	56.6	56.6	6.5	6.4	6.3	5.0	4.4	0.6	5
RI	68.3	63.8	63.8	7.1	6.8	6.7	1.8	1.7	0.1	25
VT	61.2	57.6	57.6	8.2	8.1	8.0	5.1	4.3	0.7	32
WI	60.5	56.3	56.3	8.0	7.8	7.8	4.3	4.3	0.0	14
Average	68.8	64.4	64.4	7.3	7.0	6.9	2.6	1.6	1.0	NA

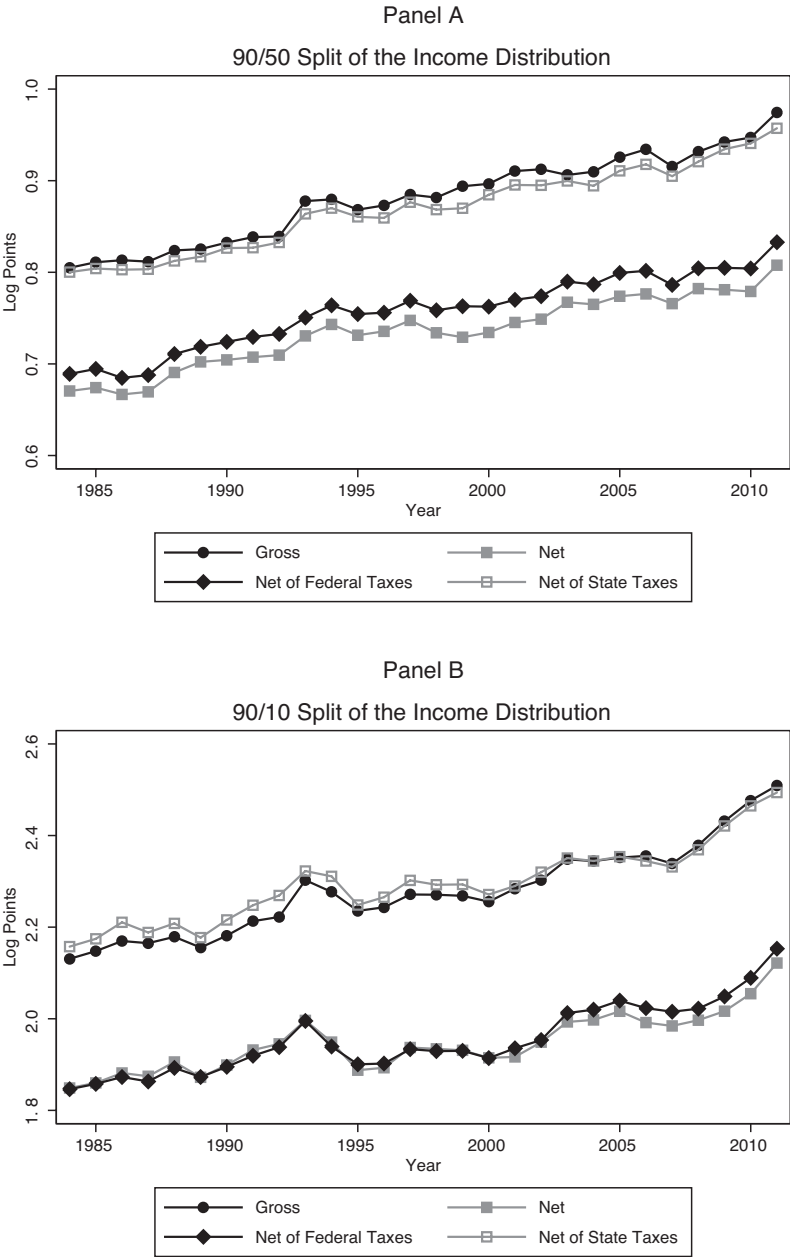
Notes: The percentage of the federal credit in Column 10 is an average across the years 2003–2007. For MN, Column 10 is averaged across recipient categories within the year. For WI, Column 10 is averaged for families with two children. All income data values are in thousands of 2000 dollars.

¹ Post-tax income excludes state EITC.

² Compression is measured in percentage points and is calculated over 2003–2007.

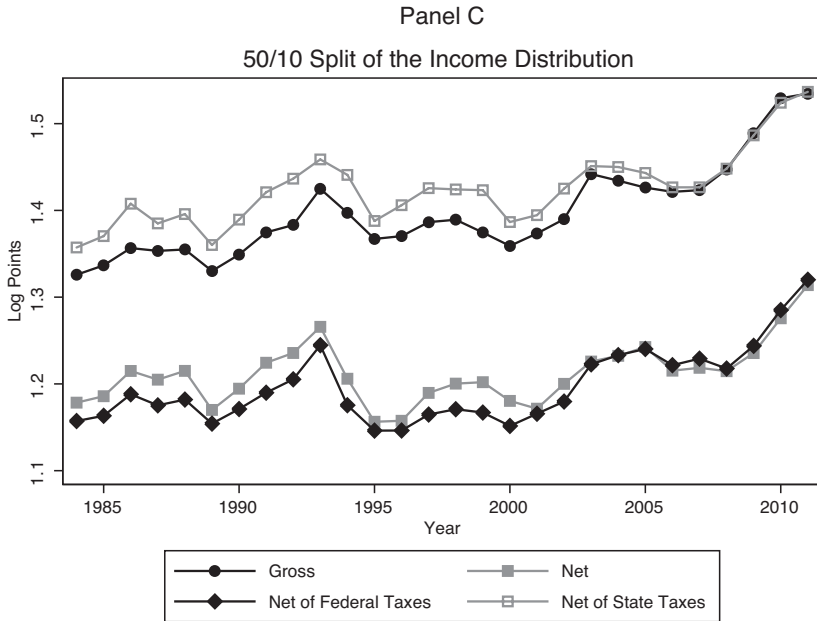
Source: Authors' calculations using CPS data

Figure 3
Pre and Post-Tax Income Inequality Over Time



Source: Authors' calculations using CPS data

Figure 3, Continued
Pre and Post-Tax Income Inequality Over Time



Source: Authors' calculations using CPS data

in 2011 — an increase of 0.11 log points or 37 percent. Of this change, 0.07 can be attributed to the federal tax code and 0.04 can be attributed to the state tax code. Thus, the state tax code was responsible for a little more than one-third of the increase in tax compression for the broad middle of the income distribution. The importance of state taxes in the change in compression is interesting in light of the relative small role that they play for the average level of compression (Table 2). Overall, the results in Figure 3 suggest that tax compression of the income distribution increased substantially over the nearly 30 years of our sample, with a more sizable increase in the bottom half of the distribution than in the upper half.¹⁹

The time-series analysis presented so far confounds two factors. First, as before-tax income inequality increases, the impact of the tax system on inequality may change even in the absence of any adjustments to the tax code. More specifically, under a progres-

¹⁹ Figure A.2 in the online appendix explores the evolution over time of tax compression on a state-by-state basis and further confirms the increase in tax compression over our period of study.

sive tax system in which the function relating income to taxes is stable, an increase in before-tax inequality would be expected to increase compression as quantified by the *comp*_{90/10} metric (Section III.B). Second, the tax code is often adjusted over time, and may even be adjusted in response to changes in pre-tax income inequality (Piketty, 1995).²⁰

Figure 4 displays counterfactual exercises that isolate the contribution of these two factors. Panel A displays after-tax income inequality (the gray line with hollow squares) and before-tax income inequality (the black line with solid diamonds) assuming that the income distribution in all years equals the 1988 real income distribution. By holding the income distribution fixed, the effect of legislated tax changes is isolated. The counterfactual tax compression measure is calculated as the difference between the counterfactual gross income inequality and counterfactual net income inequality. As the counterfactual gross income inequality is fixed (i.e., a horizontal line on the graph), movements in counterfactual net income inequality map one-for-one into the counterfactual tax compression measure.

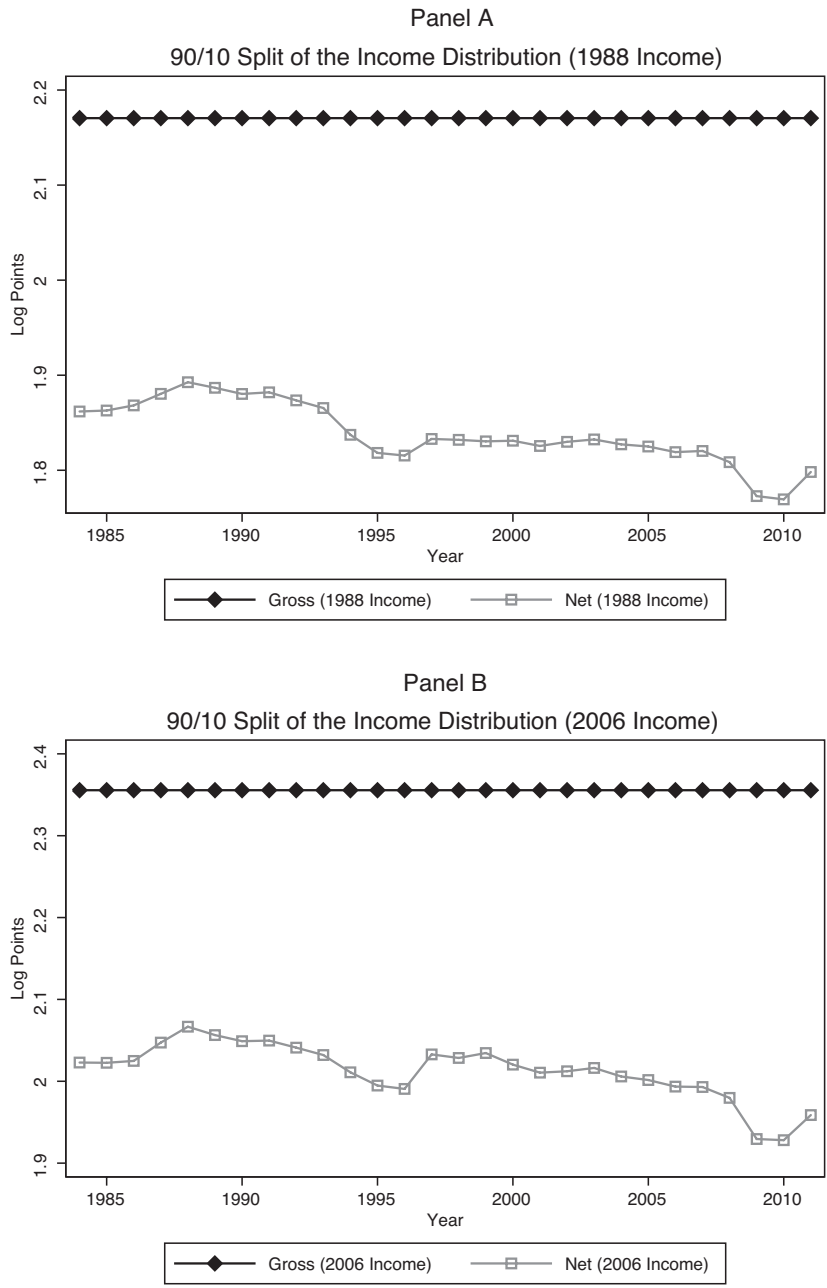
In Panel A, the counterfactual net income inequality moves down, on net, by about 0.06 log points over the sample period — a 6 percentage point *increase* in tax compression. As actual tax compression increased by around 0.11 log points over this period (Panel C of Figure 3), this counterfactual exercise suggests that changes to the tax code accounted for roughly one-half of the change in tax compression over this period. Changes in the income distribution (and the interaction of shifts in the income distribution and the changes to the tax code) explain the remaining one-half.

Panels C and E repeat the counterfactual exercise for state and federal tax compression, respectively. (Note that the scale of the vertical axis differs across the panels of Figure 4.) State tax compression holds relatively constant from the mid-1980s through the end of the 1990s and then begins to increase thereafter. Over the entire period it increases by 0.03 log points. As actual state compression increased by 0.04 log points (Panel C of Figure 3), changes to the tax code account for most of the change in state compression. This conclusion is very consistent with the finding that state taxes on average, over the entire sample period, have only a limited effect on income inequality (e.g., Table 2). With a nearly neutral tax structure — i.e., neither progressive nor regressive — there is little scope for a change in pre-tax inequality to alter the amount of tax compression.

In Panel E, after-tax income inequality drifts down over time, implying a gradual increase in federal tax compression. There is a notable increase in compression in the mid-1990s, possibly reflecting the effects of the Omnibus Budget Reconciliation Act of 1993 (which began affecting tax liabilities in 1994). There is also a noticeable increase in tax compression in 2009 that is subsequently reversed in 2011, potentially reflecting the effects of temporary stimulus measures enacted through the federal tax code. Overall, counterfactual federal tax compression increased by 0.03 log points over the period. Given that actual federal compression increased by 0.07 log points, legislated changes to the tax code therefore account for around 40 percent of the change in actual

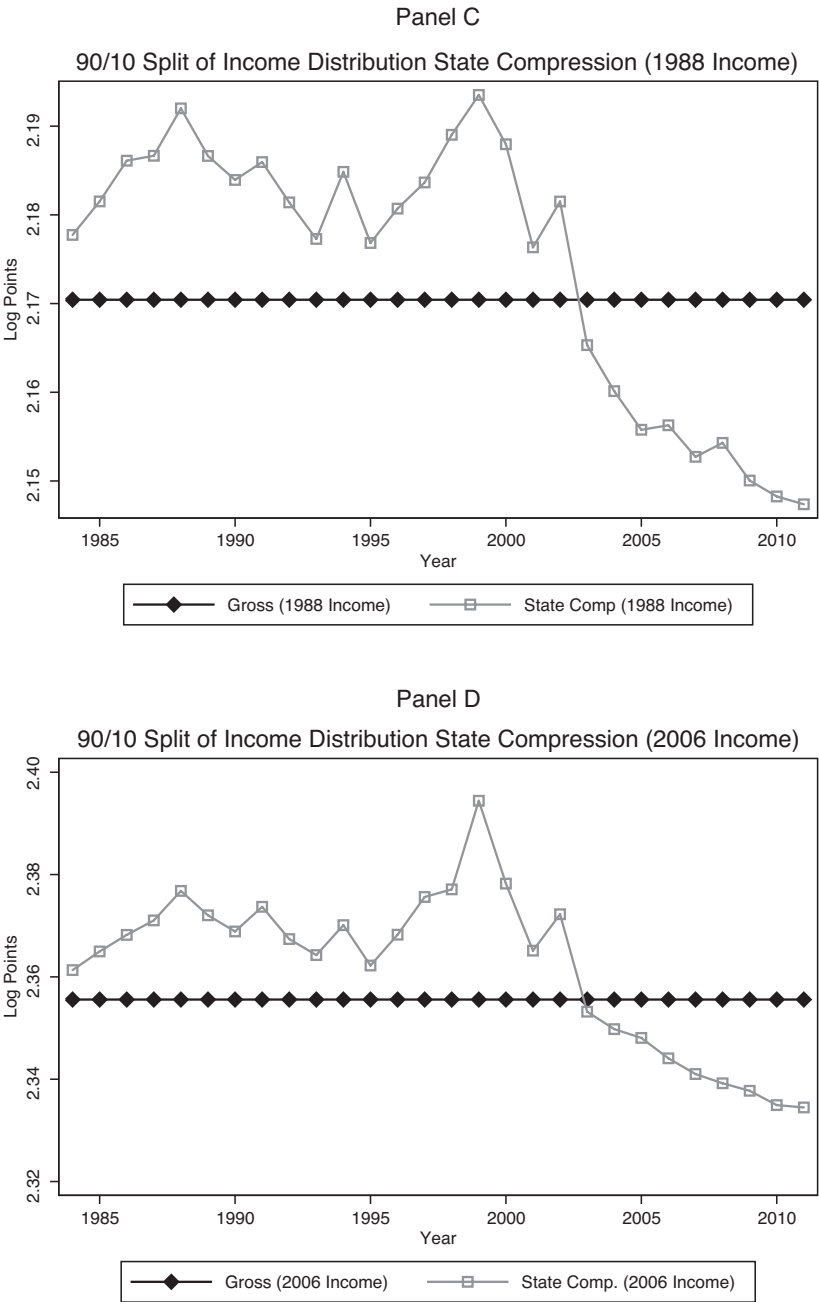
²⁰ The increase in overall tax compression is also a function of the interaction of these two factors.

Figure 4
Tax Compression Under Counterfactual Income Distributions



Source: Authors' calculations using CPS data

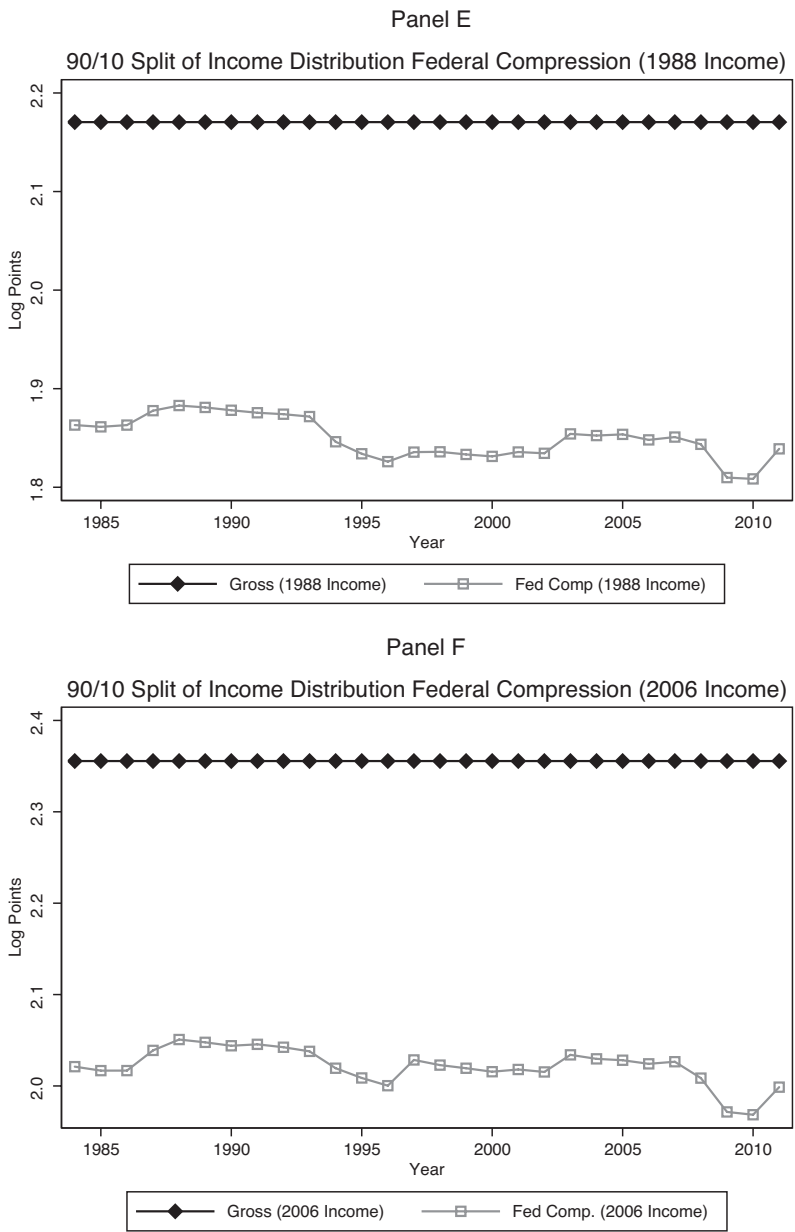
Figure 4, Continued



Source: Authors' calculations using CPS data

Figure 4, Continued

Tax Compression Under Counterfactual Income Distributions



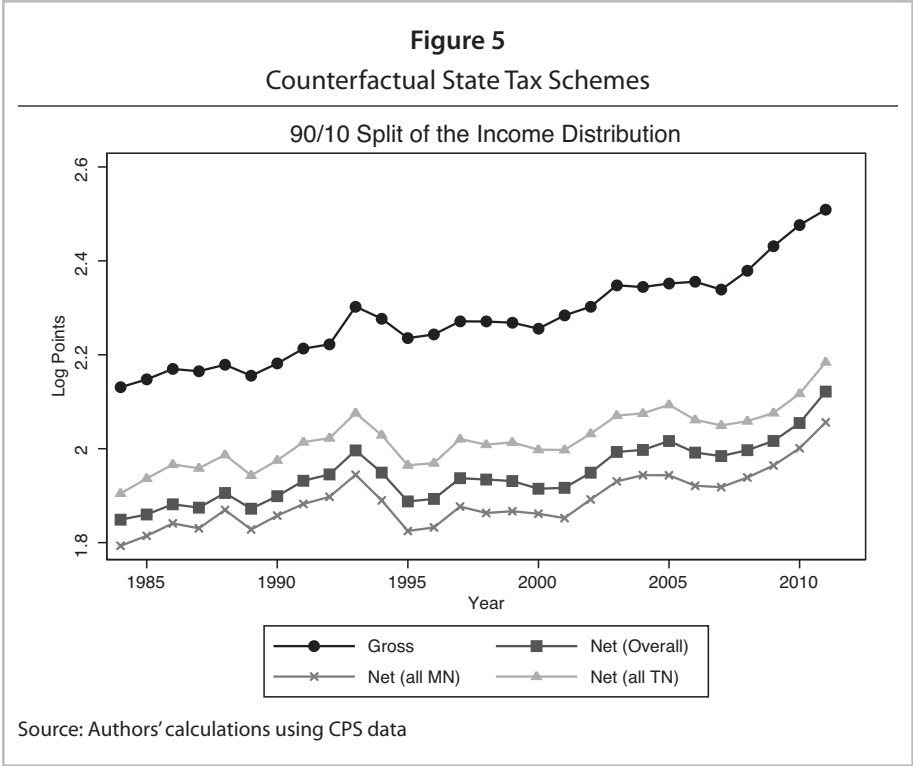
Note: Panels A, C, and E use the 1988 income distribution; Panels B, D, and F use the 2006 income distribution.
Source: Authors' calculations using CPS data

federal compression. Perhaps surprisingly, changes to federal taxes and changes to state taxes contribute equally to the increase in tax compression.

Figures B, D, and F repeat the counterfactual exercise but assume that the 2006 real income distribution was present in all years. The conclusions reached are extremely similar to those based on the 1988 real income distribution.

Overall, we conclude that around two-thirds of the increase in tax compression from 1984 through 2011 is due to the federal tax system and the remaining one-third is attributable to state tax systems. Most of the increase due to state taxes arises from changes to the tax codes. At the federal level, in contrast, a majority of the increase is due to the increase in pre-tax inequality interacting with a progressive tax structure. Legislated tax changes did, however, play some role.

Finally, Figure 5 focuses on state taxes and presents two net income inequality counterfactuals. The first counterfactual assumes that the entire sample is subject to the state tax code of Minnesota in all years (gray line with x's), while the second assumes that the entire sample is subject to the state tax code of Tennessee in all years (gray line with triangles). The choice of Minnesota and Tennessee reflects the analysis in Table 2 that indicates Minnesota is a high compression state, whereas Tennessee is a state that substantially widens the income distribution through taxation. Actual net income inequality (black line with squares) is calculated using households' true state of residence.



Net income inequality based on assigning everyone the Minnesota state tax system is well below actual net income inequality across the United States, suggesting that, if all states switched to Minnesota’s tax code, after-tax wage inequality would fall. In contrast, a switch by all states to the Tennessee tax code would serve to increase after-tax inequality substantially. The average gap between the two state net income counterfactuals, 0.13 log points, is quite large, equal to roughly 40 percent of the compression achieved by the federal tax code (0.33 log points). This exercise further highlights the substantial dispersion in state-based tax compression across the United States.

C. Sensitivity Analysis

Table 6 assesses the robustness of our conclusions to differing assumptions about tax incidence and to the possibility of a labor supply response to receipt of the EITC. The analysis is presented for total U.S. outcomes. The first row replicates the bottom row of Table 2 in order to provide a baseline.

Panel A presents results that assume the sales tax is subject to 100 percent overshifting — i.e., the price paid by consumers rises by twice the amount of the tax — which

Table 6
Sensitivity Analysis: Tax Incidence

	U.S. Total		State as Percent Federal
	Gross 90/10 –Net 90/10 Federal ¹	Gross 90/10 –Net 90/10 State ¹	
Baseline (Table 2)	30.4	–0.9	–2.9
Panel A			
100% Sales Tax Overshifting	30.4	–4.3	–14.3
Panel B			
Corporate Taxes			
Accrues 100% to Capital ¹	35.3	–0.9	–2.9
Accrues 100% to Labor ²	33.0	–0.9	–2.6
Accrues 40% Capital 60% Labor	34.0	–0.9	–2.8
Panel C			
EITC Adjustment	34.3	–1.0	–2.0

¹ The corporate tax is allocated based on a household’s share of aggregate capital income.

² The corporate tax is allocated based on a household’s share of aggregate labor income.

Source: Authors’ calculations using CPS data

is consistent with the evidence in Besley and Rosen (1999). The sales tax is a relatively regressive component of state tax systems. Correspondingly, increasing its magnitude pushes state tax systems toward being more regressive. The magnitude of this effect is large, as the state tax compression metric changes from -0.9 in the baseline estimate to -4.3 in the overshifting estimate. Although this result is an important caveat to our conclusions, we are hesitant to place too much weight on it for two reasons. First, some studies suggest the sales tax is not overshifted (Poterba, 1996). Second, overshifting is a theoretical possibility only when firms have pricing power. We assume in our sensitivity analysis that all retail goods are subject to 100 percent overshifting, but many goods are subject to competitive pressures that limit the ability of firms to set prices. Thus, even if overshifting is prevalent for some goods, the results in Panel A almost certainly overstate its importance.

Panel B presents results that account for the federal corporate income tax.²¹ Consistent with previous studies (Gramlich, Kasten, and Sammartino, 1993), we assign the incidence of the tax based on a tax unit's share of either aggregate labor income or aggregate capital income. Capital income is measured as the sum of interest income, dividend income, and realized capital gains. The first row assigns the full incidence of the corporate income tax to capital, consistent with a closed economy, while the second row assigns the full incidence to labor, consistent with a small open economy and no saving responses to capital income taxation. The third row assigns the incidence 40 percent to capital and 60 percent to labor, consistent with the beliefs of public finance economists at top-40 U.S. academic institutions (Fuchs, Krueger, and Poterba, 1998). Accounting for the corporate income tax has a moderate effect on the results, increasing the amount of federal compression by roughly 15 percent with the full incidence on capital, by 12 percent with the 60/40 incidence assumption, and by about 9 percent with the full incidence on labor.

Panel C presents results that allow for a labor supply response to the EITC. Indeed, the existing literature finds that there is a strong positive relationship between the EITC and employment with nearly all the response being on the extensive margin rather than intensive margin. Focusing on the labor force participation decisions of single women with children, we find that failure to account for a labor supply response to the EITC may cause us to understate tax compression by 13 percent.²² Thus, by drawing low-income individuals into the labor force and thereby boosting their income, the EITC may be increasing tax compression by more than what we observe in our baseline estimate.

V. CONCLUSION

This paper documents the role of the federal and state tax codes in compressing the after-tax distribution of income relative to the before-tax distribution — that is, in mitigating income inequality — over the broad middle of the income distribution. The

²¹ We do not consider state corporate income taxes as they usually account for 5 percent or less of annual state tax collections.

²² Our estimation approach is explained in detail in the online appendix.

overall progressive structure of federal taxes tends to mitigate income inequality across households to a substantial extent in all U.S. states. However, we find that state-levied taxes, on average, work to exacerbate income inequality. Looking at average state tax compression, however, masks significant heterogeneity across states. The income compression in a few states is equal to one-fifth of the compression caused by the federal code in the same state. By comparison, the tax systems in several states reverse about one-third of the compression of the income distribution caused by the federal tax code. We find that state levied gas taxes increase income inequality moderately, while sales tax exemptions decrease inequality moderately. We also demonstrate that generous state-based EITC credits can substantially increase the compression caused by state tax systems.

Between 1984 and 2011 the mitigating effect of taxes on income inequality appears to have strengthened as the rapid rise in income inequality in the before-tax distribution was passed less than one-for-one into the after-tax distribution. Federal taxes explain two-thirds of this strengthening with state taxes explaining the remainder. The strengthening of the mitigating effect of taxes on income inequality at the state level is mostly explained by changes to the tax code. At the federal level, though, a majority of the strengthening is attributable to the increase in pre-tax earnings interacting with the progressive tax schedule.

ACKNOWLEDGMENTS AND DISCLAIMERS

The views expressed herein are those of the authors and do not indicate concurrence by other members of the research staff or principals of the Board of Governors or the Federal Reserve System. We thank David Agrawal, Eric Engen, and participants at the 2011 IIPF Congress for helpful comments. We also thank Jim Sullivan for helpful comments on an earlier draft and thank Carl Nadler, Kevin Todd, Shoshana Schwartz, and Paul Eliason for excellent research assistance. We are also grateful to Adam Looney for providing state sales tax data, Erich Muehlegger for providing us with gas tax data, and Chris Foote and Rich Ryan for help with STATA graphics. We take responsibility for any errors and omissions.

DISCLOSURES

The authors have no financial arrangements that might give rise to conflicts of interest with respect to research reported in this paper.

REFERENCES

- Alm, James, Edward Sennoga, and Mark Skidmore, 2009. "Perfect Competition, Urbanization, and Tax Incidence in the Retail Gasoline Market." *Economic Inquiry* 47 (1), 118–134.

Attanasio, Orazio, Erik Hurst, and Luigi Pistaferri, 2012. "The Evolution of Income, Consumption, and Leisure Inequality in the U.S., 1980–2010." NBER Working Paper No. 17982. National Bureau of Economic Research, Cambridge, MA.

Auerbach, Alan J., 1988. "Capital Gains Taxation in the United States." *Brookings Papers on Economic Activity* 2, 595–631.

Autor, David H., Lawrence F. Katz, and Melissa S. Kearney, 2008. "Trends in U.S. Wage Inequality: Revising the Revisionists." *Review of Economics and Statistics* 90 (2), 300–323.

Bargain, Olivier, Mathias Dolls, Herwig Immervoll, Dirk Neumann, Andreas Peichl, Nico Pestel, and Sebastian Siegloch, 2011. "Tax Policy and Income Inequality in the U.S., 1978–2009: A Decomposition Approach." IZA Discussion Paper No. 5910. Institute for the Study of Labor, Bonn, Germany.

Bargain, Olivier, Mathias Dolls, Herwig Immervoll, Dirk Neumann, Andreas Peichl, Nico Pestel, and Sebastian Siegloch, 2015. "Tax Policy and Income Inequality in the United States, 1979–2007." *Economic Inquiry* 53 (2), 1061–1085.

Besley, Timothy J., and Harvey S. Rosen, 1999. "Sales Taxes and Prices: An Empirical Analysis." *National Tax Journal* 52 (2), 157–178.

Burkhauser, Richard V., Shuaizhang Feng, and Stephen P. Jenkins, 2009. "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* 55 (1), 166–185.

Burkhauser, Richard V., Shuaizhang Feng, Stephen P. Jenkins, and Jeff Larrimore, 2011. "Estimating Trends in U.S. Income Inequality Using the Current Population Survey: The Importance of Controlling for Censoring." *Journal of Economic Inequality* 9 (3), 393–415.

Burkhauser, Richard V., Jeff Larrimore, and Kosali I. Simon, 2012. "A 'Second Opinion' on the Economic Health of the American Middle Class." *National Tax Journal* 65 (1), 7–32.

Chetty, Raj, and Emmanuel Saez, 2005. "Dividend Taxes and Corporate Behavior: Evidence from the 2003 Dividend Tax Cut." *Quarterly Journal of Economics* 120 (3), 791–833.

Congressional Budget Office, 2011. "Trends in the Distribution of Household Income between 1979 and 2007." Congressional Budget Office, Washington, DC.

Debacker, Jason, Bradley Heim, Vasia Panousi, Shanthi Ramnath, and Ivan Vidangos, 2013. "Rising Inequality: Transitory or Persistent? New Evidence from a Panel of U.S. Tax Returns." *Brookings Papers on Economic Activity* 2013 (Spring), 67–122.

Due, John F., and John L. Mikesell, 2005. "Retail Sales Tax, State and Local." In Cordes, Joseph J., Robert D. Ebel, and Jane G. Gravelle (eds.), *The Encyclopedia of Taxation & Tax Policy*, 336–340. Urban Institute Press, Washington, DC.

Eissa, Nada, and Hilary W. Hoynes, 2006. "Behavioral Responses to Taxes: Lessons from the EITC and Labor Supply." In James M. Poterba (ed.), *Tax Policy and the Economy, Volume 20*, 73–110. MIT Press, Cambridge, MA.

Feldstein, Martin, and Marian Vaillant Wrobel, 1998. "Can State Taxes Redistribute Income?" *Journal of Public Economics* 68 (3), 369–396.

Fischel, William, 2001. "Municipal Corporations, Homeowners and the Benefit View of the Property Tax." In Wallace Oates (ed.), *Property Taxation and Local Government Finance* 33–77. Lincoln Institute of Land Policy, Cambridge, MA.

Frydman, Carola, and Raven E. Saks, 2010. "Executive Compensation: A New View from a Long-Term Perspective, 1936–2005." *Review of Financial Studies* 23 (5), 2099–2138.

Fuchs, Victor R., Alan B. Krueger, and James M. Poterba, 1998. "Economists' Views about Parameters, Values, and Policies: Survey Results in Labor and Public Economics." *Journal of Economic Literature* 36 (3), 1387–1425.

Fullerton, Don, and Gilbert Metcalf, 2002. "Tax Incidence." In Auerbach, Alan J., and Martin Feldstein (eds.), *Handbook of Public Economics, Volume 4*, 1787–1872. Elsevier Science, Amsterdam, Netherlands.

Gottschalk, Peter, and Sheldon Danziger, 2005. "Inequality of Wage Rates, Earnings, and Family Income in the United States, 1975–2002." *Review of Income and Wealth* 51 (2), 231–254.

Gottschalk, Peter, and Timothy Smeeding, 2000. "Empirical Evidence on Income Inequality in Industrialized Countries." In Atkinson, Anthony B., and François Bourguignon (eds.), *Handbook of Income Distribution*, 261–307. Elsevier Science, Amsterdam, Netherlands.

Gramlich, Edward M., Richard Kasten, and Frank Sammartino, 1993. "Growing Inequality in the 1980s: The Role of Federal Taxes and Cash Transfers." In Danziger, Sheldon, and Peter Gottschalk (eds.), *Uneven Tides: Rising Inequality in America*, 225–250. Russell Sage Foundation, New York, NY.

Gravelle, Jennifer, 2013. "Corporate Tax Incidence: Review of General Equilibrium Estimates and Analysis." *National Tax Journal* 66 (1), 185–214.

Heathcote, Jonathan, Fabrizio Perri, and Giovanni L. Violante, 2010. "Unequal We Stand: An Empirical Analysis of Economic Inequality in the United States, 1967–2006." *Review of Economic Dynamics* 13 (1), 15–51.

Hotz, V. Joseph, and John Karl Scholz, 2003. "The Earned Income Tax Credit." In Moffit, Robert A. (ed.), *Means-Tested Transfer Programs in the United States*, 141–198. University of Chicago Press, Chicago, IL.

Inman, Robert P., 1994. "Comments on 'The Lifetime Incidence of State and Local Taxes: Measuring Changes During the 1980s.'" In Slemrod, Joel (ed.), *Tax Progressivity and Income Inequality*, 89–94. Cambridge University Press, Cambridge, UK.

Internal Revenue Service, 2015. "States and Local Governments with Earned Income Tax Credit." Internal Revenue Service, Washington, DC, <http://www.irs.gov/Credits-&-Deductions/Individuals/Earned-Income-Tax-Credit/States-and-Local-Governments-with-Earned-Income-Tax-Credit>.

Karoly, Lynn A., 1994. "Trends in Income Inequality: The Impact of, and Implications for, Tax Policy." In Slemrod, Joel (ed.), *Tax Progressivity and Income Inequality*, 95–129. Cambridge University Press, Cambridge, UK.

King, Miriam, Steven Ruggles, J. Trent Alexander, Sarah Flood, Katie Genadek, Matthew B. Schroeder, Brandon Trampe, and Rebecca Vick, 2010. *Integrated Public Use Microdata Series, Current Population Survey: Version 3.0*. Minnesota Population Center, Minneapolis, MN.

Kotlikoff, Laurence, and Lawrence Summers, 1987. "Tax Incidence." In Auerbach, Alan J., and Martin Feldstein (eds.), *Handbook of Public Economics, Volume 2*, 1043–1092. Elsevier Science, Amsterdam, Netherlands.

Larrimore, Jeff, Richard V. Burkhauser, Shuaizhang Feng, and Laura Zayatz, 2008. "Consistent Cell Means for Topcoded Incomes in the Public Use March CPS (1976–2007)." *Journal of Economic & Social Measurement* 33 (2/3), 89–128.

Leigh, Andrew, 2008. "Do Redistributive State Taxes Reduce Inequality?" *National Tax Journal* 61 (1), 81–104.

Lutz, Byron, 2015. "Quasi-Experimental Evidence on the Connection between Property Taxes and Residential Capital Investment." *American Economic Journal: Economic Policy* 7 (1), 300–330.

Lutz, Byron F., Daniel Cooper, and Michael Palumbo, 2012. "Quantifying the Role of Federal and State Taxes in Mitigating Wage Inequality." FEDS Working Paper No. 2012–05. Board of Governors of the Federal Reserve System, Washington, DC.

Marion, Justin, and Erich Muehlegger, 2011. "Fuel Tax Incidence and Supply Conditions." *Journal of Public Economics* 95 (9), 1202–1212.

Metcalfe, Gilbert E., 1994. "The Lifetime Incidence of State and Local Taxes: Measuring Changes During the 1980s." In Slemrod, Joel (ed.), *Tax Progressivity and Income Inequality*, 59–94. Cambridge University Press, Cambridge, UK.

Meyer, Bruce D., Wallace K. C. Mok, and James X. Sullivan, 2009. "The Under-Reporting of Transfers in Household Surveys: Its Nature and Consequences." NBER Working Paper No. 15181. National Bureau of Economic Research, Cambridge, MA.

Meyer, Bruce D., and James X. Sullivan, 2013. "Consumption and Income Inequality in the U.S. Since the 1960s." Manuscript. University of Chicago, Chicago, IL.

Musgrave, R. A., J. J. Carroll, L. D. Cook, and L. Frane, 1951. "Distribution of Tax Payments by Income Groups: A Case Study for 1948." *National Tax Journal* 4 (1), 1–54.

Musgrave, R. A., and Tun Thin, 1948. "Income Tax Progression, 1929–48." *Journal of Political Economy* 56 (6), 498–514.

Nechyba, Thomas, 2001. "The Benefit View and the New View: Where Do We Stand, Twenty-Five Years into the Debate?" In Wallace Oates (ed.), *Property Taxation and Local Government Finance*, 113–121. Lincoln Institute of Land Policy, Cambridge, MA.

Oates, Wallace, 2001. "Property Taxation and Local Government Finance." In Wallace Oates (ed.), *Property Taxation and Local Government Finance*, 21–31. Lincoln Institute of Land Policy, Cambridge, MA.

Piketty, Thomas, 1995. "Social Mobility and Redistributive Politics." *Quarterly Journal of Economics* 110 (3), 551–584.

Piketty, Thomas, and Emmanuel Saez, 2003. "Income Inequality in the United States, 1913–1998." *Quarterly Journal of Economics* 118 (1), 1–39.

Piketty, Thomas, and Emmanuel Saez, 2007. "How Progressive Is the U.S. Federal Tax System? A Historical and International Perspective." *Journal of Economic Perspectives* 21 (1), 3–24.

Poterba, James M., 1996. "Retail Price Reactions to Changes in State and Local Sales Taxes." *National Tax Journal* 49 (2), 165–176.

Saez, Emmanuel, 2004. "Reported Incomes and Marginal Tax Rate, 1960–2000: Evidence and Policy Implications." In James Poterba (ed.), *Tax Policy and the Economy. Volume 18*, 117–173. National Bureau of Economic Research, Cambridge, MA.

Saez, Emmanuel, 2010. "Do Taxpayers Bunch at Kink Points?" *American Economic Journal: Economic Policy* 2 (3), 180–212.

Saez, Emmanuel, Joel Slemrod, and Seth H. Giertz, 2012. "The Elasticity of Taxable Income with Respect to Marginal Tax Rates: A Critical Review." *Journal of Economic Literature* 50 (1), 3–50.

Saez, Emmanuel, and Michael Veall, 2005. "The Evolution of High Incomes in Northern America: Lessons from Canadian Evidence." *American Economic Review* 95 (3), 831–849.

Thompson, Jeffrey P., 2011. "Costly Migration and the Incidence of State and Local Taxes." Working Paper No. 251. Political Economy Research Institute, Amherst, MA.

Zodrow, George, 2001. "Reflections on the New View and the Benefit View of the Property Tax." In Wallace Oates (ed.), *Property Taxation and Local Government Finance*, 79–111. Lincoln Institute of Land Policy, Cambridge, MA.