Supplemental Material for: Owen Zidar. 2019. "Tax Cuts for Whom? Heterogeneous Effects of Income Tax Changes on Growth and Employment." Journal of Political Economy 127(3). DOI: 10.1086/701424.

Appendices for Online Publication

This appendix contains several sections. Section A.1 discusses how I measure tax changes in the years before NBER's TAXSIM is available. It also enumerates all of the tax changes and how they are classified. Section A.2 defines all economic variables used in the paper and documents sources. Similarly, section A.3 defines and provides sources for all of the policy and social insurance variables. Section B describes how I construct adjustments for state-specific cyclicality, namely, how I construct β-differencing cyclicality groups. Section C describes the social insurance microsimulation models and how they are used to estimate annual state-specific policy-induced changes in social insurance spending.

A Data

A.1 Tax Data

Table A1: Post-War Tax Changes

Legislation	Year	Motivation	Endogeneity	Size (% GDP)
Revenue Act of 1948	1948	Long run	Exogenous	-1.86
Social Security Amendments of 1947	1950	Deficit	Exogenous	0.26
Internal Revenue Code of 1954	1954	Long run	Exogenous	-0.37
Social Security Amendments of 1958	1960	Deficit	Exogenous	0.36
Social Security Amendments of 1961	1963	Deficit	Exogenous	0.86
Revenue Act of 1964	1964	Long run	Exogenous	-1.27
Social Security Amendment of 1967	1971	Deficit	Exogenous	-0.02
Revenue Act of 1971	1972	Long run	Exogenous	-0.73
Tax Reform Act of 1976	1976	Long run	Exogenous	0.13
Tax Reduction and Simplification Act 1977	1977	Long run	Endogenous	-0.38
1972 Changes to Social Security	1978	Deficit	Exogenous	0.13
Revenue Act of 1978	1979	Long run	Exogenous	-0.39
Social Security Amendment of 1977	1981	Long run	Exogenous	0.40
Economic Recovery Tax Act of 1981	1982	Long run	Exogenous	-1.33
Economic Recovery Tax Act of 1981	1983	Long run	Exogenous	-0.87
Social Security Amendments of 1983	1984	Deficit	Exogenous	-0.41
Social Security Amendments of 1983	1985	Deficit	Exogenous	0.21
Tax Reform Act of 1986	1986	Long run	Exogenous	0.60
Tax Reform Act of 1986	1987	Long run	Exogenous	-0.57
Social Security Amendments of 1983	1988	Deficit	Exogenous	0.37
Social Security Amendments of 1983	1990	Deficit	Exogenous	0.18
Omnibus Budget Reconciliation Act of 1990	1991	Deficit	Endogenous	0.00
Omnibus Budget Reconciliation Act of 1993	1993	Deficit	Exogenous	0.42
Omnibus Budget Reconciliation Act of 1993	1994	Deficit	Exogenous	0.19
Economic Growth and Tax Relief Reconciliation Act of 2001	2002	Long run	Exogenous	-0.77
Jobs and Growth Tax Relief Reconciliation Act of 2003	2003	Long run	Exogenous	-1.13
Jobs and Growth Tax Relief Reconciliation Act of 2003	2004	Long run	Endogenous	0.00
Jobs and Growth Tax Relief Reconciliation Act of 2003	2005	Long run	Exogenous	0.54

Notes: This table lists the Romer and Romer (2010) tax changes in the post-war period that are included in the study. The first column provides the legislation for each change. The second provides the year in which the tax change altered tax liabilities. The third column provides the policy motivation from Romer and Romer (2010). The fourth column lists whether the tax change is classified as exogenous. Exogenous is defined as a year in which Romer and Romer (2010) show a nonzero tax change where more than half the revenue was from an exogenous change. Endogenous tax changes are set to zero. The final column reports the size of the tax change as a share of GDP as measured by Romer and Romer (2010).

A.1.1 Pre-NBER Tax Changes

Only four exogenous changes, affecting tax liabilities in 1948, 1950, 1954, and 1960, took place in a time preceding the coverage of TAXSIM. For each of these changes, I manually calculated tax changes by income group using the SOI data.[46] The SOI reports provide data on the number of taxable returns and the amount of taxable income for groups created by size of adjusted gross income. With many AGI brackets, one can form a rough idea of how taxes changed across the income distribution. For each income bracket, I created a representative taxpayer by dividing the amount of taxable income by the number of taxable returns. I then calculated this representative person's change in payroll or federal income tax liability using her income in the year prior to the tax change, the old schedule and the new schedule. Data from the tax schedule were from (2) and (3) for the income tax changes and from (5) for the payroll rate and base changes. For instance, in 1960, any representative taxpayer whose earnings were below the payroll tax base of $4,800 had to pay 1% of their income extra since rates increased from 5% to 6%. Note that Barrow and Sahasakul (1983) used a somewhat similar approach to calculate average marginal rates.

In general, the following sources were helpful for constructing these tax change measures: (1) the Brooking Institution's "Individual Income Tax Brackets, 1945-2010," (2) the Tax Foundation's "U.S. Federal Individual Income Tax Rates History, 1913-2010," (3) the Internal Revenue Service's annual individual income tax return reports, and (4) the Tax Policy Center's Historical Payroll Tax Rates report.[47]

A.1.2 Tax Change Calculation for Each Tax Return: 1993 Example

This section provides an example of the tax liability change calculation described in 1.1.1 for 1993. Recall the 1993 Omnibus Budget Reconciliation Act, which raised rates on high-income taxpayers by adding new brackets in 1993 according to the schedule in Table A2. For every taxpayer, my measure subtracts how much she paid in 1992 from how much she would have paid in 1992 if the 1993 tax schedule had been in place. Figure A6 plots the results for 1993.[48] Many individuals with adjusted gross income above $100,000, and especially those with adjusted gross income exceeding $150,000, faced a roughly thousand-dollar tax increase based on this measure.

[46] The 1948 change was from the Revenue Act of 1948, the 1950 change was from the 1947 Social Security Amendment, the 1954 change was from the 1950 Social Security Amendment and the Internal Revenue Code of 1954, and the 1960 change was from the 1958 Social Security Amendment (Romer & Romer (2009)).

[47] Note that the Tax Policy Center data on the payroll base and rates come from the following two Social Security Administration sites: http://www.ssa.gov/OACT/COLA/cbb.html and http://www.ssa.gov/OACT/ProgData/taxRates.html.

[48] Note that the 1993 results are based on the sample of 1992 tax returns and the 1992 and 1993 tax schedules.

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Table A2: Example of Tax Schedule Change in 1993

1992 Schedule			1993 Schedule		
Tax Rate	Bracket Min	Bracket Max	Marginal Tax Rate	Bracket Min	Bracket Max
15%	$ 0	$35,800	15%	$ 0	$36,900
28%	$35,800	$86,500	28%	$36,900	$89,150
31%	$86,500	-	31%	$89,150	$140,000
			36%	$140,000	$250,000
			39.6%	$250,000	-

Notes: This table shows the tax schedule in 1992 and 1993 for married taxpayers filing jointly. Extra top brackets were added in 1993. These new brackets mechanically increased tax liabilities for higher-income taxpayers as shown in Figure A6. Tax schedule data are from the Tax Foundation.

A.2 Data on Economic Activity

1. ACCRA Price Index $P_{s,t}^{ACCRA}$ is the average state price index. Source: The Council for Community and Economic Research; ACCRA Cost of Living Index, 1990-2014. American Chamber of Commerce Researchers Association Index Report, 1980-1989.

2. BLS Price Index. Source: Bureau of Labor Statistics (BLS); Dataset: Consumer Price Index; Variable: Consumer Price Index - All Urban Consumers; Note: Not available for all states. I used population data to allocate city price indexes in cases when a state contained multiple cities with CPI data (e.g., LA and San Francisco for CA's price index).

3. Consumption. Source for state data: U.S. Department of Commerce, Bureau of Economic Analysis; Category: Personal Consumption Expenditures by State, 1997-2014. Source for national data: NIPA Table 1.1.3. Real Gross Domestic Product, Quantity Indexes [Index numbers, 2009=100].

4. Dividends, Interest, and Rent. Source: U.S. Department of Commerce, Bureau of Economic Analysis; Category: Regional Economic Accounts; Dataset: State Personal Income Accounts, Annual state personal income and employment, Table SA4.

5. Dividends Income. This variable is the mean pre-tax income received from stocks and mutual funds for those ages 16 or over in a given state-year; see Ruggles et al. (2010). Source: U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC); Variable: incdivid.

6. Disability Benefits Income. This variable is the mean pre-tax income received from disability income for those ages 16 or over in a given state-year; see Ruggles et al. (2010). Source: U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC); Variable: incdisab.

7. Durable Consumption. Source: NIPA Table 1.1.3. Real Gross Domestic Product, Quantity Indexes [Index numbers, 2009=100].

8. Employment: This variable indicates the number of people employed in a given state-year. Source: Bureau of Labor Statistics, Local Area Unemployment Statistics.

9. Employment Rate. This variable is the share of people, ages 16 or over, in the labor force who report employment status 10 "At work" or 12 "Has job, not at work last week" in the CPS; see Ruggles et al. (2010). Source: U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC).

10. Employment-to-Population Ratio. This variable is the share of people, ages 16 or over, who report employment status 10 "At work" or 12 "Has job, not at work last week" in the CPS; see Ruggles et al. (2010). Source: U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC).

11. FHFA HPI Index. This is a broad measure of the movement of single-family house prices. It measures the average price changes in repeat sales or refinancing on the same properties. Source: Federal Housing Finance Agency House Price Index Datasets, Purchase-Only Indexes (Estimated using Sales Price Data).

12. GDP. Source: NIPA Table 1.1.3. Real Gross Domestic Product, Quantity Indexes [Index numbers, 2009=100].

13. Hours. This variable is the mean hours worked by employed residents in a given state-year given that they worked at least 48 weeks that year and are at least 16 years of age. This variable is constructed using data drawn from the U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC); see Ruggles et al. (2010). I follow Moretti (2013) by restricting the sample to workers aged between 25 and 60 and by using uhrsworkly, wkswork1, and wkswork2 to create a proxy for the number of weeks worked by taking the mean value of wkswork2 in cases where wkswork1 is missing, and call this proxy wkswork. Hours is the product of wkswork and uhrsworkly. I additionally restrict the sample to those who work at least 48 weeks (as determined by the proxy wkswork, described above).

14. Interest Income. This variable is the mean pre-tax income received from interest on savings accounts, certificates of deposit, money market funds, bonds, treasury notes, IRAs, and/or other investments which paid interest for those ages 16 or over in a given state-year; see Ruggles et al. (2010). Source: U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC); Variable: incint.

15. Investment. Source: NIPA Table 1.1.3. Real Gross Domestic Product, Quantity Indexes [Index numbers, 2009=100].

16. Labor Force Participation Rate. This variable is the share of persons, ages 16 or over, participating in the labor force; see Ruggles et al. (2010). Source: U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC). This variable is constructed simply from the given indicator "labforce," which is an indicator for whether that person is in the labor force. Those coded "yes" were either: at work; held a job but were temporarily absent due to factors like vacation or illness; seeking work; or were temporarily laid off during the reference period.

17. Moretti CPI Price Index $P_{s,t}^{CPI}$. This variable is a state-specific price index that is constructed following Moretti (2013):

    (a) I draw gross monthly rental cost of housing (rentgrs) from the Current Population Survey, Annual Social and Economic Supplement (ASEC).

    (b) Housing consumption weights w_t are provided by Moretti (2013)& Yagan (2016). These weights estimate the portion of non-housing costs that vary systematically with housing costs. For reference, this weight is approximately .35 in 2000.

    (c) Define $p_{s,t}$ as average gross monthly rental cost of housing by state-year.

    (d) Define $r_{s,1980}$ the average gross monthly rental cost of housing by state in 1980.

    (e) Define cpi_t as national CPI from FRED, anchored to 1 in 1980.

    (f) Define rental CPI $cpi_{s,t}^r = \frac{p_{s,t}}{r_{s,1980}}$. Let cpi_t^r be the annual mean of $cpi_{s,t}^r$.

    (g) Then define $cpi_t^{adj} = \frac{cpi_t}{(1-w_t)} - \frac{w_t}{(1-w_t)} cpi_t^r$.

    (h) Finally, let $P_{s,t}^{CPI} = (1-w_t)(cpi_t^{adj}) + w(cpi_{s,t}^r)$.

    As noted in Moretti (2013), this measure includes local variation in housing and non-housing costs, but is limited in that non-housing costs come from national cpi and so that portion of the price index does not vary by state.

18. Moretti HPI Price Index $P_{s,t}^{Moretti}$. This variable is a state-specific price index that is constructed following Moretti (2013). The construction of this variable follows the same steps as "Moretti CPI" above, except I utilize a Housing Price Index (FHFA HPI Index) in place of rentgrs. HPI is drawn from Federal Housing Finance Agency House Price Index Datasets, Purchase-Only Indexes (Estimated using Sales Price Data). See FHFA HPI Index above for a short description of this variable.

19. Net Earnings. Source: U.S. Department of Commerce, Bureau of Economic Analysis; Category: Regional Economic Accounts; Dataset: State Personal Income Accounts, Annual state personal income and employment, Table SA4.

20. Nominal GDP. Source: NIPA Table 1.1.5.

21. Oil Price. This variable is the average spot price of West Texas Intermediate. Source: St. Louis Federal Reserve FRED database.

22. Part-time Employment Rate. This variable is the share of persons, ages 16 or over, participating in the labor force who report employment status 10 "At work" or 12 "Has job, not at work last week" in the CPS, and also worked fewer than 48 weeks in the past year. I use wkswork1 and wkswork2 to create a proxy for the number of weeks worked by taking the mean value of wkswork2 in cases where wkswork1 is missing. Each of these variable is drawn from the CPS; see Ruggles et al. (2010). Source: U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC).

23. Payroll. This variable is the total state payroll in a given year. Source: Quarterly Census of Employment and Wages (QCEW) - Statewide.

24. Personal Income. Source: U.S. Department of Commerce, Bureau of Economic Analysis; Category: Regional Economic Accounts; Dataset: State Personal Income Accounts, Annual state personal income and employment, Table SA4.

25. Personal Transfer Receipts. Source: U.S. Department of Commerce, Bureau of Economic Analysis; Category: Regional Economic Accounts; Dataset: State Personal Income Accounts, Annual state personal income and employment, Table SA4.

26. Real Interest Rate. This variable is generated through the Federal Funds Rate less national CPI inflation. Source: St. Louis Federal Reserve FRED database.

27. Rent Income. This variable is the mean pre-tax income received from rent (after expenses) for those ages 16 or over in a given state-year; see Ruggles et al. (2010). Source: U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC); Variable: incrent.

28. Residential Investment. Source: NIPA Table 1.1.3. Real Gross Domestic Product, Quantity Indexes [Index numbers, 2009=100].

29. State GDP. This variable indicates the Gross Domestic Product by state-year. Source: U.S. Department of Commerce, Bureau of Economic Analysis; Category: Regional Economic Accounts; Dataset: Annual Gross Domestic Product (GDP) by State; Series: SIC All GDP Components & NAICS All GDP Components.

30. State Population. This variable indicates the number of residents in a state-year. Source: Federal Reserve Bank of St. Louis, FRED; Series: Resident Population in state s.

31. State GDP/Capita. This variable is state GDP divided by State Population; sources above.

32. Total Income. This variable is the mean total pre-tax personal income or losses from all sources for those ages 16 or over in a given state-year; see Ruggles et al. (2010). Source: U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC); Variable: inctot.

33. Unemployment Benefit Income. This variable is the mean pre-tax income received from state or federal unemployment compensation, Supplemental Unemployment Benefits (SUB), or union unemployment or strike benefits for those ages 16 or over in a given state-year. Source: U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC); Variable: incunemp.

34. Wage. This variable is the mean wage of full-time workers in a given state-year. This is built utilizing variables from the U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC); see Ruggles et al. (2010). I follow Moretti (2013) in terms of sample restrictions. Specifically, I take wage to be incwage/hours, where incwage comes directly from the CPS and hours is constructed as noted in the item above. In cases in which workers work fewer than 48 weeks per year, as estimated by the wkswork proxy also noted above, I set the wage value to missing so that the state-year measure reflects the average wages of full-time workers as in Moretti (2013). Finally, I restrict the sample to workers aged between 25 and 60.

35. Welfare Income. This variable is the mean pre-tax income received from various public assistant programs (welfare) for those ages 16 or over in a given state-year; see Ruggles et al. (2010). Source: U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC); Variable: incwelfr.

36. Worker's Compensation Income. This variable is the mean pre-tax income received from worker's compensation payments or other payments as a result of job-related injury or illness for those ages 16 or over in a given state-year; see Ruggles et al. (2010). Source: U.S. Census Bureau; Dataset: Current Population Survey, Annual Social and Economic Supplement (ASEC); Variable: incwkcom.

37. Composition-Constant Wage. I use Ruggles et al. (2010) data on age, sex, education, state, and wages (defined above) from the Integrated Public Use Microdata Series (IPUMS) Annual Social and Economic Supplement (ASEC) of the Current Population Survey (CPS) spanning 1975-2007. I follow the approach of Busso et al. (2013) and Suárez Serrato and Zidar (2016) to construct composition-constant wages in two steps. First, I restrict the sample to full-time workers (i.e., those working at least 48 weeks) who are aged between 25 and 60 and then de-mean wages and worker characteristics (i.e., age, sex, years of education) relative to the whole sample of these workers from 1975-2007 to create a constant reference group across states and years. Second, weighting each observation

by the supplement weight provided by the CPS, I then estimate the coefficients of the following linear regression model of hourly wages:

$$\dot{w}_{i,s,t} = \beta_1 \dot{Age}_{i,s,t} + \beta_2 \dot{Educ}_{i,s,t} + \beta_3 \dot{Male}_{i,s,t} + \mu_{s,t} + u_{i,s,t}, \tag{5}$$

where i, s, and t index individuals, states, and years respectively; $\dot{x}$ denotes the demeaned value of the variable x; Age is age in years; $Educ$ is approximate[49] years of education; $Male$ is an indicator for being male; and $\mu_{s,t}$ is a state by year fixed effect. The composition-constant wage state is the sum of the average wage in the entire sample and the estimated state-year specific average wage, i.e., $\bar{w}_{i,s,t} + \hat{\mu}_{s,t}$.

A.2.1 Real Series

Real outcomes are the nominal outcomes divided by a specified pricing index. I use the following indices throughout the paper:

1. ACCRA
2. BLS Price Index
3. Moretti CPI
4. Moretti HPI

The construction and sources of these indices are described in section A.2.

A.2.2 Demographic Groups

In the appendix of this paper, I present estimates of the effects of tax changes on certain demographic groups.[50] I only determine outcomes by demographic group if the data originate from the Integrated Public Use Microdata Series (IPUMS) Annual Social and Economic Supplement (ASEC) of the Current Population Survey (CPS); see section A.2. I define these groups as follows:

1. Skilled. Indicates working age people that have at least some college; i.e., educ takes value 80, 81, 90, 91, 92, 100, 110, 111, 120, 121, 122, 123, 124, or 125.
2. Unskilled. Indicates working-age people with no college, or with education unreported.
3. Aged 25-45. Indicates working-age people aged 25 to 45, exclusive.

[49] Specifically, *Educ* is defined as follows: 0 if educ is 2, 2.5 if educ is 10, 1 if educ is 11, 2 if educ is 12, 3 if educ is 13, 4 if educ is 14, 5.5 if educ is 20, 5 if educ is 21, 6 if educ is 22, 7.5 if educ is 30, 7 if educ is 31, 8 if educ is 32, 9 if educ is 40, 10 if educ is 50, 11 if educ is 60, 12 if inlist(educ, 70, 71, 72, 73), 13 if inlist(educ, 80, 81), 14 if inlist(educ, 90, 91, 92), 15 if educ is 100, 16 if inlist(educ, 110, 111), 17 if inlist(educ, 120, 121), 18 if inlist(educ, 122, 123, 124), 20 if educ is 125, . if inlist(educ, 1, 999).

[50] See appendix Figures A15, A16, A17, A18, A19, A20, and Table A4.

4. Aged 45-60. Indicates working-age people aged 45 to 60, inclusive.

5. Men. Indicates working-age men. Determined by sex.

6. Women. Indicates working-age women. Determined by sex.

7. White. Indicates working-age people who report their race as white (i.e., race takes value 100).

8. Non-White. Indicates working-age people who do not report their race as white.

Note that "working age people" are ages 16 or over, as that is the full sample of reported individuals in the Integrated Public Use Microdata Series (IPUMS) Annual Social and Economic Supplement (ASEC) of the Current Population Survey (CPS).

A.3 Data on Social Insurance

A.3.1 Controls

This subsection lists and describes the social insurance variables directly controlled for in regressions.

1. Government Transfers Per Capita. This variable is the total state transfers per capita by state-year. Source: U.S. Department of Commerce, Bureau of Economic Analysis; Category: Regional Economic Accounts; Dataset: State Personal Income Accounts, Annual State Personal Income and Employment, all tables and areas; Series: SA4 1929 2015 ALL.

2. Federal IG Spending Per Capita. This variable is the total federal transfers to a state per capita by state-year. Source: U.S. Census Bureau's Historical Database on Individual Government Finances.

3. Minimum Wage. This variable is the minimum wage by state-year. Data are from replication files provided by Autor et al. (2016).

4. OASDI. This variable is the ratio of total Old-Age, Survivors, and Disability Insurance (OASDI) payments in a state to that state's GDP. Source: Annual Statistical Supplement to the Social Security Bulletin 1980-2015.

5. Supplemental Security Income. This variable is the ratio of total Supplemental Security Income (SSI) payments in a state to that state's GDP. The total SSI payment in a state is constructed by taking the average federal SSI payment and multiplying that by the number of recipients in a state. Data on federal SSI payments and state recipients are drawn from the Social Security Administration (SSA) - Annual Statistical Supplement to the Social Security Bulletin 1980-2015.

6. COLA. This variable is the annual cost of living adjustment (COLA) interacted with state dummies. Data on COLA are drawn from the Social Security Administration Database. See: https://www.ssa.gov/oact/cola/SSIamts.html.

7. SNAP Benefits x State. This variable is the ratio of total Supplemental Nutrition Assistance Program (SNAP) Benefits to National GDP. This amount is then interacted with state dummies. Data on SNAP benefits is drawn from the United States Department of Agriculture. See: http://www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap.

8. Max SNAP Benefits. This variable is the maximum Supplemental Nutrition Assistance Program (SNAP) allotment for families of size 4 multiplied by the number of recipients in that state three years prior and then divided by that state's GDP. Data on SNAP benefits are drawn from the United States Department of Agriculture. See: http://www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap.

9. SNAP Benefits Per Household. This variable is the ratio of total Supplemental Nutrition Assistance Program (SNAP) benefits in a state to that state's GDP. Data on SNAP benefits are drawn from the United States Department of Agriculture. See: http://www.fns.usda.gov/pd/supplemental-nutrition-assistance-program-snap.

10. FPL x State. This variable is the federal poverty level for a family of size 4 interacted with state dummies. Source: Social Security Administration, 2015 Annual Statistical Supplement, Data on Social Welfare and the Economy Table 3.E8.

11. FMAP. This variable is the Federal Medical Assistance Percentage (FMAP) for each state. Source: Federal Medical Assistance Percentages, U.S. Department of Health and Human Services.

12. Medicaid Benefits. This variable is the ratio of total Medicaid vendor payments in a state to that state's GDP. Data on state-level recipients and vendor payments is drawn from HFCA-2082 Medicaid State Reports for 1975-1998 and MSIS-2082 Medicaid State Reports for 1999-2012. See: https://www.cms.gov/Research-Statistics-Data-and-Systems/Computer-Data-and-Systems/MedicaidDataSourcesGenInfo/MSIS-Tables.html.

13. AFDC + TANF Benefits. This variable is the ratio of total AFDC payments in a state to that state's GDP in years prior to 1997. In 1997 and later, this variable takes the ratio of total TANF payments in a state to that state's GDP. Data on AFDC and TANF payments come from the U.S. Department of Health and Human Services Office of Family Assistance. See: http://www.acf.hhs.gov/ofa/resource/afdc-caseload-data-1960-1995 and http://www.acf.hhs.gov/ofa/programs/tanf/data-reports.

14. Max AFDC + TANF Benefits. This variable is the maximum AFDC payment for families with two children multiplied by the number of recipients in that state three years prior and then divided by that state's GDP in years prior to 1997. In 1997 and later, this variable takes the maximum AFDC payment for families of size 3, multiplies this by lagged recipients in a state, and then divides it by that state's GDP. Data on AFDC and TANF payments come from the U.S. Department of Health and Human Services Office of Family Assistance. See: http://www.acf.hhs.gov/ofa/resource/afdc-caseload-data-1960-1995 and http://www.acf.hhs.gov/ofa/programs/tanf/data-reports.

A.3.2 Policy Parameters for Spending Simulations

This subsection lists the policy parameters used to simulate social insurance spending.

Aid to Families with Dependent Children (AFDC)

1. Need Standard, for all family sizes from 1 to 12. This variable comes from the Transfer Income Model (TRIM3) project website. See: http://trim3.urban.org.

2. Payment Standard, for family sizes from 1 to 12. This variable comes from the Transfer Income Model (TRIM3) project website. See: http://trim3.urban.org.

3. Maximum Benefit, for family sizes from 1 to 12. This variable comes from the Transfer Income Model (TRIM3) project website. See: http://trim3.urban.org.

4. Earnings Disregard. This formula is drawn from welfare legislation, namely, the Omnibus Budget Reconciliation Act of 1981, the Deficit Reduction Act of 1984, and the Family Support Act of 1988.

Temporary Assistance for Needy Families (TANF)

1. A number of state-specific need standards, payment standards, and maximum benefits, for all family sizes from 1 to 12. These income standards include the Allowable Payment, the Assistance Standard, the Benefit Amount, the Budgetary Adjustment, the Budgetary Standards, the Cash Assistance Monthly Standard, the Consolidated Need Standard, the Family Allowance, the Family Maximum, the Family Size Allowance, the Family Wage Level, the Flat Grant Amount, the Grant Standard, the Maximum Aid Payment, the Maximum Benefit, the Maximum Benefit Payment Schedule, the Maximum Financial Assistance Payment, the Maximum Grant, the Maximum Payment, the Maximum Payment Level, the Maximum Payment Amount, the Need Standard, the Net Income Standard, the Payment Allowance, the Payment Benefit, the Payment Level, the Payment Maximum, the Payment Standard, the Standard of Assistance, the Standard of Need, the TEEM Standard of Need, the Transitional Standard, and the Work Incentive

Payment. These variables come from the Urban Institute's Welfare Rules Database. See: http://wrd.urban.org/wrd/Query/query.cfm.

2. A number of state-specific variables used as a threshold for the gross income test, for all family sizes from 1 to 12. These include the Adjusted Standard Needs Budget, the Assistance Standard, the Budgetary Needs Standard, the Budgetary Standards, the Consolidated Need Standard, the Countable Income Limit, the Gross Income Test, the Maximum Benefit Payment Schedule, the Minimum Basic Standard of Adequate Care, the Need Standard, the Net Monthly Income Standard, the Standard of Assistance, the Standard of Need, and the TEEM Standard of Need. These variables come from the Urban Institute's Welfare Rules Database. See: http://wrd.urban.org/wrd/Query/query.cfm.

3. A number of state-specific variables used as a threshold for the net income test, for all family sizes from 1 to 12. These include the Adjusted Income Standard, the Adjusted Standard Needs Budget, the Allocation Allowance Standard, the Allowable Payment, the Benefit Standard, the Budgetary Needs Standard, the Budgetary Standards, the Family Size Allowance, the Flat Grant Amount, the Income Eligibility Standard, the Maximum Benefit, the Minimum Basic Standard of Adequate Care, the Need Standard, the Net Monthly Income Standard, the Payment Level, the Payment Standard, the Recognizable Needs, the Standard of Assistance, the Standard of Need, and the Transitional Standard. These variables come from the Urban Institute's Welfare Rules Database. See: http://wrd.urban.org/wrd/Query/query.cfm.

4. Maximum Gross Earned Income Limit, which is used as a threshold for the gross earnings test. This variable is available for all family sizes from 1 to 12 and comes from the Urban Institute's Welfare Rules Database. See: http://wrd.urban.org/wrd/Query/query.cfm.

5. Payment Standard and Standard of Assistance, which are used as a threshold for the unearned income test. These variables are available for all family sizes from 1 to 12 and come from the Urban Institute's Welfare Rules Database. See: http://wrd.urban.org/wrd/Query/query.cfm.

6. Earnings Disregard for the net income test and benefit computation. These formulae are drawn from the Urban Institute's Welfare Rules Database. See: http://wrd.urban.org/wrd/Query/query.cfm.

7. Federal Poverty Level (FPL), as defined by the U.S. Department of Health and Human Services. Source: Social Security Administration, 2015 Annual Statistical Supplement, Data on Social Welfare and the Economy Table 3.E8.

Supplemental Nutrition Assistance Program (SNAP)

1. Net Income Limit and Gross Income Limit. These variables are multiples (100% and 130%, respectively) of the Federal Poverty Level, as defined by the Department of Health and Human Services. Source: Social Security Administration, 2015 Annual Statistical Supplement, Data on Social Welfare and the Economy Table 3.E8.

2. Maximum Coupon Allotment. This parameter is set by the U.S. Department of Agriculture. See: https://www.fns.usda.gov/snap/fact-sheet-resources-income-and-benefits.

3. Standard Deduction. This parameter is set by the U.S. Department of Agriculture. See: https://www.fns.usda.gov/snap/fact-sheet-resources-income-and-benefits.

4. Excess Shelter Deduction. This parameter is set by the U.S. Department of Agriculture. See: https://www.fns.usda.gov/snap/fact-sheet-resources-income-and-benefits.

5. Earnings Disregard. Source: U.S. Department of Agriculture. See: https://www.fns.usda.gov/snap/fact-sheet-resources-income-and-benefits.

Supplemental Security Income (SSI)

1. Monthly Federal Standard for Individuals and Couples. These parameters are set by the Social Security Administration. See: https://www.ssa.gov/oact/cola/SSIamts.html.

2. Earnings and Gross Income Disregards. Source: Social Security Administration. See: https://www.ssa.gov/pubs/EN-05-11015.pdf.

Medicaid

1. Federal Poverty Level (FPL), as defined by the U.S. Department of Health and Human Services. Source: Social Security Administration, 2015 Annual Statistical Supplement, Data on Social Welfare and the Economy Table 3.E8.

2. Earnings Disregard, which is used to compute countable income for Medicaid from 1997 onwards. This formula comes from the Transfer Income Model (TRIM3) project website. See: http://trim3.urban.org.

3. Income Limit for Children, Elderly, and (section 1931) Parents, as a percentage of the Federal Poverty Level. These parameters are drawn from the Transfer Income Model (TRIM3) project website. See: http://trim3.urban.org.

4. Age Limit for Children. This parameter is drawn from the Transfer Income Model (TRIM3) project website. See: http://trim3.urban.org.

5. All AFDC parameters, which are used to assess eligibility for low-income families until 1996.

6. All SSI parameters, which are used to assess eligibility for the elderly.

B Empirical Appendix

B.1 β-Differences as Cyclicality Controls

I use β-differencing for cyclical controls primarily following Blanchard and Katz (1992). I run the following regression for each state s:

$$\Delta GDPPC_{s,t} = \mu_s + \beta_s \Delta GDPPC_t + \varepsilon_{s,t},$$

where $GDPPC_{s,t}$ is the logarithm of GDP per capita in state s at time t and $GDPPC_t$ is the logarithm of the aggregate national GDP per capita at time t. I run this regression on both 1963-2015.[51] This produces cyclicality coefficients $\hat{\beta}_s$ for each state that measure how responsive the state's economic activity is to changes in national conditions. I then group states into categories based on these coefficients. Specifically, the function $q(s) : \{AL, AK, ..., WY\} \to \{1, ..., 5\}$ gives the quintile of the state's sensitivity to national changes in economic conditions. I use these quintiles in the baseline specification but also show results using deciles instead of quintiles in Table 4. Finally, I also show results in Table 4 using quintiles of each state's standard deviation in real GDP per capita $\sigma_{s,1963-1979}$ in the years preceding the sample period 1980-2007.

C Social Insurance Microsimulation Models

C.1 Overview

This section describes the social insurance microsimulation models[52] and how I use them to estimate annual policy-induced changes in social insurance spending for each state. First, I draw individual- and household-level data from IPUMS-CPS and simulate each person's entitlement (if any) to a number of programs, namely, Aid to Families with Dependent Children (AFDC), Temporary Assistance for Needy Families (TANF), Supplemental Nutrition Assistance Program (SNAP), Supplemental Security Income (SSI), and Medicaid. Second, I aggregate individual benefits at the state level and estimate each program's annual spending. Subsequently, for

[51] I also present rules only using 1963-1979, i.e., the years the precede the state analysis sample.
[52] Francesco Ruggieri provided extraordinary research assistance on the microsimulation models.

each year and program I perform the same simulation using lagged inputs and current policy parameters, i.e., I estimate each state's spending per program holding constant financial and demographic characteristics, and letting only policy parameters vary. Finally, I construct the one-year, mechanical change in social insurance spending by comparing each program's expenditure in the year preceding a policy rule change to what the state-level spending would have been if the new policy parameters had been in place.

C.1.1 Aid to Families with Dependent Children (AFDC)

Aid to Families with Dependent Children (AFDC) was the main cash assistance program for low-income, one-parent families with dependent children. It was replaced by Temporary Assistance for Needy Families (TANF) in 1996, following the enactment of the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA). My simulation exploits most policy parameters used to determine eligibility, namely, each state's need standard, payment standard, and maximum benefit. For each household, I test whether gross income, i.e., earned and unearned income, and net income are below the threshold for eligibility. Then, I compute the earnings disregard assuming that each family is newly potentially eligible and that child care expense disregards are fully utilized.

C.1.2 Temporary Assistance for Needy Families (TANF)

Temporary Assistance for Needy Families (TANF) is the cash assistance program for low-income families with dependent children. Following President Clinton's welfare reform in 1996, states currently have broader flexibility – within federal limits – in setting policy parameters and rules, including various income and asset tests for eligibility. My simulation tests whether each household passes a gross income test (if any), a net income test (if any), a gross earnings test (if any), and an unearned income test (if any). Then, I estimate earnings disregards (if any) for the net income test, for TANF benefit computation, or both, assuming that each family has not received TANF benefits before.[53]

C.1.3 Supplemental Nutrition Assistance Program (SNAP)

The Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamps program, provides coupons to eligible low-income households to help them buy a nutritionally adequate low-cost diet. SNAP policy parameters are set by the U.S. Department of Agriculture, so program rules have little between-state variation. My simulation tests whether gross income, i.e., unearned and earned income, is below the threshold for eligibility. Then, I estimate net ("countable") income by subtracting earnings disregards, a standard deduction, and an excess

[53]Because earnings disregards are usually decreasing in the number of months a family has already received cash assistance, this assumption is likely to overstate the true earnings disregard and, subsequently, the TANF monthly benefit.

shelter deduction. In doing so, I assume that households living in non-owned properties pay 30% of their monthly earnings in rentals. Finally, I compare countable income to the threshold for net income eligibility and determine whether each household is entitled to a positive benefit.

C.1.4 Supplemental Security Income (SSI)

Supplemental Security Income (SSI) provides cash benefits to aged, blind, or disabled persons with limited income and assets. The main policy parameters are set by the Social Security Administration (SSA), but states can provide supplemental payments and impose additional requirements for benefits other than federal SSI. My simulation follows the definition of "household" as provided by SSI policy rules. Income tests and benefit computation rules are defined for one-person or two-person households (individuals and couples), so my simulation excludes household income not directly accruing to potential SSI recipients. I estimate net ("countable") income by subtracting an earnings disregard from gross income. I test whether this is below the threshold for eligibility and then compute SSI monthly benefit.

C.1.5 Medicaid

Medicaid provides health insurance for low-income families, children, parents, disabled individuals, and the elderly. Because observations in this paper range from 1980 to 2007, the expansion of Medicaid eligibility to a large number of non-disabled adults provided for by the Affordable Care Act is not taken into account. For each state and year, I estimate the number of individuals eligible for Medicaid through one (or more) of the following channels:

- Aid to Families with Dependent Children (AFDC): until 1996, eligibility for AFDC automatically implied that all family members were entitled to health care coverage under Medicaid. President Clinton's welfare reform delinked Medicaid from eligibility for welfare cash assistance;
- Supplemental Security Income (SSI): elderly and disabled persons eligible for SSI are automatically entitled to Medicaid;
- eligibility for children whose family income is below a state-specific multiple of the federal poverty level;
- eligibility for parents whose family income is below a state-specific multiple of the federal poverty level.

Subsequently, I estimate the state-year level of spending for Medicaid by multiplying the number of eligible adults, elderly, and children by a state- and category-specific average cost provided by the Transfer Income Model (TRIM) from the Urban Institute.

For all of the social insurance programs described above, I do not test whether countable assets are below the threshold for eligibility because this variable is not available in IPUMS-CPS.

C.2 Policy Parameters and Spending Formulae

C.2.1 Aid to Families with Dependent Children (AFDC)

Although the key features of the program did not change between 1980 and 1996, some policy rules were modified following the implementation of three acts: the Omnibus Budget Reconciliation Act of 1981, the Deficit Reduction Act of 1984, and the Family Support Act of 1988. The list of policy rules below applied to AFDC programs in every state in July 1996, when AFDC was replaced by TANF.

Policy Parameters

- **Dependent Children (DC)**: AFDC was not available for needy families without dependent children.
- **Gross Monthly Income (GMI)**: all of a family's earned and unearned income, after applicable disregards, such as $50 a month for child support and optional earned income disregards for certain students.
- **Net Monthly Income (NMI)**: a household's Gross Monthly Income minus the following deductions:
  - the Earned Income Tax Credit (EITC);
  - $90 per month for work expenses for individuals employed full- or part-time;
  - for an individual who received AFDC in at least one of the prior four months:
    - all monthly earned income of a child who is a full-time student or who is a part-time student and not employed full-time;
    - $30 and 1/3 of such person's remaining income for the first four consecutive months, and $30 for each of the eight subsequent months;
  - for full-time workers:
    - actual expenses for dependent care up to $175 per month for each dependent child who is at least age 2 or each incapacitated adult;
    - up to $200 per month for each dependent child who is under age 2;
  - for part-time workers: a lesser amount could be applicable at state option.

- **Countable Assets (CA)**: all of a family's assets, excluding the home, one automobile (provided the family member's ownership interest did not exceed a limit chosen by the Secretary of Health and Human Services), burial plots and (up to $1,500) funeral agreements for each member of the assistance unit.
- **Asset Limit (AL)**: the state-specific threshold for countable assets.
- **Need Standard (NS)**: the income level each State considered essential for basic consumption items. It was increasing in household size.
- **Payment Standard (PS)**: the income level each State used as a threshold for AFDC payments. It was increasing in household size.
- **Maximum Monthly Benefit (MMB)**: the maximum monthly payment, which several states set below the payment standard. It was increasing in household size.
- **Household Size (HS)**.

Spending Estimate

As of July 1996, AFDC spending per household in a given month in a given state could be expressed as:

$$\begin{aligned} AFDC_{hsm} = & I[DC_{hsm} \geq 1] \cdot \\ & I[GMI_{hsm} \leq 1.85 \cdot NS_{sm}(HS)] \cdot \\ & I[NMI_{hsm} \leq NS_{sm}(HS)] \cdot \\ & I[CA_{hsm} \leq AL_{sm}] \cdot \\ & min\{PS_{sm}(HS) - NMI_{hsm}; MMB(HS)\}, \end{aligned} \tag{6}$$

where $I[\cdot]$ is the indicator function, h denotes household, s denotes state of residence, m denotes month, and y denotes year. Thus, AFDC spending in month m in state s can be computed as follows:

$$AFDC_{sm} = \sum_{h=1}^{H_s} AFDC_{hsm}, \tag{7}$$

where H_s is the number of households residing in state s. It follows that AFDC spending in state s in year y can be expressed as:

$$AFDC_{sy} = \sum_{m=1}^{12} AFDC_{sm} = \sum_{m=1}^{12} \sum_{h=1}^{H_s} AFDC_{hsm}. \tag{8}$$

C.2.2 Temporary Assistance for Needy Families (TANF)

The Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996 gave states broader flexibility in designing their cash assistance programs for families with de-

pendent children. Matching funds were replaced by a block grant, and states were required to establish a number of job programs in order to smooth the transition between welfare and work.

Policy Parameters

- **Dependent Children (DC)**: TANF is not available for needy families without dependent children.
- **Months of Assistance (MA)**: federal law prohibits states from providing TANF-funded assistance to individuals in families with an adult who has received assistance for 60 months; states can set lower limits.
- **Countable Assets (CA)**: all of a family's liquid financial assets and other forms of property, excluding the home value. Most states fully or partially disregard the value of vehicles.
- **Asset Limit (AL)**: each state sets a limit on countable assets in order to determine eligibility for TANF.
- **Gross Monthly Income (GMI)**: all of a household's earned and unearned income.
- **Net Monthly Income (NMI)**: a household's gross monthly income minus a number of deductions and/or disregards specified by each State.
- **Income Standard (IS)**, which – depending upon States – is called Need Standard (NS), Payment Standard (PS), Benefit Standard (BS), Income Standard (IS), Transitional Standard (TS), Allowable Payment (AP), Countable Income Limit (CIL), Adjusted Income Standard (AIS), Family Size Allowance (FSA), Standard of Assistance (SA), or Grant Standard (GS). These income thresholds are generally increasing in household size and are set by States in order to:
  - determine eligibility based on gross income and/or net income;
  - compute benefit amount.
- **Federal Poverty Level (FPL)**, a measure of income issued every year by the Department of Health and Human Services.
- **Multiplier for Gross Income Eligibility ($\mathbf{M_{GIE}}$)**: the multiplier of each income threshold used to determine gross income eligibility.
- **Multiplier for Net Income Eligibility ($\mathbf{M_{NIE}}$)**: the multiplier of each income threshold used to determine gross income eligibility.

- **Multiplier for Benefit Computation ($\mathbf{M_{BC}}$)**: the multiplier of each income threshold used to compute benefit amount.
- **Maximum Monthly Benefit (MMB)**: the maximum monthly payment, which is adopted by a few states only. It is increasing in household size.
- **Flat Benefit (FB)**: some states provide flat cash assistance benefits, irrespective of household size.

Spending Estimate

Given the large degree of state flexibility in designing the cash assistance program, TANF spending per household in a given month in a given state can be summarized using three different formulas:

1. Income Standard minus Net Income:

$$\begin{aligned} TANF_{hsm} = & I[DC_{hsm} \geq 1] \cdot \\ & I[MA_h \leq 60] \cdot \\ & I[GMI_{hsm} \leq M_{GIE} \cdot IS_{sm}(HS)] \cdot \\ & I[NMI_{hsm} \leq M_{NIE} \cdot IS_{sm}(HS)] \cdot \\ & I[CA_{hsm} \leq AL_{sm}] \cdot \\ & (M_{BC} \cdot IS_{sm}(HS) - NMI_{hsm}) \end{aligned} \tag{9}$$

2. Income Standard minus Net Income, within Maximum Monthly Benefit:

$$\begin{aligned} TANF_{hsm} = & I[DC_{hsm} \geq 1] \cdot \\ & I[MA_h \leq 60] \cdot \\ & I[GMI_{hsm} \leq M_{GIE} \cdot IS_{sm}(HS)] \cdot \\ & I[NMI_{hsm} \leq M_{NIE} \cdot IS_{sm}(HS)] \cdot \\ & I[CA_{hsm} \leq AL_{sm}] \cdot \\ & min\{M_{BC} \cdot IS_{sm}(HS) - NMI_{hsm}; MMB(HS)\} \end{aligned} \tag{10}$$

3. Flat Benefit:

$$\begin{aligned} TANF_{hsm} = & I[DC_{hsm} \geq 1] \cdot \\ & I[MA_h \leq 60] \cdot \\ & I[GMI_{hsm} \leq M_{GIE} \cdot IS_{sm}(HS)] \cdot \\ & I[NMI_{hsm} \leq M_{NIE} \cdot IS_{sm}(HS)] \cdot \\ & I[CA_{hsm} \leq AL_{sm}] \cdot \\ & FB \end{aligned} \tag{11}$$

where $I[\cdot]$ is the indicator function, h denotes household, s denotes state of residence, m denotes month, and y denotes year. Thus, TANF spending in month m in state s can be computed as follows:

$$TANF_{sm} = \sum_{h=1}^{H_s} TANF_{hsm}, \tag{12}$$

where H_s is the number of households residing in state s. It follows that TANF spending in state s in year y can be expressed as:

$$TANF_{sy} = \sum_{m=1}^{12} TANF_{sm} = \sum_{m=1}^{12} \sum_{h=1}^{H_s} TANF_{hsm}. \tag{13}$$

C.2.3 Supplemental Nutrition Assistance Program (SNAP)

SNAP policy rules and parameters were almost left unchanged between 1980 and 2007. A gross income test was required for eligibility starting in 1983 and the dependent care deduction was capped starting in 1986. Policy parameters as of July 2007 are described below.

Policy Parameters

- **Gross Monthly Income (GMI)**: all of a household's cash income except a number of disregards.
- **Net Monthly Income (NMI)**: a household's Gross Monthly Income minus the following deductions:
  - Standard Deduction: a "standard" monthly deduction which varies by household size and is indexed for inflation;
  - Earned Income Deduction: 20% of any earned income, in recognition of taxes and work expenses;
  - Child Support Deduction: any amounts paid out as legally obligated child support;
  - Dependent Care Deduction: out-of-pocket dependent care expenses, when related to work or training;
  - Excess Shelter Deduction: shelter expenses (including utility costs) that exceed 50% of net income after all other deductions, typically expenses that exceed about one-third of gross monthly income. The excess shelter deduction does not vary upon household size.
- **Countable Assets (CA)**: a household's assets, including cash on hand, checking and savings accounts, savings certificates, stocks and bonds, a portion of the value of vehicles.
- **Asset Limit (AL)**: the threshold for countable assets.

- **Maximum Monthly Allotment (MMA)**: this is increasing in household size and is based upon the level of the U.S. Department of Agriculture's lowest-cost food plan.
- **Federal Poverty Level (FPL)**: a measure of income issued every year by the Department of Health and Human Services. This is higher in Alaska and Hawaii.
- **Household Size (HS)**.

Spending Estimate

As of 2007, SNAP spending per household in a given month in a given state can be expressed as:

$$\begin{aligned} SNAP_{hsm} = & I[GMI_{hsm} \leq 1.3 \cdot FPL_{sy}(HS)] \cdot \\ & I[NMI_{hsm} \leq FPL_{sy}(HS)] \cdot \\ & I[CA_{hsm} \leq AL_{sm}] \cdot \\ & (MMA_{sy}(HS) - 0.3 \cdot NMI_{hsm}), \end{aligned} \tag{14}$$

where $I[\cdot]$ is the indicator function, h denotes household, s denotes state of residence, m denotes month, and y denotes year. Thus, SNAP spending in month m in state s can be computed as follows:

$$SNAP_{sm} = \sum_{h=1}^{H_s} SNAP_{hsm}, \tag{15}$$

where H_s is the number of households residing in state s. It follows that SNAP spending in state s in year y can be expressed as:

$$SNAP_{sy} = \sum_{m=1}^{12} SNAP_{sm} = \sum_{m=1}^{12} \sum_{h=1}^{H_s} SNAP_{hsm}. \tag{16}$$

C.2.4 Supplemental Security Income (SSI)

SSI policy rules and parameters underwent no change in the time period considered in this paper.

Policy Parameters

- **Household Size (HS)**: this can take value 1 or 2, because SSI benefits are available for individuals or couples.
- **Gross Monthly Income (GMI)**: all of a household's cash income, consisting of both earnings and unearned income (such as other social insurance payments).
- **Net Monthly Income (NMI)**: a household's Gross Monthly Income minus the following deductions:

  - the first $20 of non-needs-based monthly income from virtually any source;
  - the first $32.5 in monthly earnings;
  - 50% of the remaining monthly earnings: this income disregard is provided as an incentive to undertake work activities.

- **Countable Assets (CA)**: a household's assets, excluding an individual's home, the entire value of an automobile used for essential transportation, any property essential to income-producing activity, and household goods and personal effects totaling $2,000 or less.

- **Asset Limit (AL)**: the threshold for countable assets; this is higher for couples than for individuals.

- **Maximum Net Monthly Income (MNMI)**: this is increasing in household size and is based upon the Federal Poverty Level, issued every year by the Department of Health and Human Services. Because some states provide supplemental payments to SSI, the effective maximum net monthly income varies across states.

Spending Estimate

SSI spending per household in a given month in a given state can be expressed as:

$$\begin{aligned} SSI_{hsm} = & I[NMI_{hsm} \leq MNMI_{sy}(HS)] \cdot \\ & I[CA_{hsm} \leq AL_{sm}] \cdot \\ & (MNMI_{sy}(HS) - NMI_{hsm}), \end{aligned} \tag{17}$$

where $I[\cdot]$ is the indicator function, h denotes household, s denotes state of residence, m denotes month, and y denotes year. Thus, SSI spending in month m in state s can be computed as follows:

$$SSI_{sm} = \sum_{h=1}^{H_s} SSI_{hsm}, \tag{18}$$

where H_s is the number of households residing in state s. It follows that SSI spending in state s in year y can be expressed as:

$$SSI_{sy} = \sum_{m=1}^{12} SSI_{sm} = \sum_{m=1}^{12} \sum_{h=1}^{H_s} SSI_{hsm}. \tag{19}$$

C.2.5 Medicaid

Because Medicaid does not provide recipients with cash benefits, the policy parameters described below are used to determine one's eligibility for Medicaid through each of the paths set by federal and state law.

Policy Parameters

1. **Eligibility through Aid to Families with Dependent Children (until 1996)**:

   - **Dependent Children (DC)**: AFDC was not available for needy families without dependent children.
   - **Gross Monthly Income (GMI)**: all of a family's earned and unearned income, after applicable disregards, such as $50 a month for child support and optional earned income disregards for certain students.
   - **Net Monthly Income (NMI)**: a household's Gross Monthly Income minus the following deductions:
     - the Earned Income Tax Credit (EITC);
     - $90 per month for work expenses for individuals employed full- or part-time;
     - for an individual who received AFDC in at least one of the prior four months:
       * all monthly earned income of a child who is a full-time student or who is a part-time student and not employed full-time;
       * $30 and 1/3 of such person's remaining income for the first four consecutive months, and $30 for each of the eight subsequent months;
     - for full-time workers:
       * actual expenses for dependent care up to $175 per month for each dependent child who is at least age 2 or each incapacitated adult;
       * up to $200 per month for each dependent child who is under age 2;
     - for part-time workers: a lesser amount could be applicable at state option.
   - **Countable Assets (CA)**: all of a family's assets, excluding the home, one automobile (provided the family member's ownership interest did not exceed a limit chosen by the Secretary of Health and Human Services), burial plots and (up to $1,500) funeral agreements for each member of the assistance unit.
   - **Asset Limit (AL)**: the state-specific threshold for countable assets.
   - **Need Standard (NS)**: the income level each State considered essential for basic consumption items. It was increasing in household size.
   - **Household Size (HS)**.

2. **Eligibility through Supplemental Security Income**:

   - **Household Size (HS)**: this can take value 1 or 2, because SSI benefits are available for individuals or couples.
   - **Gross Monthly Income (GMI)**: all of a household's cash income, consisting of both earnings and unearned income (such as other social insurance payments).

- **Net Monthly Income (NMI)**: a household's Gross Monthly Income minus the following deductions:
  - the first $20 of non-needs-based monthly income from virtually any source;
  - the first $32.5 in monthly earnings;
  - 50% of the remaining monthly earnings: this income disregard is provided as an incentive to undertake work activities.
- **Countable Assets (CA)**: a household's assets, excluding an individual's home, the entire value of an automobile used for essential transportation, any property essential to income-producing activity, and household goods and personal effects totaling $2,000 or less.
- **Asset Limit (AL)**: the threshold for countable assets; this is higher for couples than for individuals.
- **Maximum Net Monthly Income (MNMI)**: this is increasing in household size and is based upon the Federal Poverty Level, issued every year by the Department of Health and Human Services. Because some states provide supplemental payments to SSI, the effective maximum net monthly income varies across states.

3. **Eligibility for Children and Parents**:

- **Gross Monthly Income (GMI)**: all of a household's earnings and unearned income.
- **Net Monthly Income (NMI)**: until 1996, Net Monthly Income for Medicaid used to be determined according to AFDC rules. Following the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), which delinked AFDC eligibility from Medicaid, Net Monthly Income calculation rules involved a state-specific earnings disregard as well as a deduction in recognition of child care expenses and a child support deduction.
- **Countable Assets (CA)**: all of a household's countable resources, as defined by federal and state law.
- **Asset Limit (AL)**: the state-specific threshold for countable assets.
- **Federal Poverty Level (FPL)**: a measure of income issued every year by the Department of Health and Human Services. This is higher in Alaska and Hawaii.
- **Children's Income Limit Multiplier ($\mathbf{M_{CH}}$)**: the Federal Poverty Level multiplier used to determine income eligibility for children.
- **Parents' Income Limit Multiplier ($\mathbf{M_{PA}}$)**: the Federal Poverty Level multiplier used to determine income eligibility for parents.
- **Household Size (HS)**.

Spending Estimate

Medicaid is a dummy variable which takes value 1 if all conditions for eligibility are met.

1. **Eligibility through Aid to Families with Dependent Children (until 1996)**. As of July 1996, Medicaid eligibility through AFDC can be expressed as:

$$\begin{aligned} MED_{hsm}^{AFDC} =& I[DC_{hsm} \geq 1] \cdot \\ & I[GMI_{hsm} \leq 1.85 \cdot NS_{sm}(HS)] \cdot \\ & I[NMI_{hsm} \leq NS_{sm}(HS)] \cdot \\ & I[CA_{hsm} \leq AL_{sm}], \end{aligned} \tag{20}$$

   where $I[\cdot]$ is the indicator function, h denotes household, s denotes state of residence, m denotes month, and y denotes year.

2. **Eligibility through Supplemental Security Income**. Medicaid eligibility through SSI can be expressed as:

$$\begin{aligned} MED_{hsm}^{SSI} =& I[NMI_{hsm} \leq MNMI_{sy}(HS)] \cdot \\ & I[CA_{hsm} \leq AL_{sm}], \end{aligned} \tag{21}$$

   where $I[\cdot]$ is the indicator function, h denotes household, s denotes state of residence, m denotes month, and y denotes year.

3. **Eligibility for Children**

$$\begin{aligned} MED_{hsm}^{CH} =& I[NMI_{hsm} \leq M_{CH} \cdot FPL_{sy}(HS)] \cdot \\ & I[CA_{hsm} \leq AL_{sm}], \end{aligned} \tag{22}$$

   where $I[\cdot]$ is the indicator function, h denotes household, s denotes state of residence, m denotes month, and y denotes year.

4. **Eligibility for Parents**

$$\begin{aligned} MED_{hsm}^{PA} =& I[NMI_{hsm} \leq M_{PA} \cdot FPL_{sy}(HS)] \cdot \\ & I[CA_{hsm} \leq AL_{sm}], \end{aligned} \tag{23}$$

   where $I[\cdot]$ is the indicator function, h denotes household, s denotes state of residence, m denotes month, and y denotes year.

Medicaid spending in month m in state s can be estimated by multiplying the number of eligible individuals by the average health care expense per Medicaid recipient (labeled as AVG):

$$MED_{sm} = AVG_{sm} \cdot \sum_{h=1}^{H_s} MED_{hsm}, \tag{24}$$

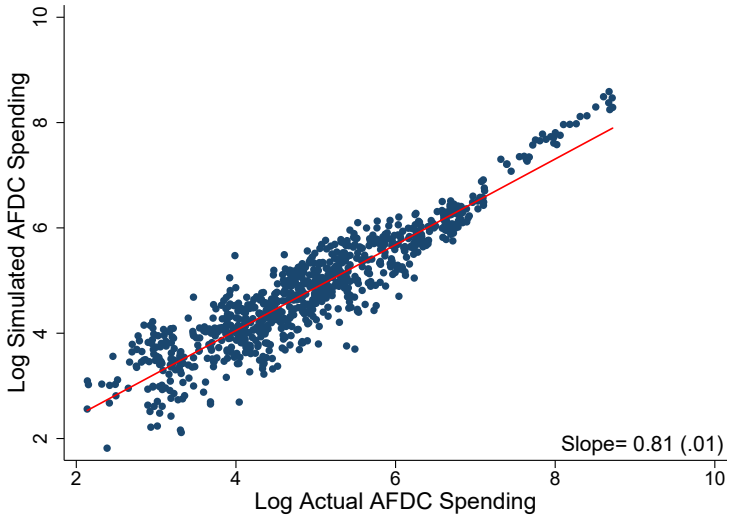
where H_s is the number of households residing in state s. It follows that Medicaid spending in state s in year y can be expressed as:

$$MED_{sy} = \sum_{m=1}^{12} MED_{sm} = \sum_{m=1}^{12} AVG_{sm} \cdot \sum_{h=1}^{H_s} MED_{hsm}. \tag{25}$$

C.3 Actual and Simulated Spending for Social Insurance Programs

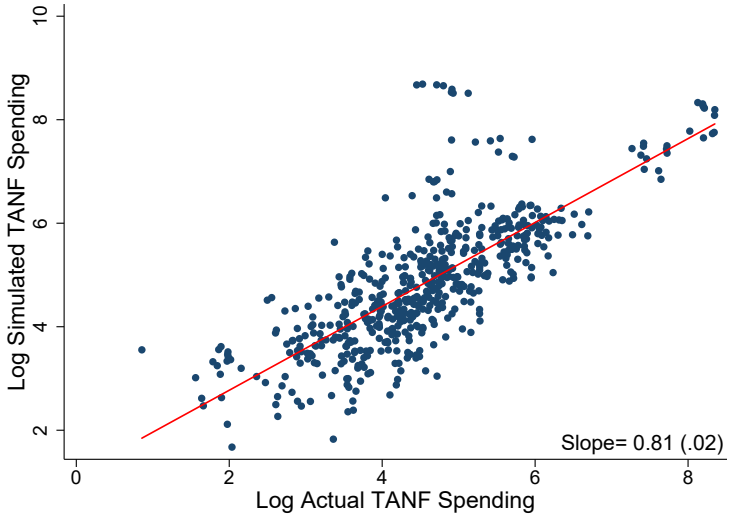
This section shows how simulated social insurance spending at the state level compares to actual data. All states and the District of Columbia are included, and observations range from 1980 to 2007.

Figure A1: Actual vs. Simulated Spending for AFDC



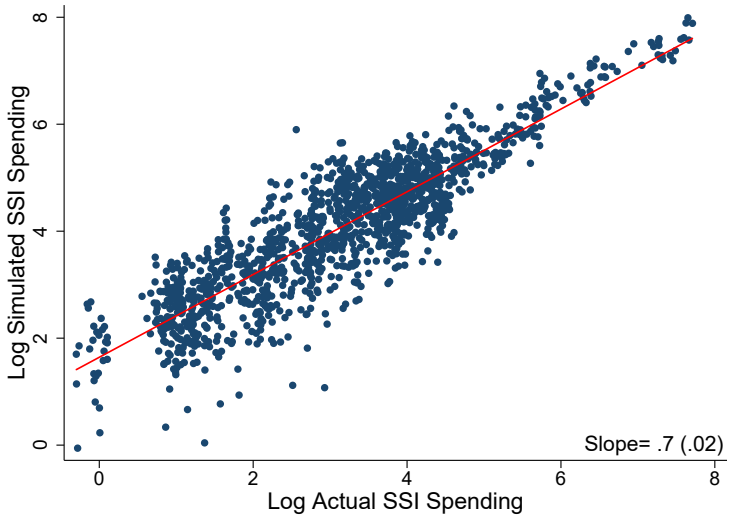
Notes: This figure shows the log of actual AFDC spending against the log of simulated AFDC spending. The data are at the state-year level from 1980 to 1996. See appendix C for more details on the construction of these spending estimates.

Figure A2: Actual vs. Simulated Spending for TANF



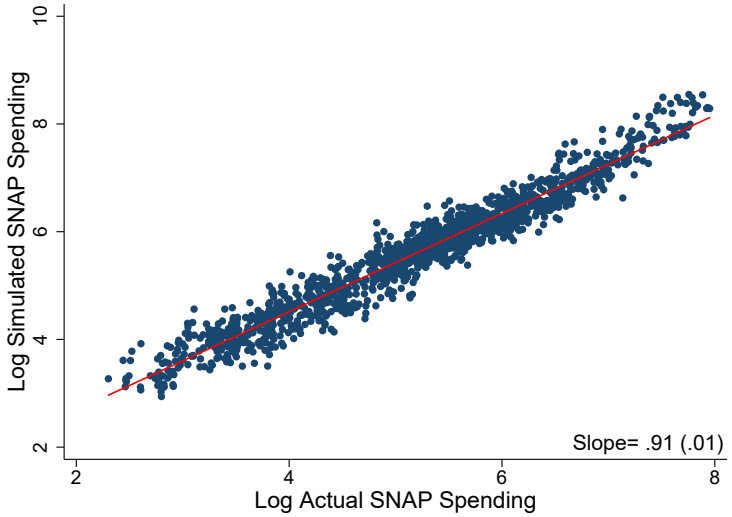
Notes: This figure shows the log of actual TANF spending against the log of simulated TANF spending. The data are at the state-year level from 1997 to 2007. See appendix C for more details on the construction of these spending estimates.

Figure A3: Actual vs. Simulated Spending for SSI



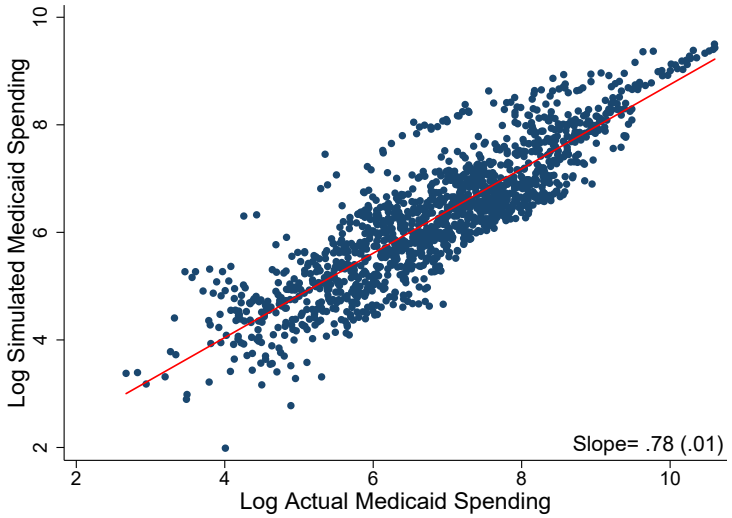
Notes: This figure shows the log of actual SSI spending against the log of simulated SSI spending. The data are at the state-year level from 1980 to 2007. See appendix C for more details on the construction of these spending estimates.

Figure A4: Actual vs. Simulated Spending for SNAP



Notes: This figure shows the log of actual SNAP spending against the log of simulated SNAP spending. The data are at the state-year level from 1980 to 2007. See appendix C for more details on the construction of these spending estimates.

Figure A5: Actual vs. Simulated Spending for Medicaid



Notes: This figure shows the log of actual Medicaid spending against the log of simulated Medicaid spending. The data are at the state-year level from 1980 to 2007. See appendix C for more details on the construction of these spending estimates.

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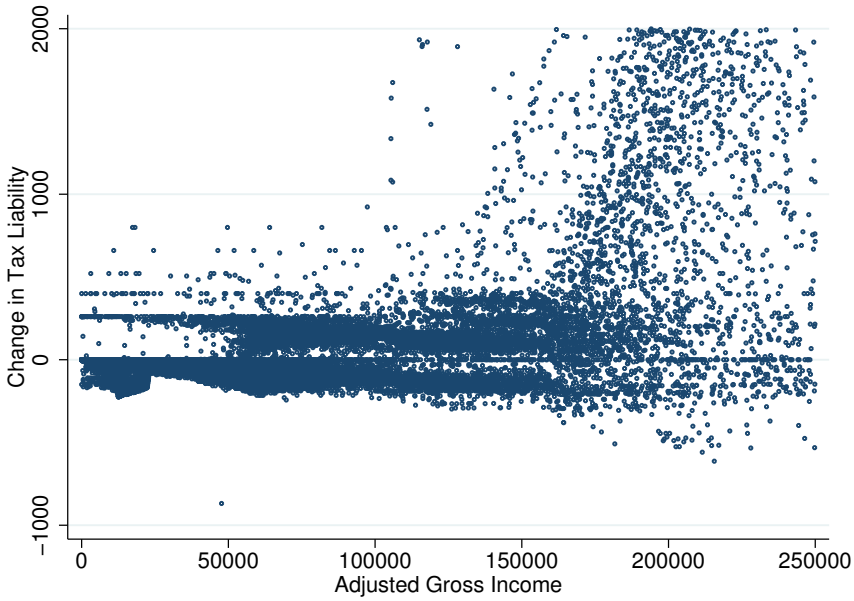
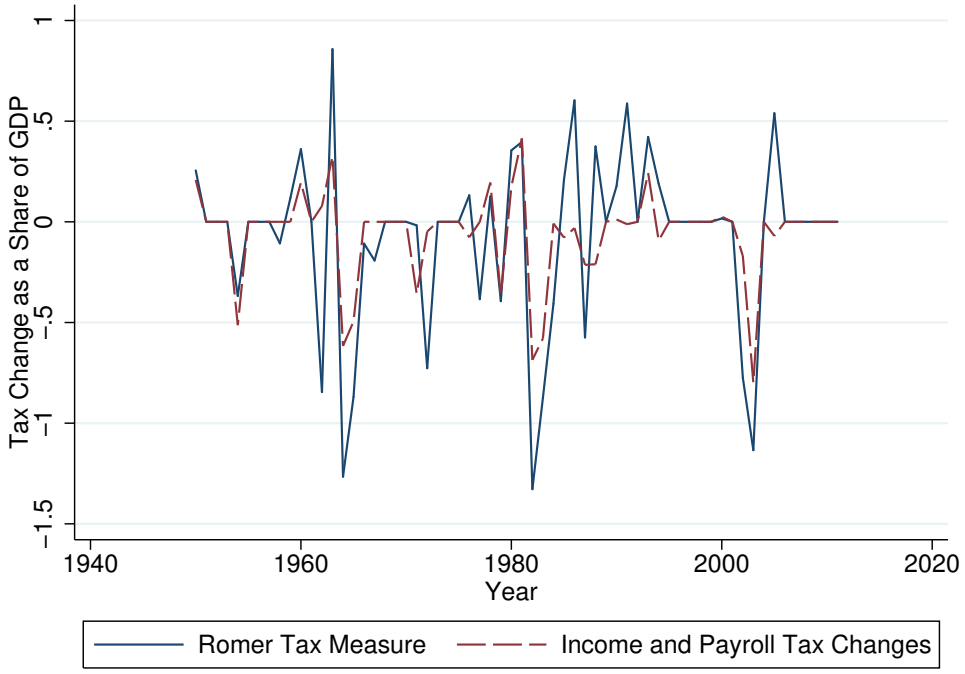
Figure A6: Tax Change Calculation for Each Tax Return: 1993 Example



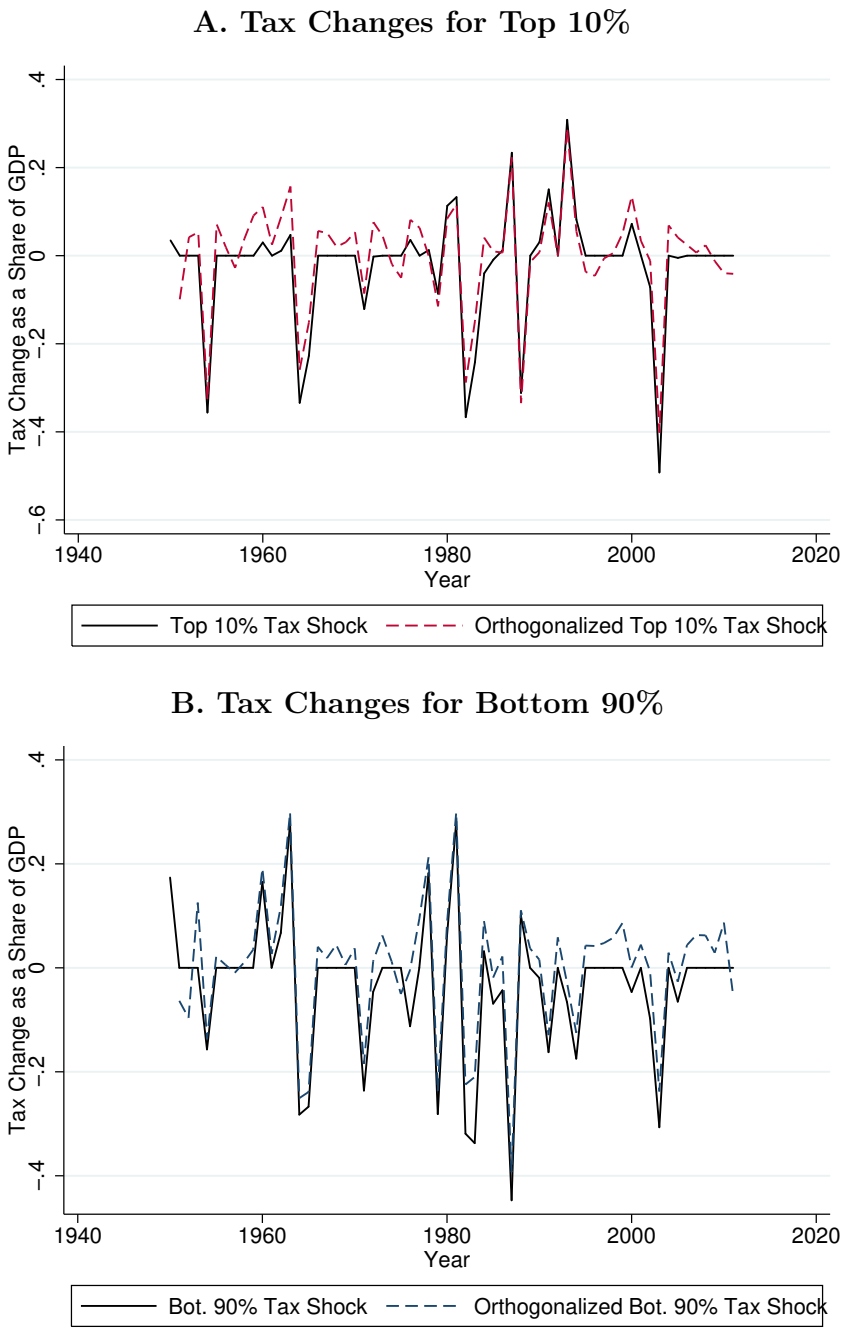
Notes: This figure displays the mechanical change in income and payroll tax liability for each tax return in TAXSIM from tax schedule changes in 1993 by AGI. For display purposes, it shows results for tax changes for $0 < AGI < 250K$ and $|\Delta Tax| < 2,000$.

Figure A7: Comparison of Aggregate Tax Changes with Romer & Romer Changes



Notes: This figure shows two postwar time series of tax changes: (1) the sum of all income and payroll tax changes that Romer and Romer (2010) classify as exogenous and (2) the exogenous tax change measures of Romer and Romer (2010). Both series are as a share of GDP. Some of the Romer and Romer (2010) tax changes affect corporate taxes and other revenue sources, but the two series track each other fairly closely.

Figure A8: Favero and Giavazzi Orthogonality Test for Both Tax Change Series

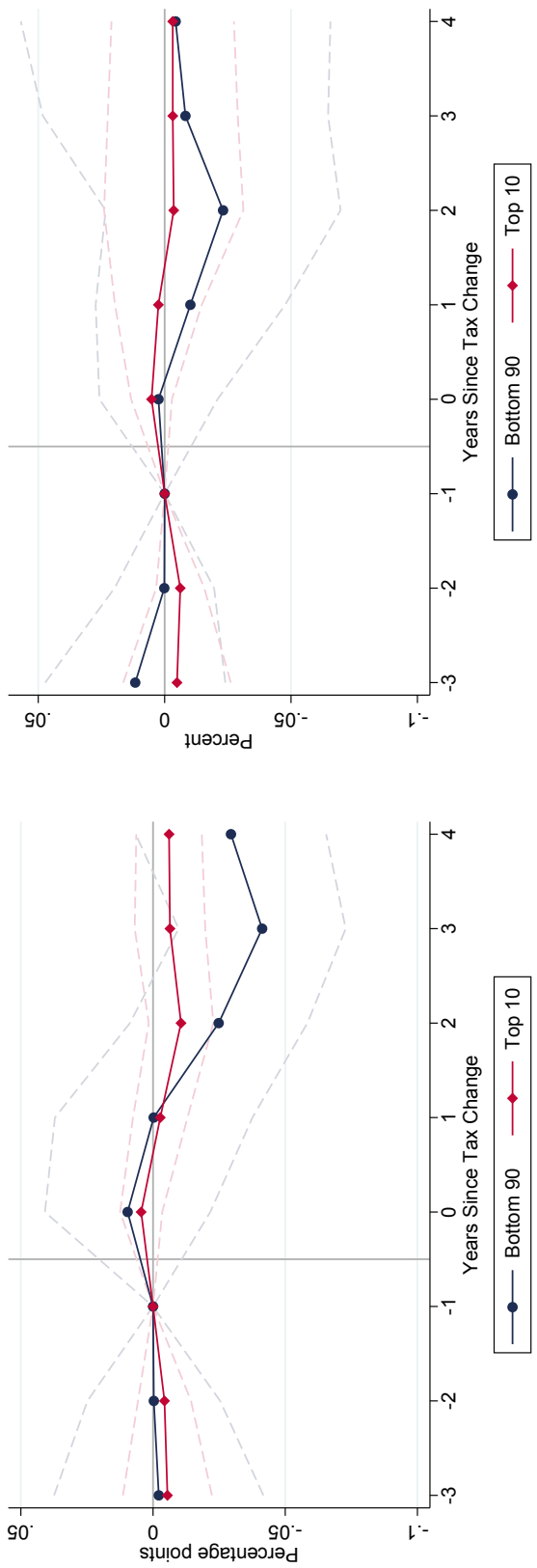


Notes: This figure plots the raw time series of federal income and payroll tax changes as a share of GDP as well as an orthogonalized time series of the residual of the tax change measure after partialling out lagged macro aggregates, which are annual log changes in employment, inflation, government transfers as a share of GDP, and federal debt as a share of GDP. The graphs show that the orthogonalized version is quite similar to the raw time series, suggesting that these federal tax shock series for the top 10% and bottom 90% both pass the Favero and Giavazzi (2012) orthogonality test. See data section for sources and section 3.4 for additional discussion.

Figure A9: Frisch Waugh Regression: Tax Changes for Top versus Bottom

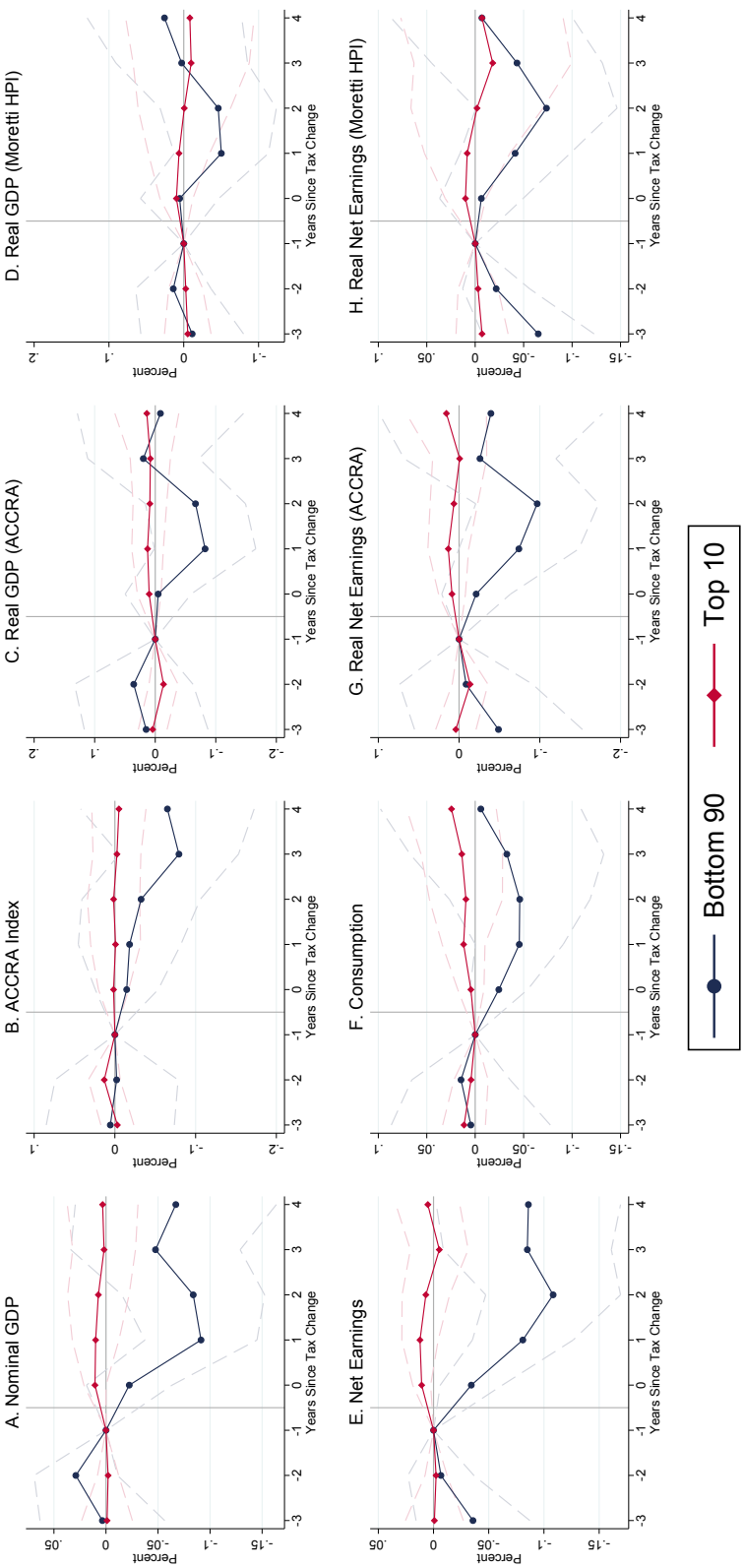
Notes: This figure plots exogenous tax changes for those with AGI in top 10% by those for the bottom 90%. Both tax changes are as a share of output. The figure also plots the predicted value of exogenous tax changes for those in the top 10% from a simple bivariate regression on exogenous tax changes for those with AGI in the bottom 90%. Years that fall below the best fit line had tax changes that went disproportionately to the top 10% (given the magnitude of tax changes for the bottom 90% as a share of output).

Figure A10: Cumulative Growth in Emp-to-Pop Ratio and Employment: Lagged Tax Changes as Controls



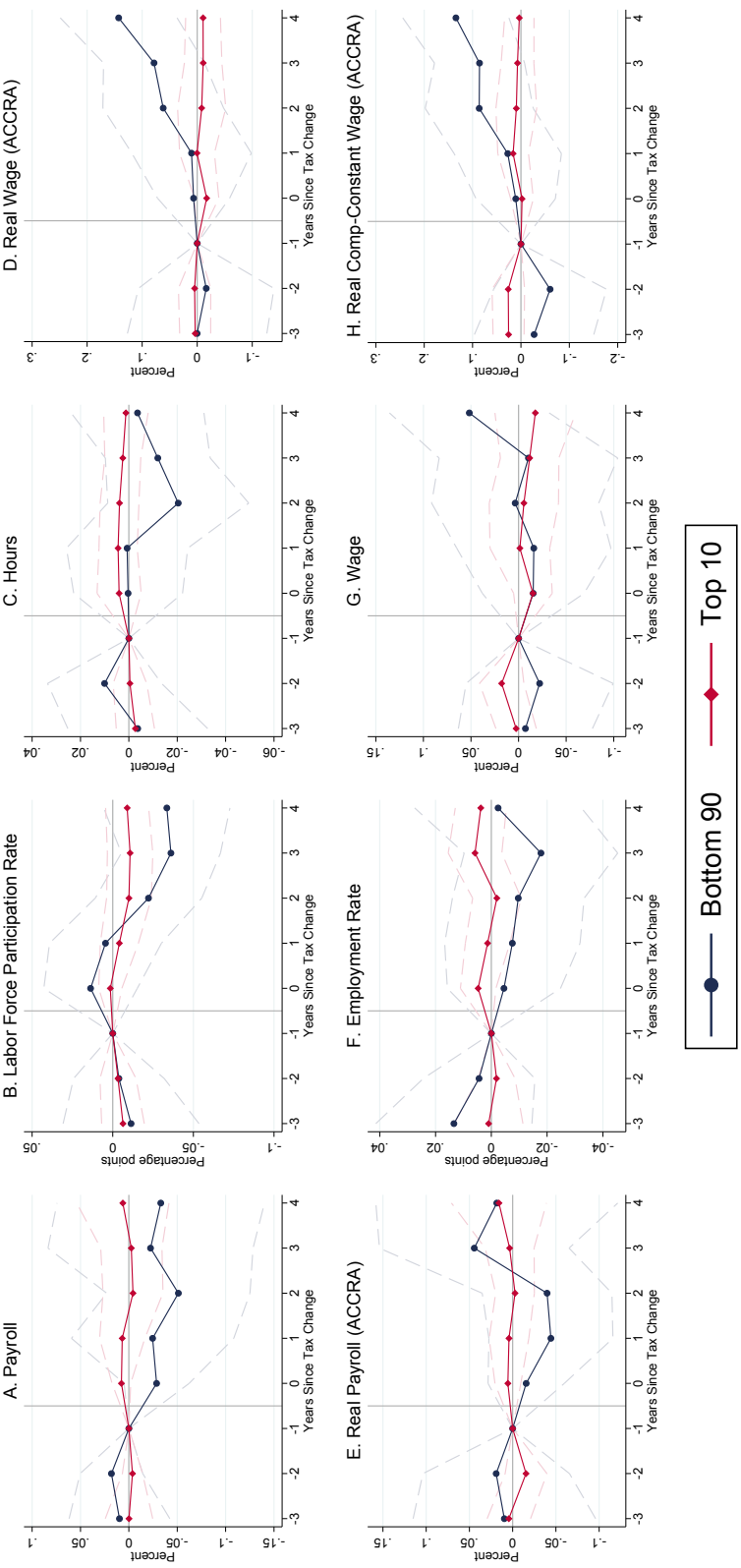
Notes: This figure shows event studies of a 1% of GDP tax increase on the state employment-to-population ratio and employment for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. One and two year lags of tax changes and spending controls are also included. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

Figure A11: Cumulative Growth in Prices, GDP, and Earnings: Lagged Tax Changes as Controls



Notes: This figure shows event studies of a 1% of GDP tax increase on outcomes for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. The outcomes are (a) nominal state GDP, (b) the ACCRA state price index $P^{ACCRA}_{s,t}$, (c) real state GDP using $P^{ACCRA}_{s,t}$, (d) real state GDP using $P^{Moretti}_{s,t}$, (e) nominal net earnings, (f) consumption, (g) real net earnings using $P^{ACCRA}_{s,t}$, and (h) real net earnings using $P^{Moretti}_{s,t}$. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}^{B90}_h$, and the top 10%, $\hat{\alpha}^{T10}_h$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. One and two year lags of tax changes and spending controls are also included. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007 for (a)-(e) and (g)-(h). However, state consumption is only available since 1997, so the sample period for (f) is 1997-2007.

Figure A12: Cumulative Growth in State-level Labor Market Outcomes: Lagged Tax Changes as Controls



Notes: This figure shows event studies of a 1% of GDP tax increase on outcomes for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. These outcomes are (a) nominal state payroll, (b) labor force participation rate, (c) mean hours worked among those who worked at least 48 weeks in the past year, (d) mean real wages using $P_{s,t}^{ACCRA}$, (e) real state payroll using $P_{s,t}^{ACCRA}$, (f) employment rate, (g) mean wages, and (h) real composition-constant average wages using $P_{s,t}^{ACCRA}$. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. One and two year lags of tax changes and spending controls are also included. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

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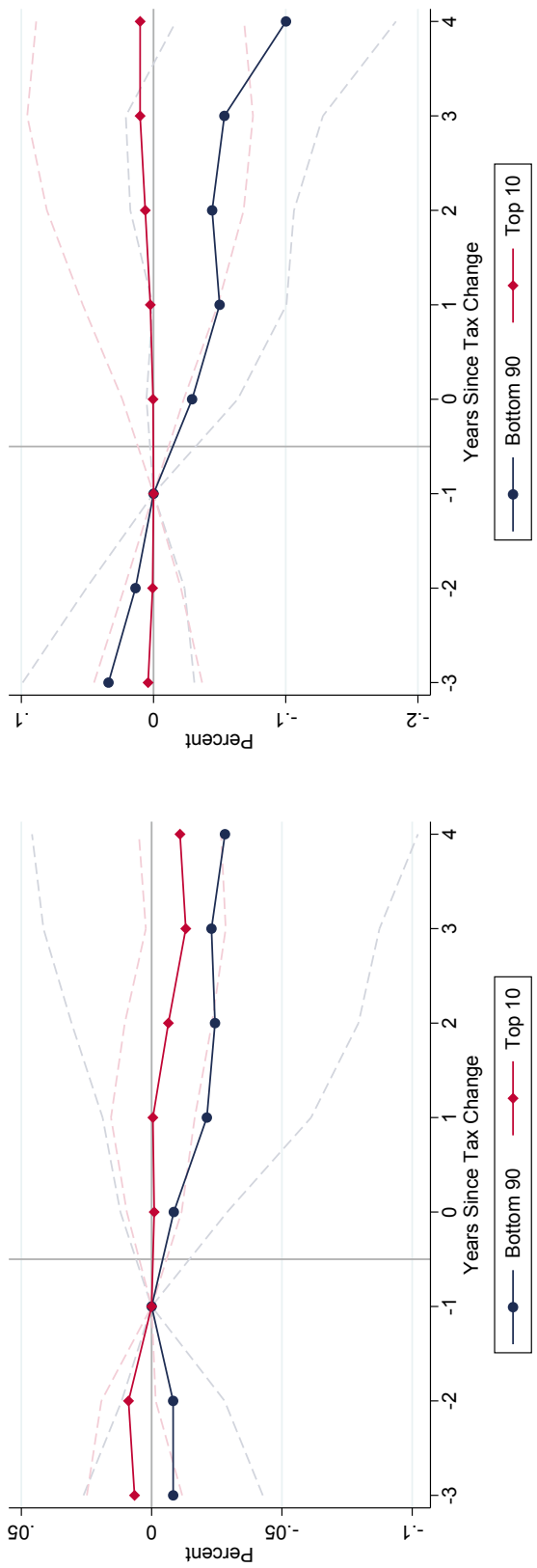
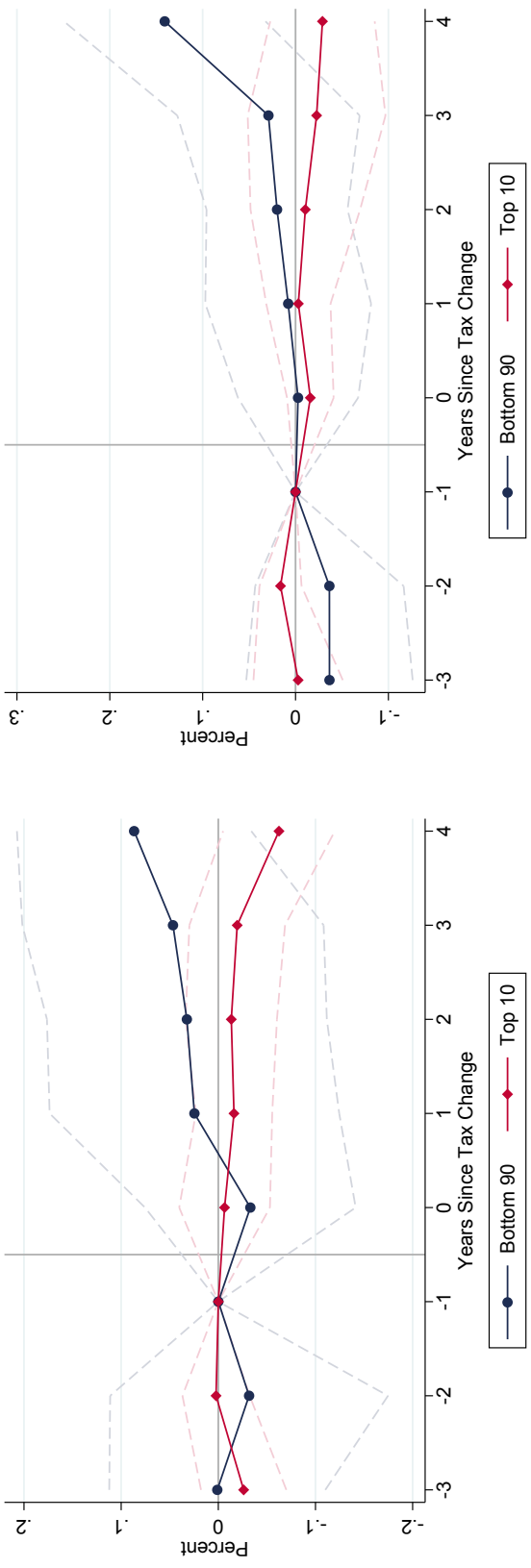
Figure A13: Cumulative Growth in Prices



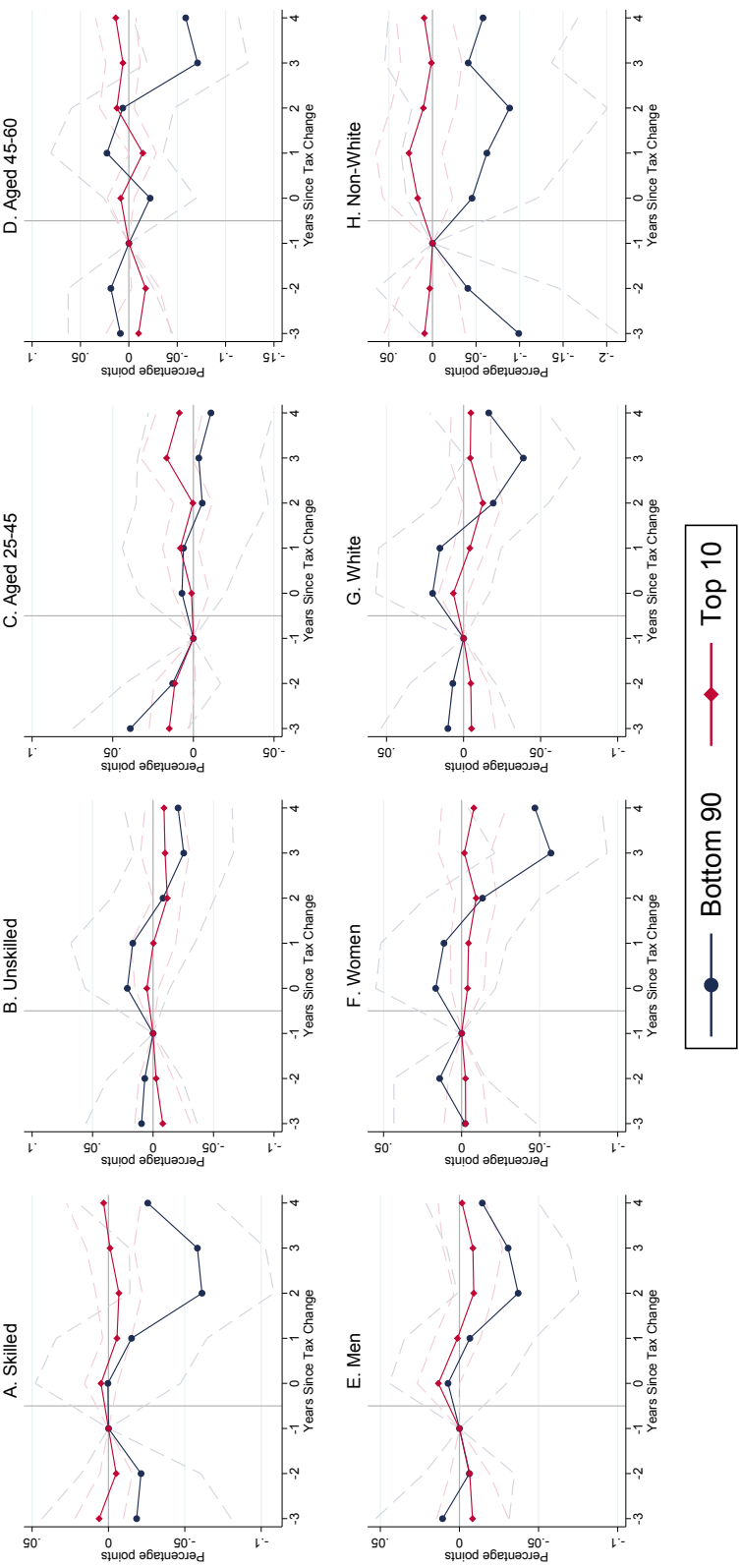
Notes: This figure shows event studies of a 1% of GDP tax increase on the BLS price index and Moretti HPI index $P_{s,t}^{Moretti}$ for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

Figure A14: Cumulative Growth in State-level Real Wages



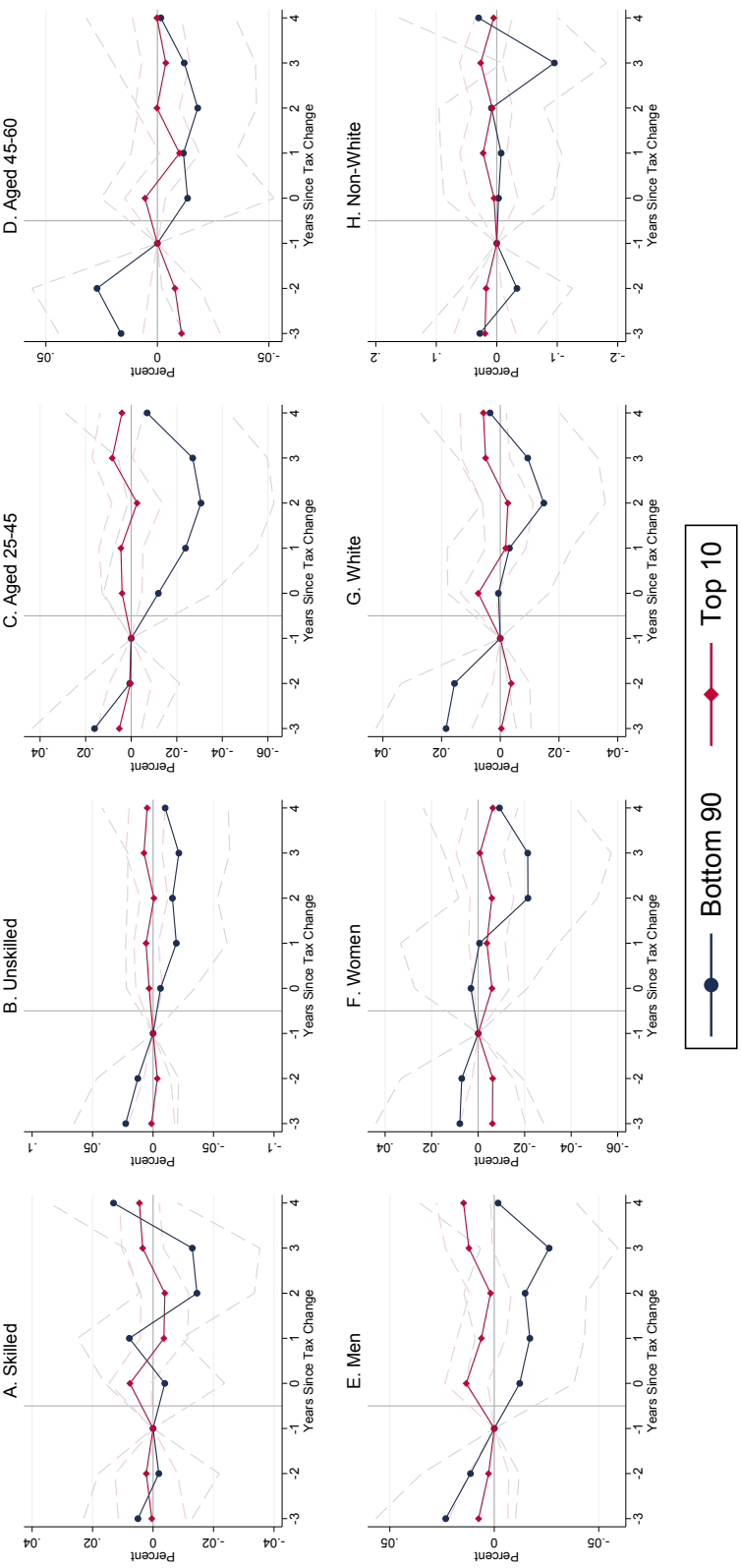
Notes: This figure shows event studies of a 1% of GDP tax increase on real wages using the BLS price index and Moretti HPI price index $P_{s,t}^{Moretti}$, for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

Figure A15: Cumulative Growth in Employment-to-Population Ratio by Demographic Split



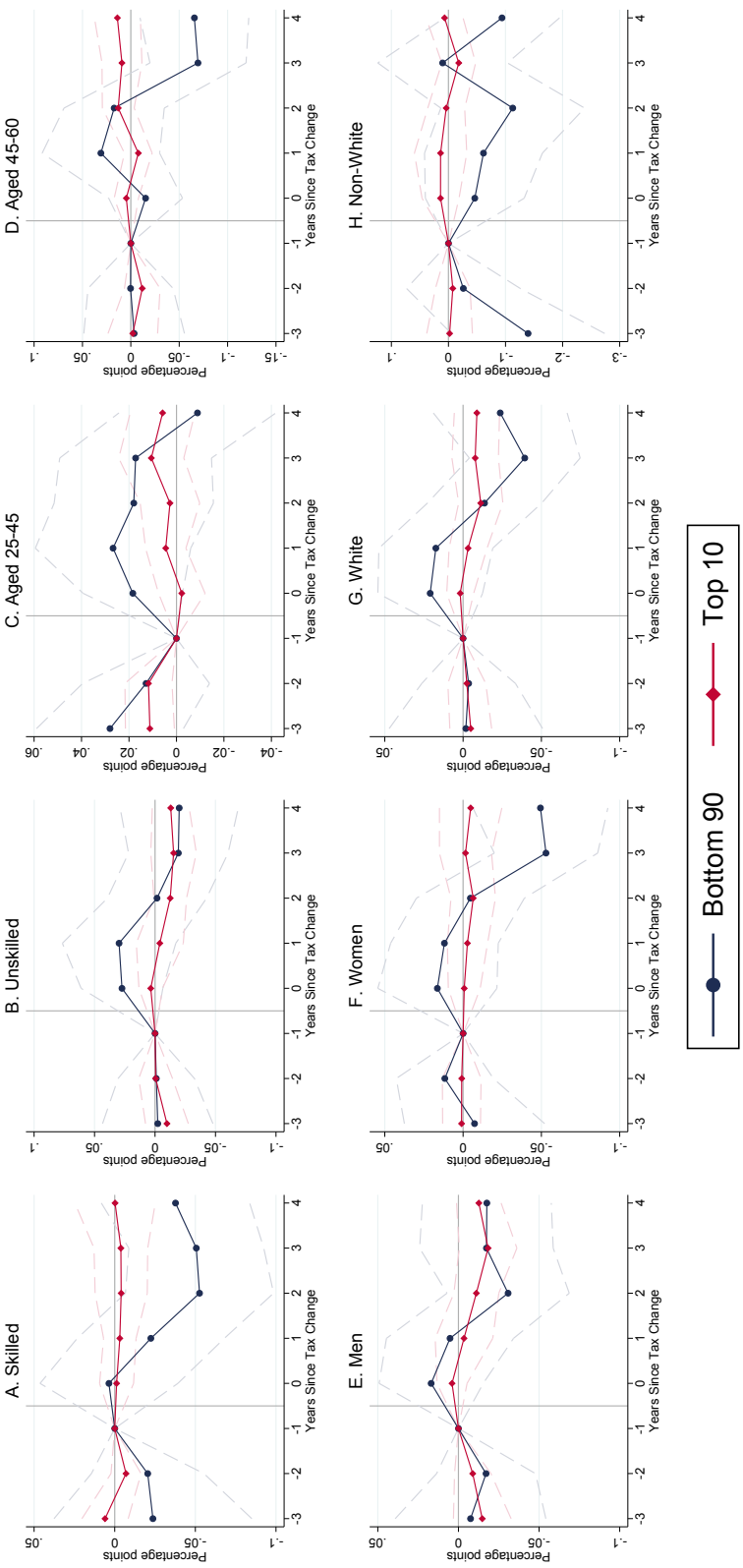
Notes: This figure shows event studies of a 1% of GDP tax increase on the state employment-to-population ratio by demographic splits for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. See section A.2.2 for details on each demographic split. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

Figure A16: Cumulative Growth in Employment Rate by Demographic Split



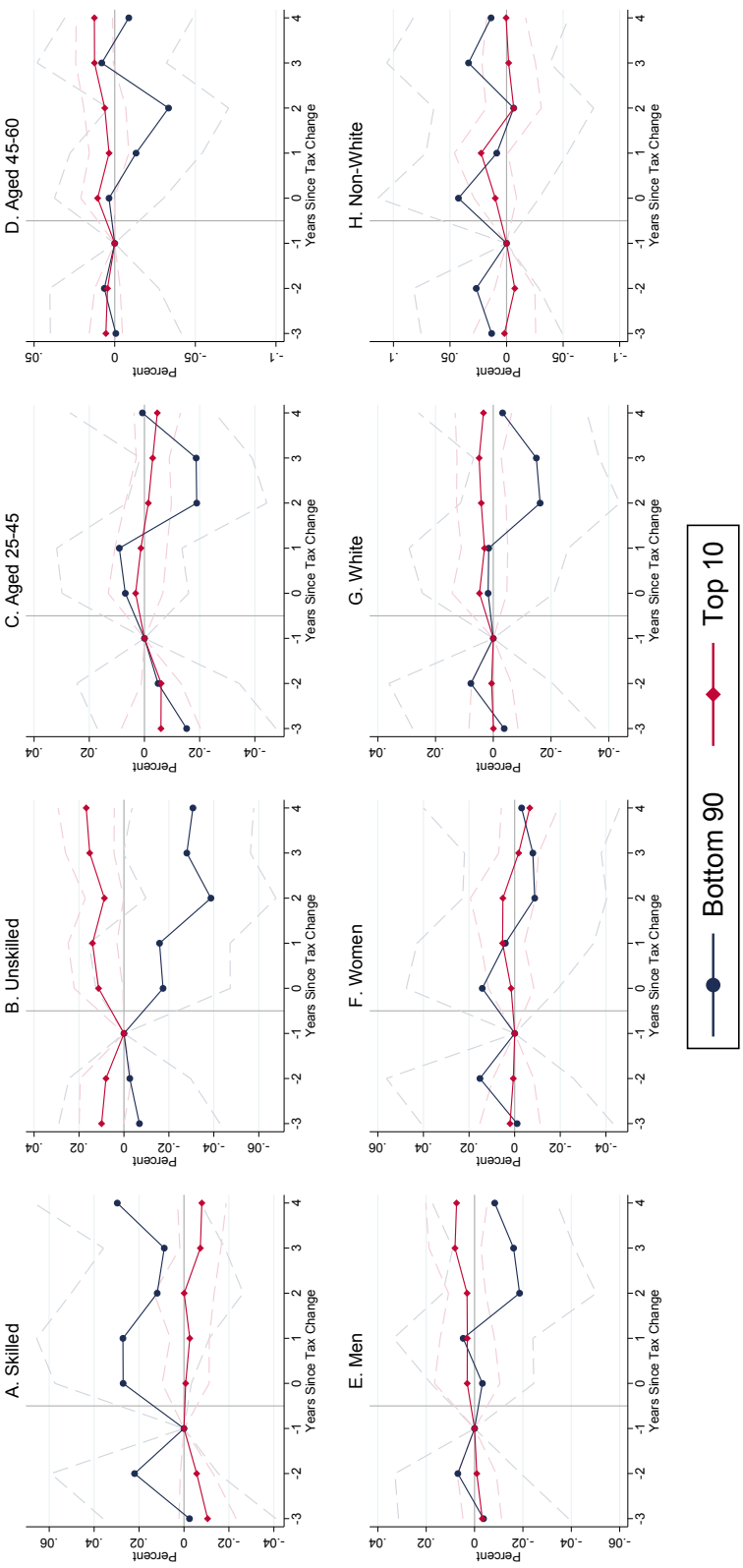
Notes: This figure shows event studies of a 1% of GDP tax increase on the state employment rate by demographic splits for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. See section A.2.2 for details on each demographic split. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

Figure A17: Cumulative Growth in Labor Force Participation Rate by Demographic Split



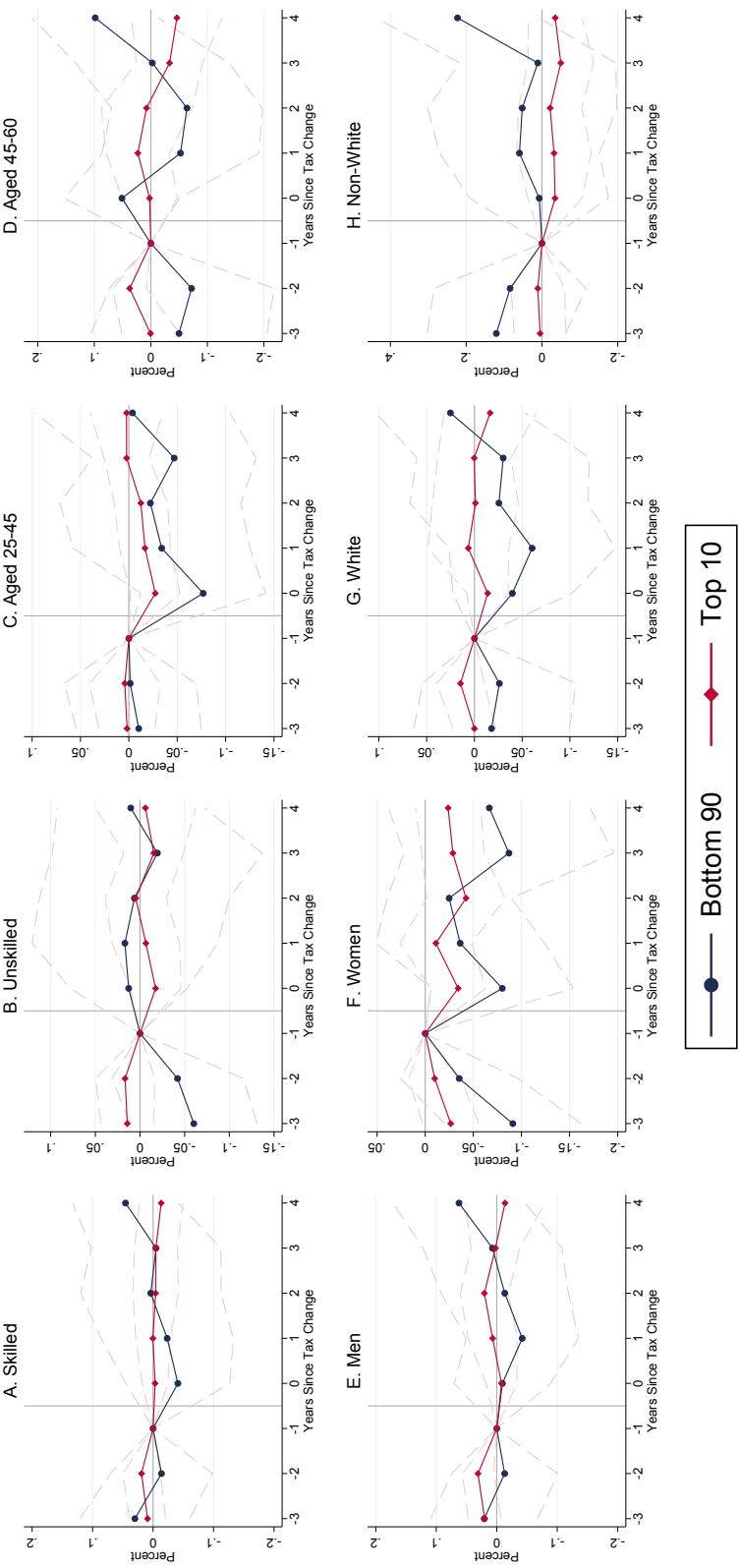
Notes: This figure shows event studies of a 1% of GDP tax increase on the state labor force participation rate by demographic splits for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. See section A.2.2 for details on each demographic split. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

Figure A18: Cumulative Growth in Hours by Demographic Split



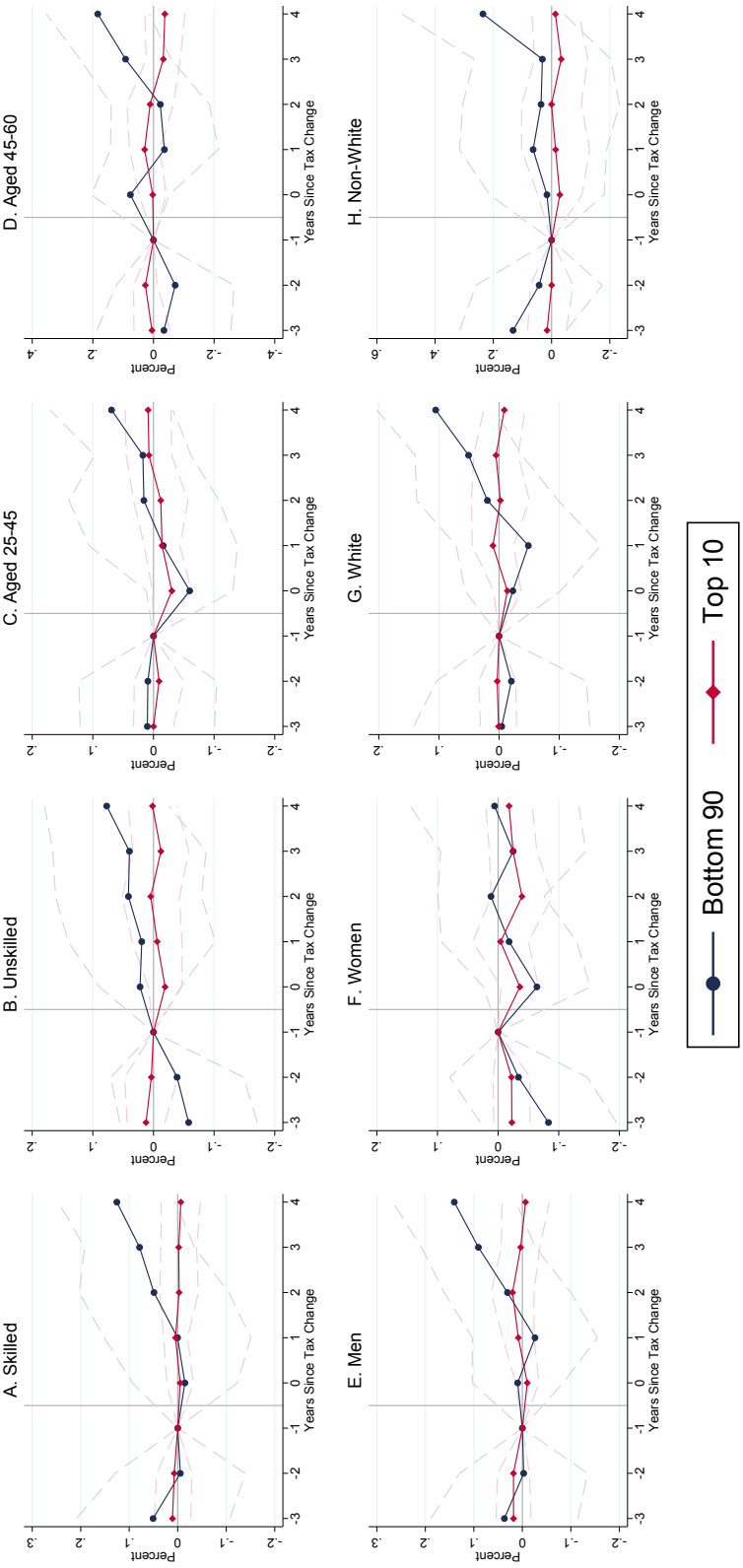
Notes: This figure shows event studies of a 1% of GDP tax increase on hours worked (if at least 48 weeks were worked in the past year) by demographic splits for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. See section A.2.2 for details on each demographic split. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

Figure A19: Cumulative Growth in Wage by Demographic Split



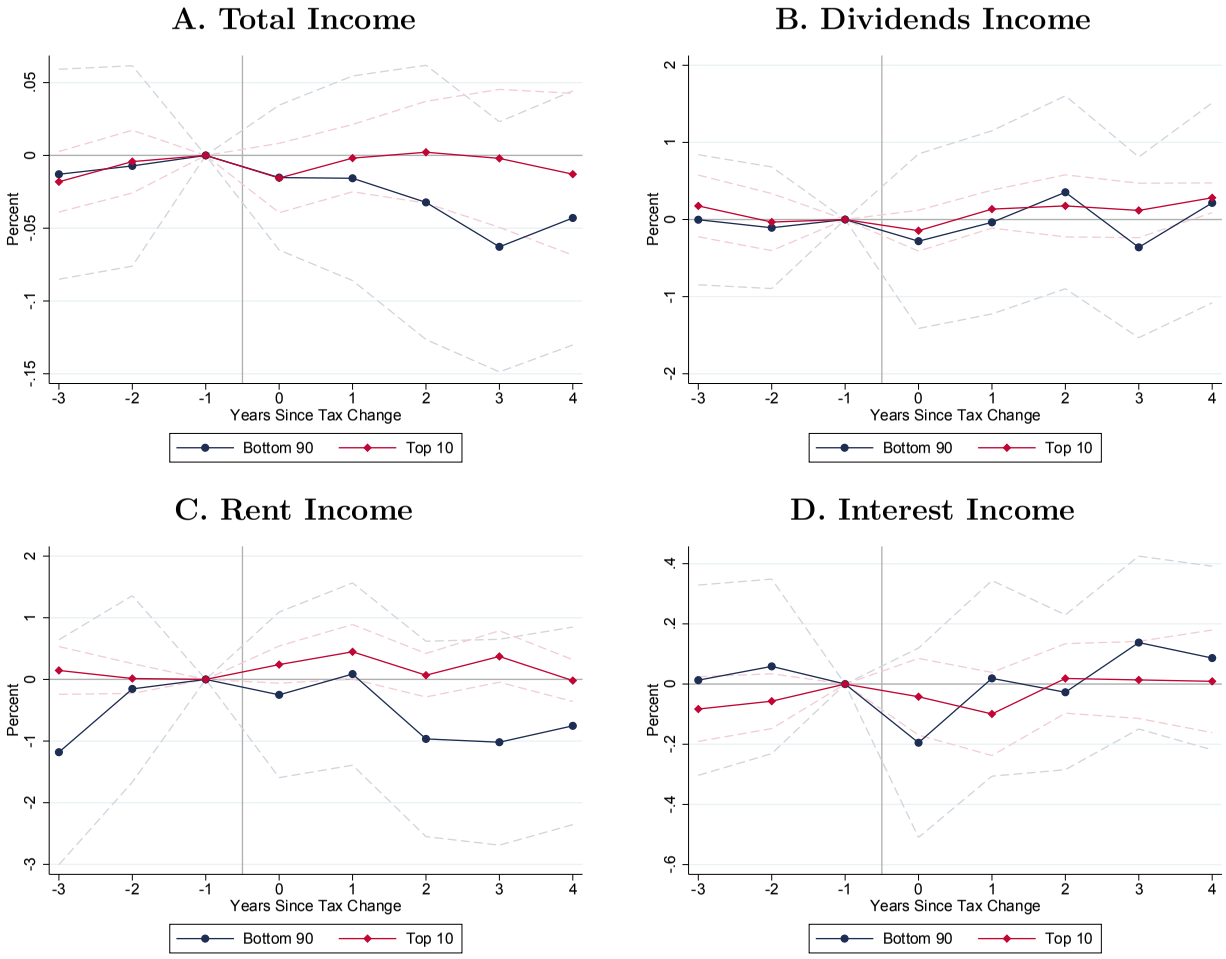
Notes: This figure shows event studies of a 1% of GDP tax increase on wages by demographic splits for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. See section A.2.2 for details on each demographic split. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

Figure A20: Cumulative Growth in Real Wage by Demographic Split



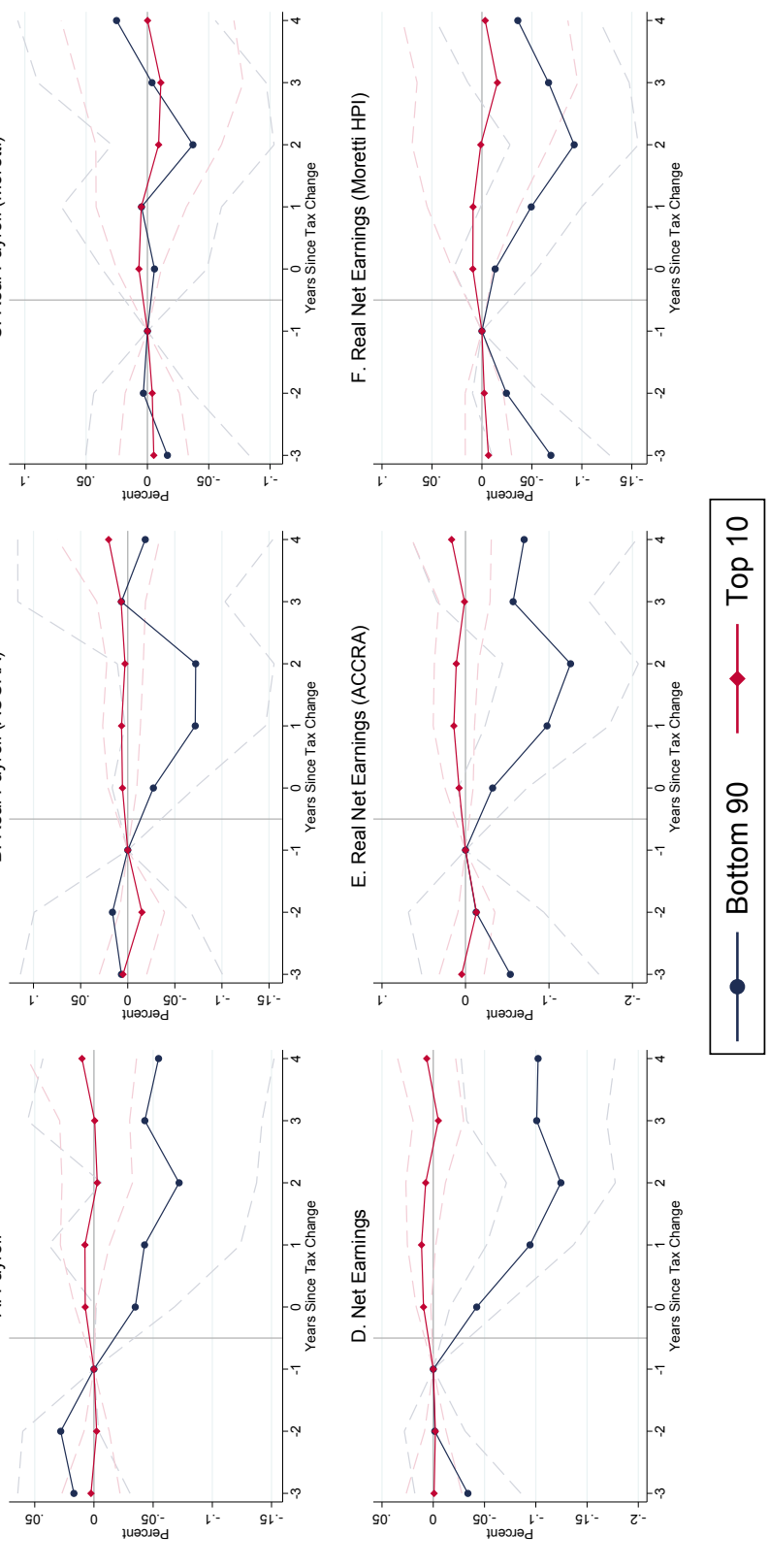
Notes: This figure shows event studies of a 1% of GDP tax increase on real wages using $P_{s,t}^{ACCRA}$ by demographic splits for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. See section A.2.2 for details on each demographic split. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

Figure A21: Cumulative Growth in Income by Type of Income



Notes: This figure shows event studies of a 1% of GDP tax increase on outcomes for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. These outcomes are (a) total income, (b) dividends income, (c) rent income, and (d) interest income. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

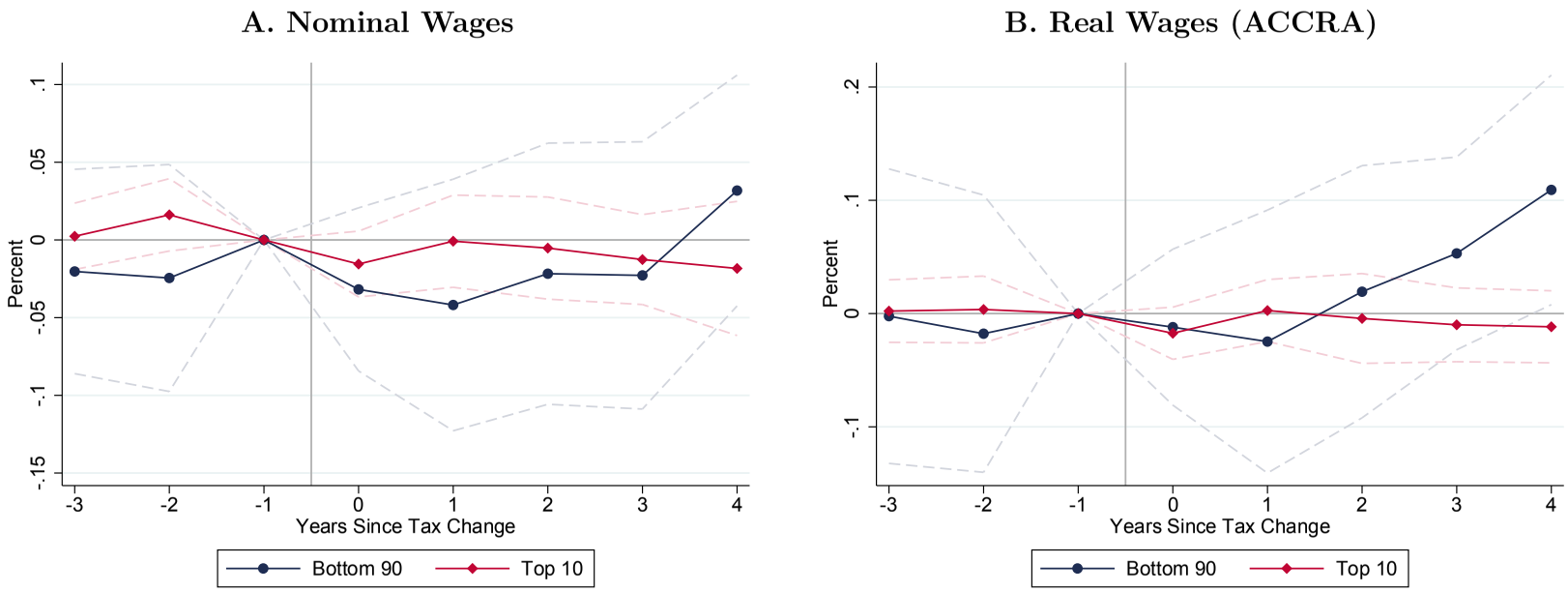
Figure A22: Cumulative Growth in Payrolls and Earnings



Notes: This figure shows event studies of a 1% of GDP tax increase on outcomes for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. These outcomes are (a) nominal state payrolls, (b) real state payrolls using $P_{s,t}^{ACCRA}$, (c) real state payrolls using $P_{s,t}^{Moretti}$, (d) nominal earnings net of contributions for social insurance and dividends, interest, and rental income, (e) real net earnings using $P_{s,t}^{ACCRA}$, and (f) real net earnings using $P_{s,t}^{Moretti}$. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

Supplemental Material for: Owen Zidar. 2019. "Tax Cuts for Whom? Heterogeneous Effects of Income Tax Changes on Growth and Employment." Journal of Political Economy 127(3). DOI: 10.1086/701424.

Figure A23: Cumulative Growth in State Wages



Notes: This figure shows event studies of a 1% of GDP tax increase on wages and real wages using $P_{s,t}^{ACCRA}$ for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

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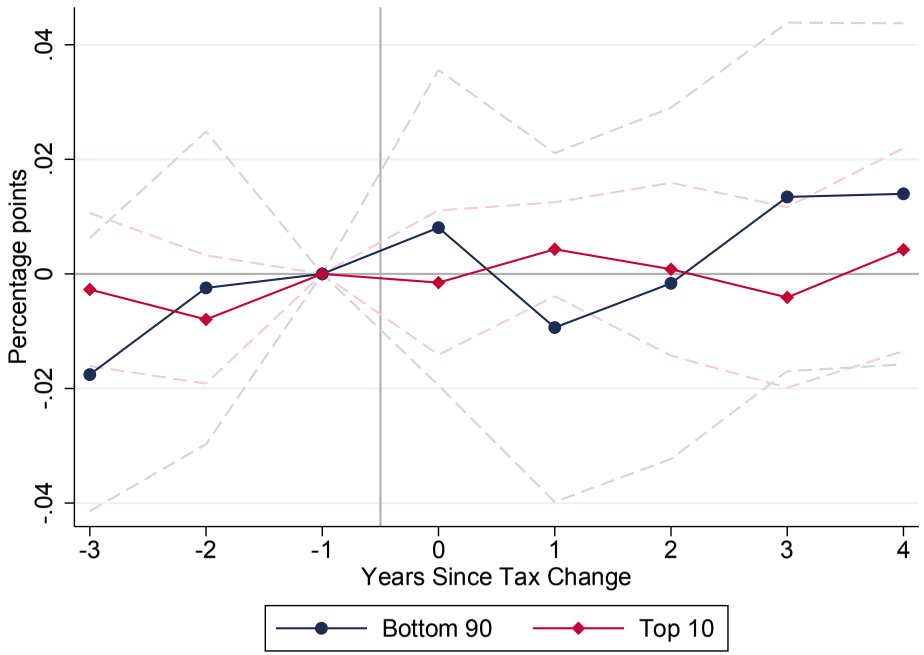
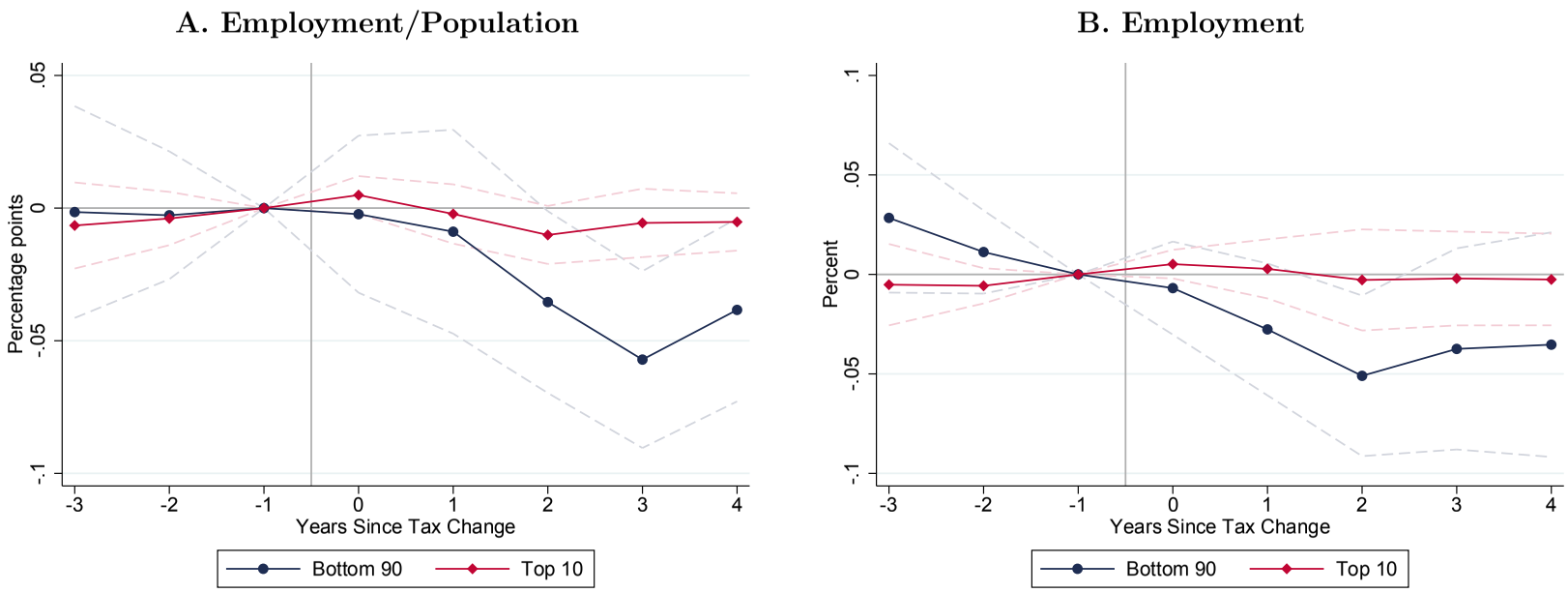
Figure A24: Cumulative Growth in Part-time Employment Rate



Notes: This figure shows event studies of a 1% of GDP tax increase on the part-time employment rate for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. Specifically, the figure plots the estimates from the baseline specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

Figure A25: Cumulative Growth in State Emp-to-Pop Ratio and Employment: Includes Non-Personal Income Taxes in Top Decile



Notes: This figure shows event studies of a 1% of GDP tax increase on the state employment-to-population ratio and employment for those with AGI in the bottom 90% nationally in blue and for those with AGI in the top 10% nationally in red. Specifically, the figure plots the estimates from the specification of equation 2 for the impact of tax changes in year h for the bottom 90%, $\hat{\alpha}_h^{B90}$, and the top 10%, $\hat{\alpha}_h^{T10}$. However, unlike the baseline specification definition for tax changes for the top 10%, I also allocate the non-personal income tax changes to top earners in the same proportion as the top 10% shares are allocated. This is done in an attempt to resolve potential issues with exclusions of non-personal income taxes (corporate taxes, etc.) biasing estimates for the Top 10% group. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

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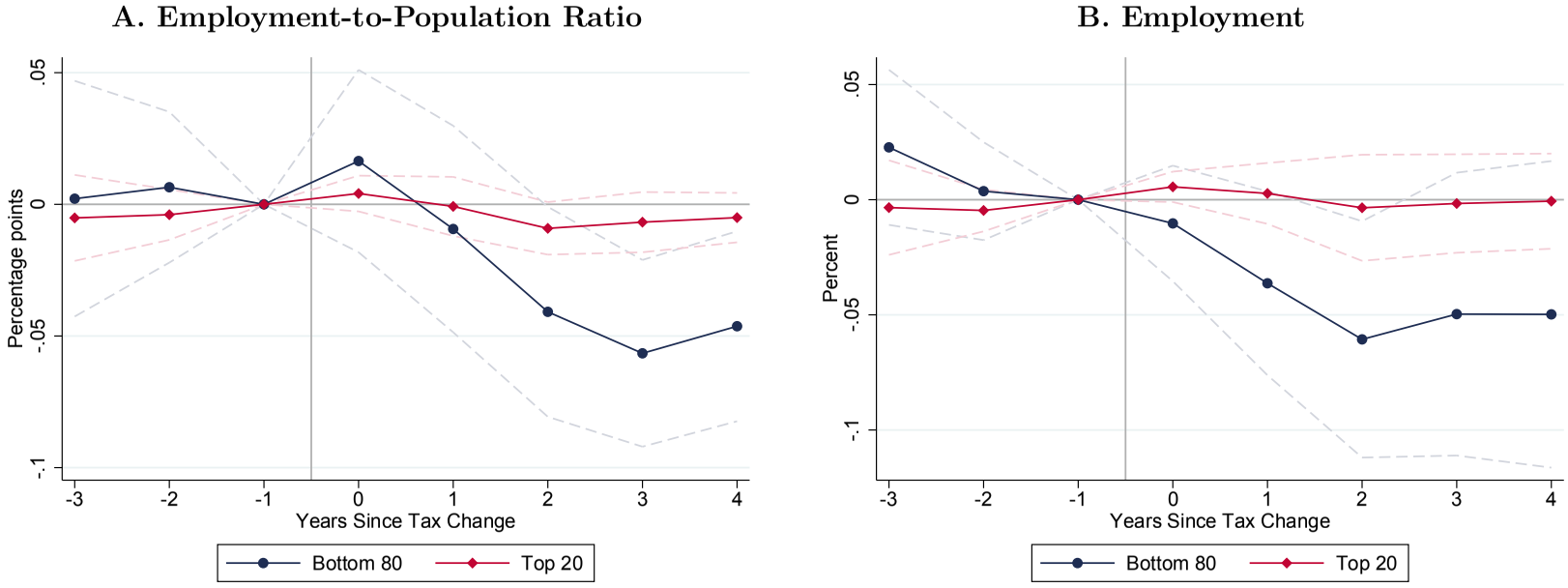
Figure A26: Cumulative Growth in Emp-to-Pop Ratio and Employment: Bottom 80% and Top 20%



Notes: This figure shows event studies of a 1% of GDP tax increase on the state employment-to-population ratio and employment for those with AGI in the bottom 80% nationally in blue and for those with AGI in the top 20% nationally in red. Specifically, the figure plots the estimates from equation 2 for the impact of tax changes in year h for the bottom 80%, $\hat{\alpha}_h^{B80}$, and the top 20%, $\hat{\alpha}_h^{T20}$. The baseline specification includes controls for mechanical changes in AFDC, TANF, SNAP, SSI, and Medicaid spending as a percentage of state GDP, as well as cyclicality-quintile year fixed effects. See section 2 for details. Standard errors are robust and clustered by state; 95% confidence intervals are shown as dotted lines. The sample period is 1980-2007.

Table A3: Summary Statistics

Panel A: State Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max	N
Year			1980	2007	1400
Log Employment	15.151	0.879	12.04	16.64	1400
Log State GDP	26.585	0.976	23.36	28.43	1400
Employment Rate	93.520	2.111	81.23	97.94	1400
Emp/Pop	60.145	4.175	39.72	73.45	1400
LFP Rate	64.277	3.676	46.27	76.74	1400
Part-Time Emp Rate	18.747	3.655	10.06	37.94	1400
Log Payroll	25.763	0.989	22.61	27.53	1400
Log Hours	7.657	0.017	7.58	7.72	1400
Log Wages	3.071	0.137	2.49	3.46	1400
Log Comp-Constant Wages	2.996	0.122	2.45	3.36	1400
Employment Growth	1.388	1.632	-6.77	10.35	1350
GDP Growth	2.758	2.933	-32.89	25.76	1350
Real GDP Growth (ACCRA)	2.655	3.692	-59.01	27.77	1246
Real GDP Growth (Moretti)	2.670	3.273	-29.48	22.26	1350
$T_{s,t}^{B90}$	-0.075	0.186	-1.08	0.46	1400
$T_{s,t}^{T10}$	-0.013	0.171	-1.27	1.57	1400

Panel B: National Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max	N
Year			1950	2007	58
GDP Growth	3.366	2.144	-1.93	7.75	57
Investment Growth	3.855	8.326	-17.67	24.13	57
Residential Investment Growth	2.141	11.791	-23.47	35.05	57
Consumption Growth	3.507	1.653	-0.83	7.12	57
Durable Consumption Growth	4.956	6.192	-8.68	19.33	57
Non-Durable Consumption Growth	2.653	1.422	-2.46	5.41	57
T_{t}^{B90}	-0.038	0.139	-0.45	0.28	58
T_{t}^{T10}	-0.023	0.135	-0.49	0.31	58

Table A4: 2-Year Change - Demographic Robustness

Panel A: Skill

Skilled	LFP Rate	Emp Rate	Hours	Wage	Real Wage
Bottom 90	-2.21*	-0.56	0.24	-1.05	1.91
	(1.20)	(0.45)	(0.93)	(3.51)	(4.53)
Top 10	0.03	-0.33*	0.08	-0.87	-0.43
	(0.40)	(0.19)	(0.32)	(1.34)	(0.96)
Unskilled					
Bottom 90	0.74	-2.12*	-2.11***	0.69	2.31
	(1.21)	(1.20)	(0.79)	(2.59)	(3.01)
Top 10	-0.53*	0.29	0.48***	-0.76	-0.36
	(0.32)	(0.28)	(0.17)	(0.96)	(0.99)

Panel B: Age

Aged 25-45	LFP Rate	Emp Rate	Hours	Wage	Real Wage
Bottom 90	0.53	-2.52**	-0.49	-2.85	-0.33
	(0.98)	(0.94)	(0.63)	(2.84)	(3.66)
Top 10	-0.17	0.08	0.20	-1.33	-0.91
	(0.35)	(0.28)	(0.23)	(1.06)	(0.97)
Aged 45-60					
Bottom 90	0.65	-2.17***	-2.31**	-1.92	0.09
	(1.48)	(0.69)	(0.87)	(3.44)	(4.69)
Top 10	0.58	-0.03	0.17	-0.21	0.46
	(0.46)	(0.22)	(0.33)	(2.01)	(1.62)

Panel C: Sex

Men	LFP Rate	Emp Rate	Hours	Wage	Real Wage
Bottom 90	-0.52	-1.95**	-0.91	-2.38	0.26
	(0.98)	(0.83)	(0.78)	(2.92)	(3.95)
Top 10	-0.21	0.20	0.26	-0.23	0.15
	(0.34)	(0.27)	(0.22)	(1.45)	(1.09)
Women					
Bottom 90	-0.50	-1.44	-1.15	-2.13	-0.00
	(0.94)	(0.97)	(0.92)	(2.27)	(2.80)
Top 10	-0.30	-0.15	0.29	-1.71	-1.14
	(0.39)	(0.23)	(0.32)	(1.39)	(1.49)

Panel D: Race

White	LFP Rate	Emp Rate	Hours	Wage	Real Wage
Bottom 90	0.03	-1.68**	-1.00	-3.10	-0.73
	(0.89)	(0.75)	(0.64)	(2.57)	(3.41)
Top 10	-0.38	-0.02	0.20	-0.45	-0.11
	(0.40)	(0.22)	(0.23)	(1.62)	(1.28)
Non-White					
Bottom 90	-6.25**	0.01	-2.54	5.54	7.52
	(3.08)	(2.20)	(1.78)	(5.82)	(7.10)
Top 10	0.89	0.40	0.93	-3.16	-1.51
	(1.05)	(0.88)	(0.69)	(2.43)	(3.01)

Notes: This table presents state-level estimates of two-year tax changes for different demographic groups. Each specification is the same as column 1 in Table 1. The subsample (demographic group) of outcomes drawn from the CPS varies, as specified in the first column. In the cases of the labor force participation rate and employment rate, the outcomes are the simple difference, i.e., $Y_{s,t} - Y_{s,t-2}$, rather than the ratio described in equation 3. Hours are restricted to those working at least 48 weeks in the past year. See section A.2.2 for details on each demographic split. In each specification, I absorb state-specific effects and cluster standard errors by state (*** p<0.01, ** p<0.05, * p<0.1). The sample period is 1980-2007.

Table A5: 2-Year Change - Policy Robustness (Additional)

	(1)	(2)	(3)	(4)	(5)	(6)
Employment						
Bottom 90	-4.74**	-3.21**	-3.61**	-4.74**	-3.15**	-3.43**
	(1.79)	(1.54)	(1.50)	(1.79)	(1.49)	(1.55)
Top 10	0.16	-0.10	0.29	0.16	0.22	0.21
	(0.93)	(0.71)	(0.83)	(0.93)	(0.88)	(0.89)
State GDP						
Bottom 90	-12.12***	-11.65***	-12.28***	-12.11***	-11.08***	-11.98***
	(2.19)	(2.22)	(2.22)	(2.19)	(1.99)	(2.21)
Top 10	0.40	0.39	0.87	0.40	0.75	0.75
	(1.03)	(0.91)	(0.89)	(1.03)	(0.89)	(0.97)
Employment Rate						
Bottom 90	-1.98*	-1.79**	-1.76**	-1.98*	-1.62**	-1.72**
	(0.99)	(0.82)	(0.78)	(0.99)	(0.77)	(0.79)
Top 10	0.05	0.06	0.05	0.05	0.05	0.07
	(0.22)	(0.22)	(0.21)	(0.22)	(0.21)	(0.22)
Emp/Pop						
Bottom 90	-1.76	-1.66	-1.59	-1.76	-1.43	-1.52
	(1.19)	(1.00)	(0.95)	(1.19)	(0.94)	(0.96)
Top 10	-0.26	-0.31	-0.22	-0.26	-0.24	-0.23
	(0.35)	(0.34)	(0.32)	(0.35)	(0.33)	(0.34)
Payroll						
Bottom 90	-8.78***	-8.36***	-8.72***	-8.80***	-7.49***	-8.36***
	(2.95)	(2.55)	(2.54)	(2.95)	(2.38)	(2.61)
Top 10	0.09	-0.13	0.45	0.09	0.32	0.34
	(1.10)	(0.83)	(0.90)	(1.10)	(0.95)	(1.03)
Net Earnings						
Bottom 90	-11.58***	-10.34***	-10.86***	-11.57***	-9.88***	-10.56***
	(2.11)	(1.96)	(1.99)	(2.11)	(1.77)	(1.94)
Top 10	0.59	0.57	0.83	0.59	0.72	0.75
	(0.73)	(0.79)	(0.64)	(0.73)	(0.64)	(0.72)
Controls						
1) COLA	Y	N	N	N	N	N
2) SNAP Benefits x State	N	Y	N	N	N	N
3) SNAP Benefits Per Household	N	N	Y	N	N	N
4) FPL x State	N	N	N	Y	N	N
5) FMAP	N	N	N	N	Y	N
6) Max AFDC + TANF Benefits	N	N	N	N	N	Y

Notes: This table presents state-level estimates of two-year changes in taxes for different groups on economic activity using a variety of ways to account for sensitivity to state-specific policies. Each specification is the same as column 1 in Table 1 with additional controls. Column 1 controls for the annual cost of living adjustment (COLA). Columns 2 and 3 control for the ratio of total Supplemental Nutrition Assistance Program (SNAP) benefits to GDP, calculated in different ways. Column 4 controls for the Federal Poverty Level (FPL) interacted with state dummies. Column 5 controls for the Federal Medical Assistance Percentage (FMAP). Column 6 controls for total AFDC and TANF payments, as determined by the maximum payment for the modal households. See sections A.2 and A.3 for more details on these controls. Standard errors are clustered by state (*** p<0.01, ** p<0.05, * p<0.1). The sample period is 1980-2007.

Table A6: State-level Effects of Tax Changes by Income Group on Economic Activity: Cyclical Robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Employment Rate												
Bottom 90	-1.74**	-2.39***	-1.80**	-1.89**	-1.42**	-2.33***	-2.44***	-2.26**	-2.54**	-1.70*	-2.01**	-1.95*
	(0.79)	(0.73)	(0.73)	(0.80)	(0.56)	(0.78)	(0.83)	(0.79)	(0.81)	(0.95)	(0.72)	(0.99)
Top 10	0.05	0.14	0.14	-0.32	0.07	0.19	0.06	0.16	0.08	-0.01	-0.03	0.05
	(0.21)	(0.21)	(0.22)	(0.23)	(0.18)	(0.24)	(0.22)	(0.25)	(0.21)	(0.23)	(0.28)	(0.22)
Emp/Pop												
Bottom 90	-1.53	-1.62*	-1.03	-1.08	-0.49	-1.59*	-1.54	-1.64	-1.88	-1.39	-1.73	-1.78
	(0.96)	(0.89)	(0.99)	(0.97)	(0.89)	(0.94)	(0.94)	(0.95)	(1.05)	(1.08)	(1.45)	(1.18)
Top 10	-0.24	-0.12	0.02	-0.45	-0.24	-0.06	-0.20	-0.05	-0.11	-0.26	-0.25	-0.27
	(0.33)	(0.33)	(0.39)	(0.33)	(0.31)	(0.36)	(0.34)	(0.35)	(0.36)	(0.32)	(0.38)	(0.34)
Payroll												
Bottom 90	-8.37***	-7.45**	-4.93*	-7.95***	-5.24*	-7.09**	-7.56**	-6.18	-7.71*	-8.17**	-8.38*	-8.79***
	(2.61)	(3.10)	(2.55)	(2.20)	(2.80)	(3.27)	(2.91)	(4.62)	(3.74)	(3.06)	(3.80)	(2.94)
Top 10	0.32	0.47	-0.07	-0.25	0.11	0.34	-0.12	0.34	-0.05	-0.09	-0.12	0.08
	(1.01)	(0.83)	(0.85)	(0.81)	(0.72)	(0.85)	(0.70)	(0.84)	(0.75)	(1.03)	(0.81)	(1.11)
Net Earnings												
Bottom 90	-10.59***	-7.99**	-5.10*	-10.84***	-6.73**	-7.79**	-7.89**	-6.28	-8.00*	-10.15***	-9.94***	-11.47***
	(1.95)	(3.30)	(2.56)	(1.91)	(2.75)	(3.39)	(3.25)	(4.50)	(3.86)	(2.13)	(2.21)	(2.11)
Top 10	0.73	0.89	0.19	-0.13	0.55	0.65	0.49	0.63	0.40	0.52	0.40	0.58
	(0.70)	(0.87)	(0.85)	(0.63)	(0.83)	(0.78)	(0.79)	(0.84)	(0.80)	(0.71)	(0.44)	(0.73)
Controls												
1) Baseline Cyclicality	Y	N	N	N	N	N	N	N	N	Y	Y	Y
2) Year	N	Y	N	N	N	Y	Y	Y	Y	N	N	N
3) σ_{GDPPC} Cyclicality	N	N	Y	N	N	N	N	N	N	N	N	N
4) Alternate β-diff Control #1	N	N	N	Y	N	N	N	N	N	N	N	N
5) Alternate β-diff Control #2	N	N	N	N	Y	N	N	N	N	N	N	N
6) Oil Price x State	N	N	N	N	N	Y	N	N	N	Y	N	N
7) Real Interest Rate x State	N	N	N	N	N	N	Y	N	N	Y	N	N
8) Oil Price x State + Region	Y	N	N	N	N	N	N	Y	N	N	Y	N
9) Real Interest Rate x State + Region	N	N	N	N	N	N	N	N	Y	N	Y	N
10) State Trends	N	N	N	N	N	N	N	N	N	N	N	Y

Notes: This table presents state-level estimates of two-year changes in taxes for different groups on economic activity using a variety of ways to account for state-specific cyclicality, trends, and sensitivity to other macro shocks. Each specification is the same as column 1 in Table 1 other than the controls. The first five columns present different ways to account for state-specific cyclicality (see section 2.1.1 or appendix B.1 for details); (1) baseline specification with cyclicality-quintile by year fixed effects, (2) year fixed effects, (3) cyclicality-quintile by year fixed effects where the quintiles are defined based on the standard deviation in state GDP per capita, (4) cyclicality-decile by year fixed effects, and (5) cyclicality-quintile by year fixed effects that group states only using the years before the sample (i.e., before 1980). The next five columns show controls for state-specific sensitivity to other shocks and trends; (6) controls for oil price interacted with state dummies, (7) controls for real interest rate interacted with state dummies, (8) and (9) add region fixed effects to (6) and (7), and (10) includes state-specific trends. Standard errors are clustered by state (*** p<0.01, ** p<0.05, * p<0.1) in all specifications other than (8) and (9), which are clustered by region. The sample period is 1980-2007. See appendix A.2 for data definitions and sources.

Table A7: State-level Effects of Tax Changes by Income Group on Economic Activity: Policy Robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Employment Rate												
Bottom 90	-1.68**	-1.77**	-1.74**	-1.74**	-1.78**	-1.74**	-1.68**	-1.75**	-1.74**	-1.78**	-1.75**	-1.78**
	(0.80)	(0.79)	(0.79)	(0.79)	(0.78)	(0.79)	(0.81)	(0.80)	(0.79)	(0.79)	(0.80)	(0.80)
Top 10	0.06	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.04	0.05	0.06
	(0.20)	(0.21)	(0.21)	(0.21)	(0.21)	(0.21)	(0.21)	(0.22)	(0.21)	(0.21)	(0.21)	(0.21)
Emp/Pop												
Bottom 90	-1.35	-1.52	-1.53	-1.53	-1.59*	-1.53	-1.48	-1.52	-1.53	-1.52	-1.53	-1.53
	(0.95)	(0.97)	(0.96)	(0.96)	(0.95)	(0.96)	(0.98)	(0.96)	(0.96)	(0.98)	(0.96)	(0.98)
Top 10	-0.20	-0.24	-0.24	-0.26	-0.23	-0.24	-0.24	-0.25	-0.24	-0.24	-0.24	-0.23
	(0.30)	(0.34)	(0.33)	(0.33)	(0.33)	(0.33)	(0.33)	(0.33)	(0.33)	(0.33)	(0.33)	(0.31)
Payroll												
Bottom 90	-7.82***	-8.54***	-8.38***	-8.37***	-8.60***	-8.37***	-8.54***	-8.30***	-8.38***	-8.46***	-8.39***	-8.72***
	(2.55)	(2.62)	(2.61)	(2.61)	(2.53)	(2.60)	(2.61)	(2.63)	(2.61)	(2.61)	(2.62)	(2.58)
Top 10	0.47	0.28	0.29	0.29	0.36	0.33	0.31	0.25	0.32	0.26	0.33	0.20
	(0.88)	(1.03)	(1.01)	(1.00)	(0.98)	(1.02)	(1.03)	(0.92)	(1.01)	(0.96)	(1.01)	(0.90)
Net Earnings												
Bottom 90	-10.21***	-10.72***	-10.59***	-10.59***	-10.65***	-10.59***	-10.55***	-10.53***	-10.59***	-10.65***	-10.59***	-10.57***
	(1.95)	(1.97)	(1.95)	(1.94)	(1.92)	(1.97)	(1.97)	(1.97)	(1.96)	(1.96)	(1.96)	(1.99)
Top 10	0.83	0.69	0.75	0.69	0.74	0.73	0.73	0.67	0.73	0.69	0.73	0.67
	(0.63)	(0.69)	(0.72)	(0.68)	(0.69)	(0.70)	(0.69)	(0.67)	(0.70)	(0.68)	(0.70)	(0.65)
Controls												
1) Government Transfers Per Capita	Y	N	N	N	N	N	N	N	N	N	N	N
2) Federal IG Spending Per Capita	N	Y	N	N	N	N	N	N	N	N	N	N
3) Minimum Wage	N	N	Y	N	N	N	N	N	N	N	N	Y
4) OASDI	N	N	N	Y	N	N	N	N	N	N	N	Y
5) Supplemental Security Income	N	N	N	N	Y	N	N	N	N	N	N	Y
6) Max SNAP Benefits	N	N	N	N	N	Y	N	N	N	N	N	Y
7) Medicaid Benefits	N	N	N	N	N	N	Y	N	N	N	N	Y
8) AFDC + TANF Benefits	N	N	N	N	N	N	N	Y	N	N	N	Y
9) Mechanical Change in AFDC & TANF	N	N	N	N	N	N	N	N	Y	N	N	Y
10) Mechanical Change in SNAP & SSI	N	N	N	N	N	N	N	N	N	Y	N	Y
11) Mechanical Change in Medicaid	N	N	N	N	N	N	N	N	N	N	Y	Y

Notes: This table presents state-level estimates of two-year changes in taxes for different groups on economic activity using a variety of ways to account for sensitivity to state-specific policies. Each specification is the same as column 1 in Table 1 with additional controls. Columns 1 and 2 control for total state transfers per capita and total federal transfers to a state per capita, respectively. Column 3 controls for the minimum wage. Columns 4-11 control for the following as a share of state GDP: OASDI payments, Supplemental Security Income payments, SNAP benefits (assuming max allotment per recipient), Medicaid vendor payments, AFDC and TANF payments, mechanical changes in AFDC and TANF spending, mechanical changes in SNAP and SSI spending, mechanical changes in Medicaid spending. See sections A.2, A.3, and C for more details on these controls and on the microsimulation-model based mechanical changes. Standard errors are clustered by state (*** p<0.01, ** p<0.05, * p<0.1). The sample period is 1980-2007.

Table A8: State-level Effects of Tax Changes by Income Group on State GDP: Cyclical Robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Distributed Lag Model of Tax Changes for Different Income Groups												
$T^{B90}_{s,t}$	-2.05	-1.60	0.63	-1.76	-0.69	-1.91	-0.13	-1.25	-0.07	-1.06	-1.15	-1.65
	(2.18)	(2.44)	(1.74)	(2.33)	(1.98)	(2.75)	(1.90)	(3.81)	(2.72)	(2.36)	(2.64)	(2.48)
$T^{B90}_{s,t-1}$	-7.39***	-8.15***	-5.24***	-6.69***	-6.71***	-7.95***	-7.54***	-7.51**	-7.51***	-6.64***	-6.83***	-7.29***
	(1.34)	(1.95)	(1.30)	(1.15)	(1.50)	(2.11)	(1.83)	(2.82)	(2.23)	(1.32)	(1.61)	(1.32)
$T^{B90}_{s,t-2}$	0.25	-1.09	-0.85	-0.25	0.71	-0.75	-0.97	-0.56	-0.98	0.65	0.53	0.55
	(1.44)	(1.71)	(1.34)	(1.55)	(1.71)	(1.80)	(1.65)	(2.39)	(2.31)	(1.72)	(2.18)	(1.77)
$T^{T10}_{s,t}$	1.05*	0.96	0.55	0.53	1.02	0.90	0.66	0.85	0.74	0.95	0.90***	0.84
	(0.58)	(0.60)	(0.64)	(0.63)	(0.64)	(0.61)	(0.52)	(0.60)	(0.54)	(0.61)	(0.20)	(0.65)
$T^{T10}_{s,t-1}$	0.10	-0.08	-0.53	-0.11	0.03	-0.32	-0.59	-0.24	-0.48	-0.33	-0.25	-0.18
	(0.70)	(0.58)	(0.67)	(0.62)	(0.57)	(0.56)	(0.61)	(0.51)	(0.53)	(0.74)	(0.52)	(0.76)
$T^{T10}_{s,t-2}$	-0.12	-0.08	-0.65	-0.44	0.09	-0.47	-0.51	-0.24	-0.46	-0.67	-0.59	-0.42
	(0.57)	(0.57)	(0.57)	(0.65)	(0.56)	(0.54)	(0.53)	(0.36)	(0.42)	(0.62)	(0.36)	(0.59)
B90 Sum: $\beta_t + \beta_{t-1} + \beta_{t-2}$	-9.19***	-10.84**	-5.45*	-8.70**	-6.69*	-10.62*	-8.64**	-9.31	-8.55	-7.04*	-7.45	-8.39*
	(3.40)	(5.09)	(2.95)	(3.44)	(3.94)	(5.69)	(3.85)	(7.66)	(5.34)	(3.91)	(4.50)	(4.27)
T10 Sum: $\beta_t + \beta_{t-1} + \beta_{t-2}$	1.03	0.81	-0.64	-0.02	1.14	0.12	-0.44	0.37	-0.21	-0.05	0.06	0.24
	(1.56)	(1.44)	(1.52)	(1.48)	(1.50)	(1.36)	(1.29)	(1.13)	(1.13)	(1.68)	(0.75)	(1.71)
Bottom - Top:	-10.22**	-11.65**	-4.81	-8.69**	-7.83*	-10.73*	-8.20*	-9.68	-8.35	-6.99	-7.51	-8.63*
	(3.96)	(5.48)	(3.50)	(3.75)	(4.45)	(5.98)	(4.42)	(8.18)	(6.02)	(4.45)	(4.88)	(4.84)
Panel B: Two-Year Changes												
Bottom 90	-11.98***	-13.16***	-7.60***	-11.71***	-9.81***	-12.81***	-12.78***	-11.70*	-12.36**	-11.64***	-11.58***	-11.98***
	(2.21)	(4.17)	(2.37)	(2.21)	(3.05)	(4.46)	(3.79)	(5.89)	(4.77)	(2.28)	(2.29)	(2.20)
Top 10	0.75	0.90	-0.10	0.18	0.74	0.53	0.26	0.65	0.32	0.24	0.31	0.38
	(0.96)	(1.07)	(1.02)	(0.86)	(1.02)	(0.99)	(0.89)	(1.04)	(0.98)	(1.01)	(0.60)	(1.04)
P-Value (Bottom 90 = Top 10)	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.08	0.04	0.00	0.00	0.00
Controls												
1) Baseline Cyclicality	Y	N	N	N	N	N	N	N	N	Y	Y	Y
2) Year	N	Y	N	N	N	Y	Y	Y	Y	N	N	N
3) σ_{GDPPC} Cyclicality	N	N	Y	N	N	N	N	N	N	N	N	N
4) Alternate β-diff Control #1	N	N	N	Y	N	N	N	N	N	N	N	N
5) Alternate β-diff Control #2	N	N	N	N	Y	N	N	N	N	N	N	N
6) Oil Price x State	N	N	N	N	N	Y	N	N	N	Y	N	N
7) Real Interest Rate x State	N	N	N	N	N	N	Y	N	N	Y	N	N
8) Oil Price x State + Region	Y	N	N	N	N	N	N	Y	N	N	Y	N
9) Real Interest Rate x State + Region	N	N	N	N	N	N	N	N	Y	N	Y	N
10) State Trends	N	N	N	N	N	N	N	N	N	N	N	Y

Notes: This table presents analogous results to Table 4 for state GDP. The first five columns present different ways to account for state-specific cyclicality (see section 2.1.1 or appendix B.1 for details); (1) baseline specification with cyclicality-quintile by year fixed effects, (2) year fixed effects, (3) cyclicality-quintile by year fixed effects where the quintiles are defined based on the standard deviation in state GDP per capita, (4) cyclicality-decile by year fixed effects, and (5) cyclicality-quintile by year fixed effects that group states only using the years before the sample (i.e., before 1980). The next five columns show controls for state-specific sensitivity to other shocks and trends; (6) controls for oil price interacted with state dummies, (7) controls for real interest rate interacted with state dummies, (8) and (9) add region fixed effects to (6) and (7), and (10) includes state-specific trends. Standard errors are clustered by state (*** p<0.01, ** p<0.05, * p<0.1) in all specifications other than (8) and (9), which are clustered by region. The sample period is 1980-2007. See appendix A.2 for data definitions and sources.

Table A9: State-level Effects of Tax Changes by Income Group on State GDP: Policy Robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Distributed Lag Model of Tax Changes for Different Income Groups												
$T^{B90}_{s,t}$	-2.06	-2.27	-2.07	-2.58	-1.41	-3.07	-2.11	-1.57	-2.10	-2.31	-2.03	-2.12
	(2.11)	(2.17)	(2.18)	(2.13)	(1.81)	(2.00)	(2.08)	(2.18)	(2.20)	(2.15)	(2.19)	(1.85)
$T^{B90}_{s,t-1}$	-7.54***	-7.45***	-7.31***	-6.39***	-5.14***	-6.59***	-7.19***	-6.91***	-7.28***	-7.91***	-7.36***	-4.13***
	(1.48)	(1.36)	(1.34)	(1.33)	(1.20)	(1.30)	(1.37)	(1.26)	(1.33)	(1.41)	(1.35)	(1.34)
$T^{B90}_{s,t-2}$	0.38	0.11	0.30	2.15	0.43	0.15	-0.16	0.54	0.19	0.30	0.28	1.12
	(1.37)	(1.44)	(1.43)	(1.48)	(1.35)	(1.44)	(1.42)	(1.42)	(1.45)	(1.40)	(1.44)	(1.24)
$T^{T10}_{s,t}$	0.94	1.03*	1.04*	0.97*	0.98	1.39***	0.86	1.00*	1.05*	1.02**	1.07*	0.77*
	(0.57)	(0.59)	(0.58)	(0.56)	(0.68)	(0.42)	(0.58)	(0.57)	(0.58)	(0.49)	(0.58)	(0.46)
$T^{T10}_{s,t-1}$	0.15	0.06	0.11	0.12	0.30	0.18	0.07	0.16	0.09	0.08	0.08	0.26
	(0.62)	(0.70)	(0.71)	(0.65)	(0.54)	(0.52)	(0.70)	(0.64)	(0.71)	(0.66)	(0.70)	(0.40)
$T^{T10}_{s,t-2}$	0.05	-0.16	-0.10	-0.15	0.17	-0.15	-0.17	-0.02	-0.13	-0.22	-0.13	0.24
	(0.53)	(0.57)	(0.56)	(0.54)	(0.52)	(0.43)	(0.55)	(0.53)	(0.57)	(0.53)	(0.56)	(0.34)
B90 Sum: $\beta_t + \beta_{t-1} + \beta_{t-2}$	-9.22***	-9.60***	-9.09**	-6.82*	-6.13**	-9.50***	-9.46***	-7.94**	-9.18***	-9.92***	-9.11**	-5.14**
	(3.03)	(3.43)	(3.41)	(3.48)	(2.63)	(3.18)	(3.33)	(3.32)	(3.42)	(3.31)	(3.42)	(2.50)
T10 Sum: $\beta_t + \beta_{t-1} + \beta_{t-2}$	1.14	0.93	1.05	0.95	1.45	1.43	0.76	1.14	1.01	0.89	1.02	1.27
	(1.35)	(1.58)	(1.56)	(1.48)	(1.56)	(1.04)	(1.55)	(1.43)	(1.56)	(1.39)	(1.56)	(0.96)
Bottom - Top:	-10.36***	-10.54**	-10.14**	-7.77*	-7.58**	-10.93***	-10.22**	-9.08**	-10.20**	-10.82***	-10.13**	-6.41**
	(3.46)	(4.03)	(3.97)	(3.96)	(3.09)	(3.39)	(3.93)	(3.77)	(3.97)	(3.81)	(3.97)	(2.68)
Panel B: Two-Year Changes												
Bottom 90	-11.43***	-12.23***	-11.98***	-11.97***	-12.01***	-11.97***	-11.85***	-11.91***	-11.99***	-12.09***	-11.98***	-11.94***
	(2.17)	(2.23)	(2.21)	(2.18)	(2.14)	(2.22)	(2.21)	(2.23)	(2.21)	(2.19)	(2.21)	(2.16)
Top 10	0.90	0.69	0.80	0.66	0.76	0.77	0.76	0.69	0.75	0.69	0.76	0.66
	(0.85)	(0.98)	(0.98)	(0.93)	(0.96)	(0.97)	(0.94)	(0.90)	(0.96)	(0.92)	(0.96)	(0.86)
P-Value (Bottom 90 = Top 10)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Controls												
1) Government Transfers Per Capita	Y	N	N	N	N	N	N	N	N	N	N	N
2) Federal IG Spending Per Capita	N	Y	N	N	N	N	N	N	N	N	N	N
3) Minimum Wage	N	N	Y	N	N	N	N	N	N	N	N	Y
4) OASDI	N	N	N	Y	N	N	N	N	N	N	N	Y
5) Supplemental Security Income	N	N	N	N	Y	N	N	N	N	N	N	Y
6) Max SNAP Benefits	N	N	N	N	N	Y	N	N	N	N	N	Y
7) Medicaid Benefits	N	N	N	N	N	N	Y	N	N	N	N	Y
8) AFDC + TANF Benefits	N	N	N	N	N	N	N	Y	N	N	N	Y
9) Mechanical Change in AFDC & TANF	N	N	N	N	N	N	N	N	Y	N	N	Y
10) Mechanical Change in SNAP & SSI	N	N	N	N	N	N	N	N	N	Y	N	Y
11) Mechanical Change in Medicaid	N	N	N	N	N	N	N	N	N	N	Y	Y

Notes: This table presents analogous results to Table 5 for state GDP. Columns 1 and 2 control for total state transfers per capita and total federal transfers to a state per capita, respectively. Column 3 controls for the minimum wage. Columns 4-11 control for the following as a share of state GDP: OASDI payments, Supplemental Security Income payments, SNAP benefits (assuming max allotment per recipient), Medicaid vendor payments, AFDC and TANF payments, mechanical changes in AFDC and TANF spending, mechanical changes in SNAP and SSI spending, mechanical changes in Medicaid spending. See sections A.2, A.3, and C for more details on these controls and on the microsimulation-model based mechanical changes. Standard errors are clustered by state (*** p<0.01, ** p<0.05, * p<0.1). The sample period is 1980-2007.

Table A10: State-level Effects of Tax Changes by Income Group on Real State GDP: Cyclical Robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Distributed Lag Model of Tax Changes for Different Income Groups												
$T^{B90}_{s,t}$	-0.29	0.02	3.44	-0.24	1.61	0.06	0.06	-0.12	0.24	0.17	-0.38	-1.46
	(2.83)	(2.52)	(2.21)	(3.54)	(2.54)	(2.84)	(1.67)	(4.03)	(1.91)	(3.37)	(3.68)	(3.39)
$T^{B90}_{s,t-1}$	-8.40***	-10.85***	-7.74***	-6.80***	-8.35***	-10.71***	-10.86***	-10.65**	-11.16**	-8.19**	-8.91**	-9.11***
	(2.85)	(2.87)	(1.95)	(2.36)	(2.74)	(2.97)	(3.37)	(4.20)	(4.20)	(3.18)	(3.81)	(2.97)
$T^{B90}_{s,t-2}$	2.11	0.08	-0.33	3.52	2.36	-0.10	-1.09	-0.24	-1.09	1.17	1.08	1.64
	(2.11)	(1.65)	(1.99)	(2.66)	(2.09)	(1.78)	(2.69)	(1.21)	(1.45)	(2.64)	(2.40)	(2.65)
$T^{T10}_{s,t}$	0.91	1.49	0.58	1.49	1.33	1.48	1.02	1.36	1.12	0.62	0.67	0.68
	(0.99)	(1.12)	(1.03)	(0.97)	(1.07)	(1.17)	(0.96)	(1.15)	(0.95)	(1.04)	(0.91)	(0.96)
$T^{T10}_{s,t-1}$	0.88	0.91	0.40	1.37*	0.79	0.81	0.18	0.71	0.35	0.32	0.50	0.63
	(0.61)	(0.78)	(0.70)	(0.71)	(0.68)	(0.79)	(0.86)	(0.77)	(0.71)	(0.69)	(0.56)	(0.61)
$T^{T10}_{s,t-2}$	-0.12	-0.00	-0.37	-0.99	0.14	-0.21	-0.68	-0.19	-0.59	-0.85	-0.69	-0.42
	(0.77)	(0.81)	(0.89)	(1.06)	(0.76)	(0.84)	(1.04)	(0.75)	(1.00)	(0.84)	(0.55)	(0.79)
B90 Sum: $\beta_t + \beta_{t-1} + \beta_{t-2}$	-6.59	-10.75**	-4.62	-3.52	-4.39	-10.76**	-11.89*	-11.01	-12.01**	-6.85	-8.21	-8.92
	(4.97)	(4.27)	(3.88)	(6.03)	(4.85)	(4.84)	(6.01)	(6.73)	(5.05)	(6.66)	(7.58)	(6.68)
T10 Sum: $\beta_t + \beta_{t-1} + \beta_{t-2}$	1.67	2.40	0.61	1.87	2.27	2.09	0.52	1.88	0.89	0.09	0.47	0.89
	(1.33)	(1.83)	(1.59)	(1.51)	(1.75)	(1.87)	(1.81)	(1.72)	(1.57)	(1.45)	(1.12)	(1.26)
Bottom - Top:	-8.26	-13.14**	-5.23	-5.39	-6.66	-12.85**	-12.41**	-12.90	-12.90**	-6.94	-8.68	-9.81
	(5.10)	(5.17)	(4.33)	(6.19)	(5.42)	(5.69)	(5.74)	(7.42)	(5.29)	(6.67)	(7.29)	(6.79)
Panel B: Two-Year Changes												
Bottom 90	-9.70***	-13.18***	-6.96***	-8.98**	-8.05**	-13.27***	-14.28***	-12.54*	-14.15**	-10.22**	-10.87**	-11.32***
	(3.46)	(3.53)	(2.36)	(3.63)	(3.39)	(3.82)	(3.78)	(5.66)	(4.55)	(4.06)	(4.51)	(3.81)
Top 10	1.44*	2.09	0.66	2.30**	1.57	1.83	1.03	1.86	1.17	0.49	0.88	1.08
	(0.85)	(1.38)	(0.95)	(1.09)	(1.10)	(1.33)	(1.05)	(1.53)	(1.12)	(0.86)	(0.81)	(0.77)
P-Value (Bottom 90 = Top 10)	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.04	0.02	0.01	0.03	0.00
Controls												
1) Baseline Cyclicality	Y	N	N	N	N	N	N	N	N	Y	Y	Y
2) Year	N	Y	N	N	N	Y	Y	Y	Y	N	N	N
3) σ_{GDPPC} Cyclicality	N	N	Y	N	N	N	N	N	N	N	N	N
4) Alternate β-diff Control #1	N	N	N	Y	N	N	N	N	N	N	N	N
5) Alternate β-diff Control #2	N	N	N	N	Y	N	N	N	N	N	N	N
6) Oil Price x State	N	N	N	N	N	Y	N	N	N	Y	N	N
7) Real Interest Rate x State	N	N	N	N	N	N	Y	N	N	Y	N	N
8) Oil Price x State + Region	Y	N	N	N	N	N	N	Y	N	N	Y	N
9) Real Interest Rate x State + Region	N	N	N	N	N	N	N	N	Y	N	Y	N
10) State Trends	N	N	N	N	N	N	N	N	N	N	N	Y

Notes: This table presents analogous results to Table 4 for real state GDP using the ACCRA price index $P^{ACCRA}_{s,t}$. The first five columns present different ways to account for state-specific cyclicality (see section 2.1.1 or appendix B.1 for details); (1) baseline specification with cyclicality-quintile by year fixed effects, (2) year fixed effects, (3) cyclicality-quintile by year fixed effects where the quintiles are defined based on the standard deviation in state GDP per capita, (4) cyclicality-decile by year fixed effects, and (5) cyclicality-quintile by year fixed effects that group states only using the years before the sample (i.e., before 1980). The next five columns show controls for state-specific sensitivity to other shocks and trends; (6) controls for oil price interacted with state dummies, (7) controls for real interest rate interacted with state dummies, (8) and (9) add region fixed effects to (6) and (7), and (10) includes state-specific trends. Standard errors are clustered by state (*** p<0.01, ** p<0.05, * p<0.1) in all specifications other than (8) and (9), which are clustered by region. The sample period is 1980-2007. See appendix A.2 for data definitions and sources.

Table A11: State-level Effects of Tax Changes by Income Group on Real State GDP: Policy Robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Distributed Lag Model of Tax Changes for Different Income Groups												
$T^{B90}_{s,t}$	-0.32	-0.66	-0.66	-0.53	0.32	-1.09	-0.15	0.62	-0.42	-0.69	-0.50	-0.61
	(2.83)	(2.85)	(2.92)	(2.89)	(2.65)	(2.81)	(2.83)	(2.85)	(2.83)	(2.87)	(2.85)	(2.89)
$T^{B90}_{s,t-1}$	-8.61***	-8.33***	-8.29***	-7.66**	-6.28**	-7.65***	-8.24***	-7.58***	-8.23***	-9.24***	-8.38***	-6.22**
	(2.97)	(2.97)	(2.89)	(2.88)	(2.52)	(2.71)	(2.90)	(2.68)	(2.85)	(3.00)	(2.86)	(2.86)
$T^{B90}_{s,t-2}$	2.19	1.92	2.91	3.91*	2.21	1.97	1.87	2.58	2.09	2.36	2.22	3.29*
	(2.09)	(2.18)	(2.22)	(2.01)	(1.93)	(2.08)	(2.12)	(1.96)	(2.11)	(2.05)	(2.08)	(1.76)
$T^{T10}_{s,t}$	0.92	0.96	1.10	0.84	0.89	1.29	0.81	0.82	0.92	0.92	0.96	1.11
	(1.01)	(1.00)	(0.97)	(0.96)	(0.86)	(1.12)	(1.01)	(1.07)	(0.99)	(1.06)	(1.00)	(1.04)
$T^{T10}_{s,t-1}$	0.79	0.91	1.03*	0.86	1.10*	1.01	0.91	0.97	0.88	0.85	0.82	1.14*
	(0.63)	(0.60)	(0.58)	(0.59)	(0.57)	(0.67)	(0.59)	(0.59)	(0.62)	(0.65)	(0.62)	(0.66)
$T^{T10}_{s,t-2}$	-0.04	-0.12	-0.12	-0.21	0.14	-0.14	-0.08	0.01	-0.15	-0.21	-0.16	0.12
	(0.75)	(0.76)	(0.77)	(0.76)	(0.83)	(0.74)	(0.77)	(0.78)	(0.76)	(0.71)	(0.76)	(0.72)
B90 Sum: $\beta_t + \beta_{t-1} + \beta_{t-2}$	-6.74	-7.07	-6.03	-4.28	-3.76	-6.78	-6.51	-4.38	-6.56	-7.57	-6.65	-3.54
	(4.93)	(5.12)	(5.15)	(5.04)	(4.27)	(4.67)	(5.04)	(4.62)	(4.98)	(4.92)	(5.00)	(4.41)
T10 Sum: $\beta_t + \beta_{t-1} + \beta_{t-2}$	1.67	1.75	2.01	1.48	2.13	2.16	1.63	1.80	1.65	1.56	1.63	2.37
	(1.34)	(1.36)	(1.34)	(1.26)	(1.32)	(1.62)	(1.36)	(1.37)	(1.35)	(1.39)	(1.33)	(1.49)
Bottom - Top:	-8.41	-8.83*	-8.04	-5.76	-5.89	-8.93*	-8.15	-6.18	-8.21	-9.13*	-8.28	-5.91
	(5.05)	(5.18)	(5.31)	(5.14)	(4.59)	(4.90)	(5.11)	(4.84)	(5.11)	(4.97)	(5.12)	(4.71)
Panel B: Two-Year Changes												
Bottom 90	-9.41***	-9.87***	-9.70***	-9.71***	-9.71***	-9.67***	-9.64***	-9.67***	-9.70***	-9.83***	-9.72***	-9.76***
	(3.48)	(3.50)	(3.53)	(3.43)	(3.44)	(3.51)	(3.50)	(3.46)	(3.47)	(3.47)	(3.47)	(3.60)
Top 10	1.52*	1.40	1.66**	1.38	1.44*	1.47*	1.44*	1.39	1.44*	1.39	1.44*	1.55*
	(0.87)	(0.84)	(0.82)	(0.84)	(0.85)	(0.86)	(0.86)	(0.90)	(0.85)	(0.84)	(0.85)	(0.83)
P-Value (Bottom 90 = Top 10)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Controls												
1) Government Transfers Per Capita	Y	N	N	N	N	N	N	N	N	N	N	N
2) Federal IG Spending Per Capita	N	Y	N	N	N	N	N	N	N	N	N	N
3) Minimum Wage	N	N	Y	N	N	N	N	N	N	N	N	Y
4) OASDI	N	N	N	Y	N	N	N	N	N	N	N	Y
5) Supplemental Security Income	N	N	N	N	Y	N	N	N	N	N	N	Y
6) Max SNAP Benefits	N	N	N	N	N	Y	N	N	N	N	N	Y
7) Medicaid Benefits	N	N	N	N	N	N	Y	N	N	N	N	Y
8) AFDC + TANF Benefits	N	N	N	N	N	N	N	Y	N	N	N	Y
9) Mechanical Change in AFDC & TANF	N	N	N	N	N	N	N	N	Y	N	N	Y
10) Mechanical Change in SNAP & SSI	N	N	N	N	N	N	N	N	N	Y	N	Y
11) Mechanical Change in Medicaid	N	N	N	N	N	N	N	N	N	N	Y	Y

Notes: This table presents analogous results to Table 5 for real state GDP using the ACCRA price index $P^{ACCRA}_{s,t}$. Columns 1 and 2 control for total state transfers per capita and total federal transfers to a state per capita, respectively. Column 3 controls for the minimum wage. Columns 4-11 control for the following as a share of state GDP: OASDI payments, Supplemental Security Income payments, SNAP benefits (assuming max allotment per recipient), Medicaid vendor payments, AFDC and TANF payments, mechanical changes in AFDC and TANF spending, mechanical changes in SNAP and SSI spending, mechanical changes in Medicaid spending. See sections A.2, A.3, and C for more details on these controls and on the microsimulation-model based mechanical changes. Standard errors are clustered by state (*** p<0.01, ** p<0.05, * p<0.1). The sample period is 1980-2007.