Tax Cuts for Whom? Heterogeneous Effects of Income Tax Changes on Growth & Employment

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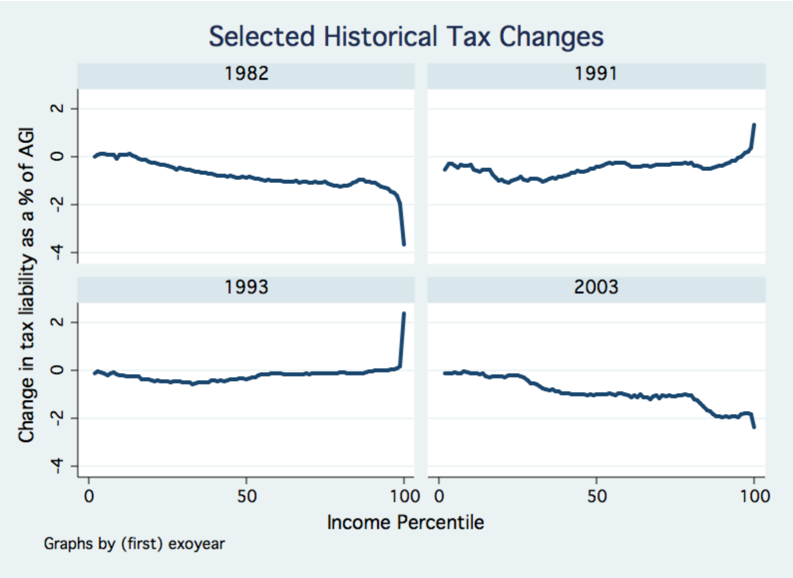
Variation in Tax Policy & Structure of Income Tax Changes



Research Questions

How does the composition of income tax changes affect subsequent output & employment?

- Do tax cuts for high income taxpayers generate more employment & output growth than equivalently sized tax cuts for low and moderate income taxpayers?
- **If so, why?**

Overview

1. **Theoretical Framework:** Redistribution from savers to constrained/less patient borrowers
2. **Empirical Approach:**
   - National: Romer & Romer AER 2010 disaggregated by income group
   - Regional: Bartik approach
3. **Data:** Historical returns & counterfactuals from NBER TAXSIM
4. **Results:** Tax cuts for the rich lead to substantially less employment growth and economic activity than similarly sized tax cuts for the poor and middle class
   - Aggregate consumption, particularly durable consumption, and investment tend to increase much more strongly after bottom 90% gets tax cuts
   - No detectable relationship between tax cuts for the top 10% and employment growth

Motivation

Why study the impacts of these tax changes and how they vary over the income distribution?

- Empirical importance of heterogeneity in effects of fiscal policy [e.g. Mertens & Ravn AER forthcoming]
- Optimal stimulus design
- Effects of ending the Bush tax cuts for certain income groups
- Effects of mass refinancing[1]

[1] Or any other modestly sized redistributive policies at a business cycle frequency

Some Relevant Literature

- Little direct evidence likely due to empirical issues: endogeneity, simultaneity, and observability
- **Heterogeneity matters theoretically**
  Monacelli and Perotti (2011), Heathcote (2005), Gali, Lopez-Salifo, and Valles (2007)
- **Taxes and Consumption responses**
  - **MPC** Parker (1999), Dynan Skinner and Zeldes (2001), McCarthy (1995), Jappelli and Pistaferri (2010).
- **Real responses among upper income taxpayers are likely small**
  Saez, Slemrod, and Giertz (2012), Romer & Romer (2012), Goolsbee (2000), Auerbach and Siegel (2000)

I. Theoretical Framework (1/3)

Two types $j \in (b, s)$ w/ same separable utility for consumption & hours

$$\max_{c_{j,t}, h_{j,t}} \mathbb{E} \left\{ \sum_{t=0}^{\infty} \beta_j^t [u(c_{j,t}) - v(h_{j,t})] \right\} \tag{1}$$

$$c_{j,t} \leq \underbrace{d_{j,t} - R_{t-1} d_{j,t-1}}_{net\ \ borrowing} + w_t h_{j,t} - \tau_{j,t} \tag{2}$$

$$d_{b,t} \leq \bar{d} \tag{3}$$

where $\beta_s > \beta_b$, (2) and (3) have multipliers $\lambda_{j,t}$ and Ψ_t respectively.

FOCs that give us Consumption and Labor Supply

$$u'(c_{j,t}) = \lambda_{j,t} \tag{4}$$
$$v'(h_{j,t}) = w_t \lambda_{j,t} \tag{5}$$
$$\lambda_{j,t} = \beta_j \mathbb{E}\{R_t \lambda_{j,t+1}\} + \underbrace{\mathbb{I}(j=b)\lambda_{j,t}\Psi_t}_{credit\ \ premium} \tag{6}$$

Implication

- **Higher MPCs:**[2] (4) & (6) $\Rightarrow u'(c_{b,t}) > u'(c_{s,t})$.

[2] Example: $R\beta_b\mathbb{E}_t(\frac{c_{b,t}}{c_{b,t+1}}) = 1 - \Psi_t$

I. Theoretical Framework (3/3)

Consider lump sum redistribution $-\Delta\tau_b = \Delta\tau_s$

- $c_{b,t} \Uparrow$ and $c_{s,t} \downarrow$
- Increased aggregate consumption
- In standard new Keynesian framework,[3] higher consumption $\Rightarrow$ increased output, L^D, and employment

[3] See Monacelli and Perotti (2011) for full detail

II. Empirical Framework: Background (1/2)

Romer & Romer (AER 2010)

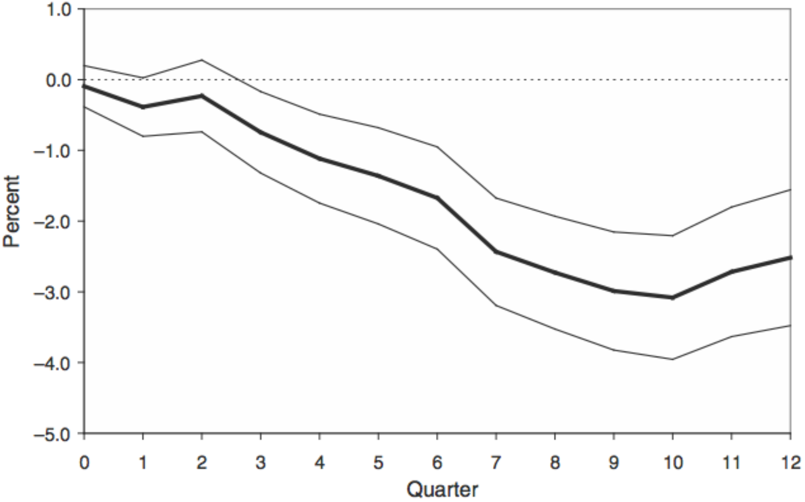
$$\Delta Y_t = \alpha + \beta \Delta Tax_t + \epsilon_t \quad (7)$$

Types of Tax Changes

1. Counteract economic forces
2. Spending offsets
3. Address inherited deficit
4. Promote long run growth

II. Empirical Framework: Background (2/2)

$$\Delta Y_t = \alpha + \sum_{i=0}^{M} \Delta b_i Tax_{t-i} + e_t$$



II. Empirical Framework: (1) Narrative Approach

Output growth & exogenous tax changes for different income groups

$$Growth_{Y,t} = \beta_0 + \beta_{BOT90}(\Delta Tax_{B90,t}) + \beta_{TOP10}(\Delta Tax_{T10,t}) + X_t\lambda + \epsilon_t$$

- ΔTax_{B90} and ΔTax_{T10} are changes in income and payroll taxes as a share of GDP for the bottom 90% and top 10% respectively
- X_t is a vector of controls such as non-income and payroll tax changes and lagged GDP growth
- Assume $\text{Cov}(\Delta Tax_{g,t}, \epsilon_t) = 0 \; \forall g \in (BOT90, TOP10, NONINCOME)$ following Romer & Romer AER 2010
- Frisch Waugh

II. Empirical Framework: (2) Bartik Approach

Overview of Bartik approach

- **Idea:** Auto shock on employment in Detroit vs. Denver
- **Labor literature:** Bartik (1991), Card (1992), Katz & Murphy (1992), Moretti (2004)
- **Implementation:** When *national* tax policy affects high income taxpayers, states with large shares of high income taxpayers will face larger shocks
- **Test:** If high income tax cuts have substantial effects, CT and NJ should grow faster following national high income tax cuts
- **Value:** Provides additional identifying variation [4]

[4] Within & across state variation. Avoids national concerns: fed & trends

II. Empirical Framework: (2) Bartik Approach

State emp growth & Bartik tax shocks for different income groups

$$\begin{aligned} Growth_{E,s,t} = \alpha &+ \beta_{B90}\left(\gamma_{B90,s,t-1}\Delta Tax_{B90,t}\right) \\ &+ \beta_{T10}(\gamma_{T10,s,t-1}\Delta Tax_{T10,t}) \\ &+ \eta_s + \phi_t + X_t\lambda + \epsilon_{s,t} \end{aligned}$$

- $\Delta Tax_{B90,t}$ is the exogenous change in taxes as a share of national GDP for taxpayers who are in the bottom 90 percent of AGI nationally
- $\gamma_{B90,s,t-1}$ is the share of taxpayers in the prior year who filed taxes from state s whose AGI falls in the bottom 90 percent nationally
- If 20% of taxpayers in CT earn incomes that are in the top ten percent nationally, then CT will have $\gamma_{T10,CT} = 20$
- Some states have disproportionate share (e.g, $\gamma_{T10,NJ} > \gamma_{T10,\bar{s}}$)

III. Data Overview

National Data: 1945-2010

1. Dependent Variables: Employment (BLS) & macro aggregates(BEA[5])
2. Independent Variables: SOI, NBER TAXSIM for 1960+

State Data: 1980-2010

1. Dependent Variables: Employment data from BLS
2. Independent Variables: NBER TAXSIM

[5] Real GDP, C, and I are chain-type quantity indexes from NIPA Table 1.1.3 and Nominal GDP is from 1.1.5

Data: Constructing tax changes

Tax Change Measure is a function of three things:

1. Income and deductions from year prior to an exogenous tax change[6]
2. Old tax schedule
3. New tax schedule

[6] The results are robust to using two year lags and various inflation adjustments

Data: Constructing tax changes

Example: 1993 Omnibus Budget Reconciliation Act

1992		
Marginal	Tax Brackets	
Tax Rate	Over	But Not Over
15.0%	$0	$35,800
28.0%	$35,800	$86,500
31.0%	$86,500	-

1993		
Marginal	Tax Brackets	
Tax Rate	Over	But Not Over
15.0%	$0	$36,900
28.0%	$36,900	$89,150
31.0%	$89,150	$140,000
36.0%	$140,000	$250,000
39.6%	$250,000	-

Note: Data from Tax Foundation. Rates shown for married filiing jointly.

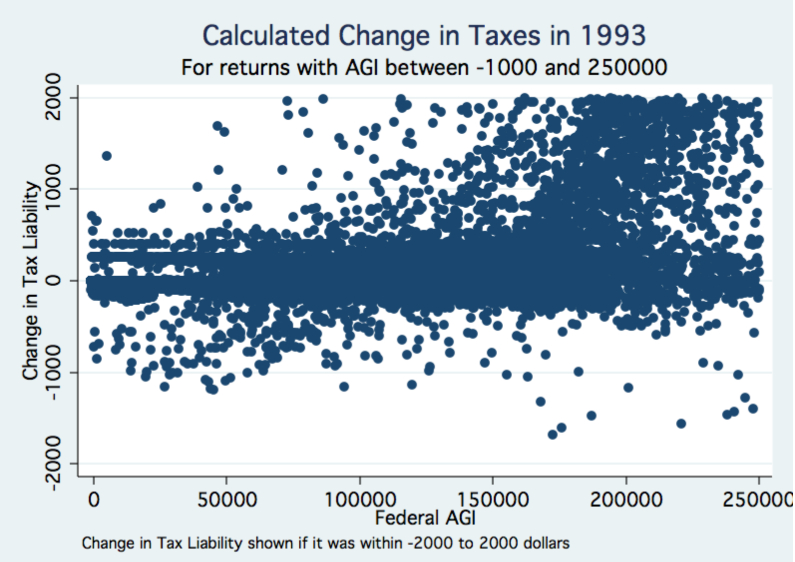
Data: Constructing tax changes

Example: 1993 Omnibus Budget Reconciliation Act

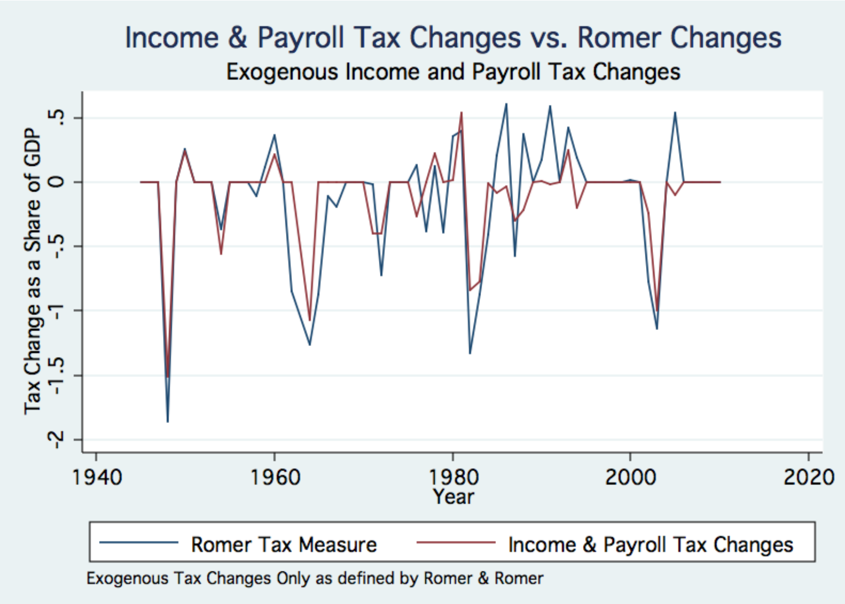
- Suppose a taxpayer made $180K in 1992
- Based on the **1992** schedule & her income and deductions in **1992**, she would have paid $50,500
- Based on the **1993** schedule & her income and deductions in **1992**, she would have paid $54,000
- My measure assigns her a $3,500 tax increase in 1993

Data: Constructing tax changes

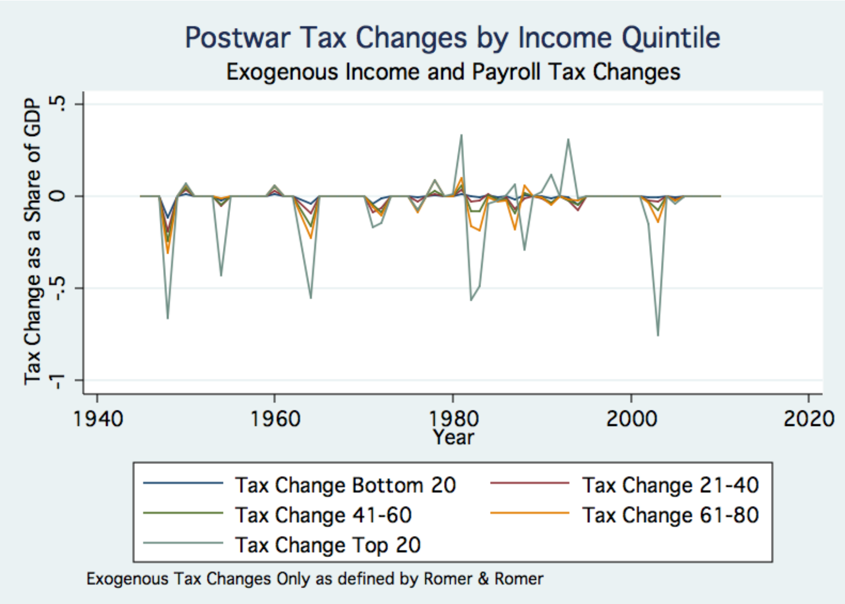
I do this calculation for entire sample of NBER returns



Comparison of Aggregate Changes w/ Romer Changes



Disaggregated Tax Changes by Income Quintile



State Bartik Statistics

TAXSIM has states for those with income<$200K, so I (1) use obs below cutoff and (2) extrapolate shares based on state shares of $150 to $200K.[7]

$$\text{Local Tax Shock}_{g,s,t} = \begin{cases} \gamma_{g,s,t-1} \times \text{Tax Increase to AGI Ratio}_{g,t} & \text{for} \quad g = \text{Top 10} \\ \frac{\gamma_{g,s,t-1}}{9} \times \text{Tax Increase to AGI Ratio}_{g,t} & \text{for} \quad g = \text{Bottom 90} \end{cases}$$

Table: Distributional Statistics of Bartik Components for Top 10%

Descriptive Statistics	Average State Share$_{\text{Top10}}$	Tax Increase to AGI Ratio$_{\text{Top10}}$
1st	3.8	-1.9
5th	5.2	-1.6
10th	5.6	-0.5
25th	7.4	0.0
Median	8.7	0.0
75th	10.6	0.1
90th	12.8	0.2
95th	13.7	0.7
99th	15.4	1.1

[7] Very little extrapolation is required in the early years, in which more than 99% of incomes fall below the censoring cutoff. In 2010, more than 95% of income earners still earned less than $200,000.

IV. Results Overview

National Data:

1. 2 year output and employment growth
2. Mechanisms: Consumption and Investment

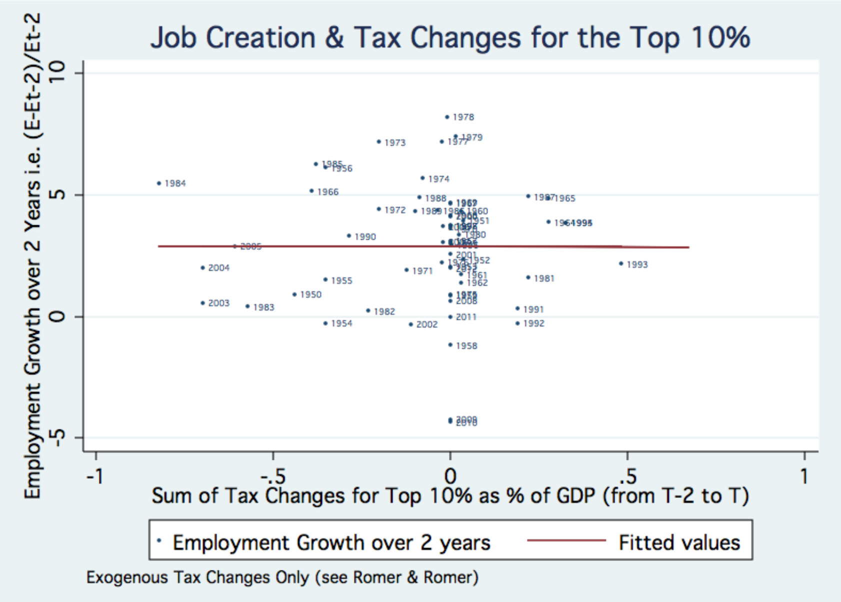
State Data:

1. Similar specification at state-level
2. Bartik results

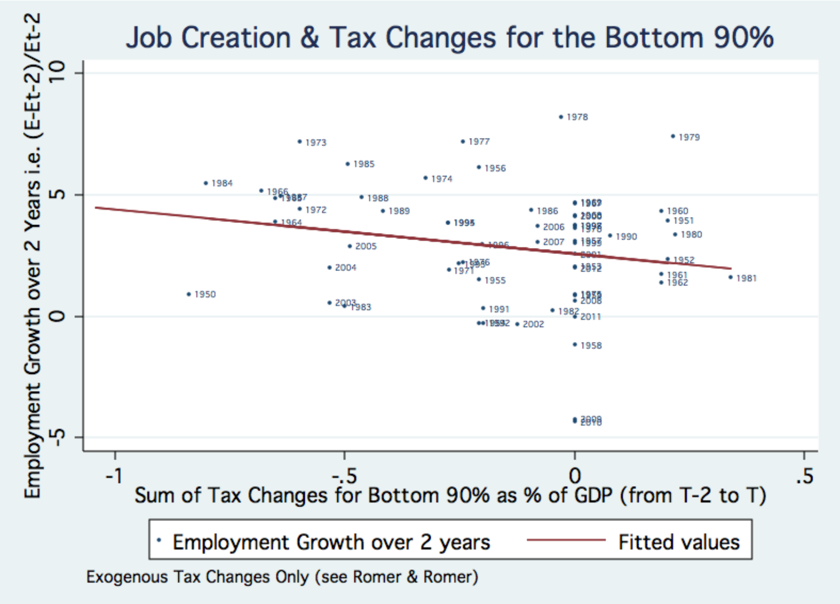
Robustness:

1. Flexible third order approach

National Data: Employment & Top 10%



National Data: Employment & Bottom 90%



2 Year Effects of Tax Δs on Output and Emp Growth

VARIABLES	(1) $Growth_Y$	(2) $Growth_Y$	(3) $Growth_Y$	(4) $Growth_Y$	(5) $Growth_E$	(6) $Growth_E$
$\sum_{t-2}^{t} \Delta Tax_{ROMER}$	-0.853**					
	(0.362)					
$\sum_{t-2}^{t} \Delta Tax_{INCOME}$		-1.373*				
		(0.780)				
$\sum_{t-2}^{t} \Delta Tax_{Top10}$			0.199	0.605	0.373	0.241
			(0.992)	(0.932)	(0.735)	(0.791)
$\sum_{t-2}^{t} \Delta Tax_{Bottom90}$			-2.725**	-2.543**	-1.851**	-1.899**
			(1.162)	(1.139)	(0.789)	(0.801)
$\sum_{t-2}^{t} \Delta Tax_{NONINCOME}$				-0.738		0.243
				(0.476)		(0.420)
Constant	2.491***	2.090**	1.963*	2.204*	0.201	0.123
	(0.905)	(1.012)	(1.026)	(1.106)	(0.640)	(0.693)
Control for serial corr.	Y	Y	Y	Y	Y	Y
Observations	61	61	61	61	61	61
R-squared	0.578	0.573	0.588	0.596	0.577	0.579

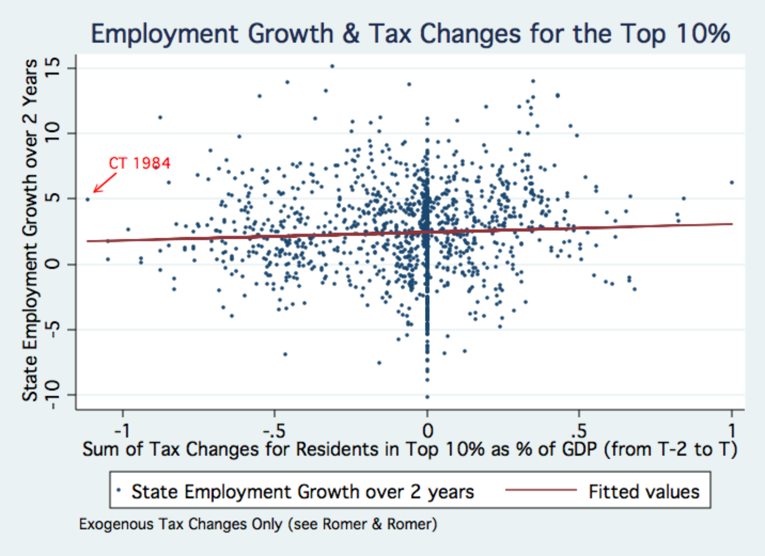
Controlled for serial correlation by including $\Delta \ln Y_{t-k}$ for $k \in (1, 2, 3)$ in regression
Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

2 Year Effects of Tax Changes on Macro Aggregates

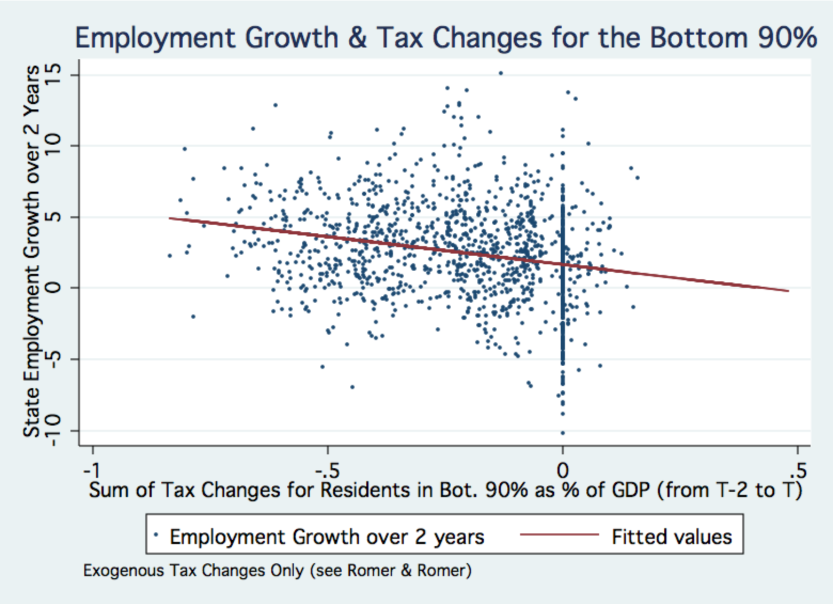
VARIABLES	(1) $Growth_C$	(2) $Growth_I$	(3) $Growth_D$	(4) $Growth_{ND}$	(5) $Growth_{RI}$
$\sum_{t-2}^{t} \Delta Tax_{Top10}$	-0.313	2.182	-3.378	-0.609	-15.24
	(0.926)	(4.874)	(2.737)	(0.773)	(11.85)
$\sum_{t-2}^{t} \Delta Tax_{Bottom90}$	-4.508***	-10.04**	-18.03***	-2.379***	-8.765
	(0.956)	(4.767)	(3.456)	(0.767)	(6.697)
$\sum_{t-2}^{t} \Delta Tax_{NONINCOME}$	-0.423	-1.408	-1.006	-0.464	12.21**
	(0.439)	(2.172)	(1.567)	(0.373)	(4.803)
Constant	3.019***	0.872	3.060	2.013**	41.49***
	(0.934)	(5.172)	(2.402)	(0.853)	(5.571)
Control for serial corr.	Y	Y	Y	Y	Y
Observations	61	61	61	61	61
R-squared	0.477	0.454	0.447	0.398	0.113

Controlled for serial correlation by including $\Delta \ln Y_{t-k}$ for $k \in (1, 2, 3)$ in regression
Robust standard errors in parentheses *** p$<$0.01, ** p$<$0.05, * p$<$0.1

State Data: Employment & Top 10%



State Data: Employment & Bottom 90%



Cumulative Effects of Tax Δs on State Emp Growth

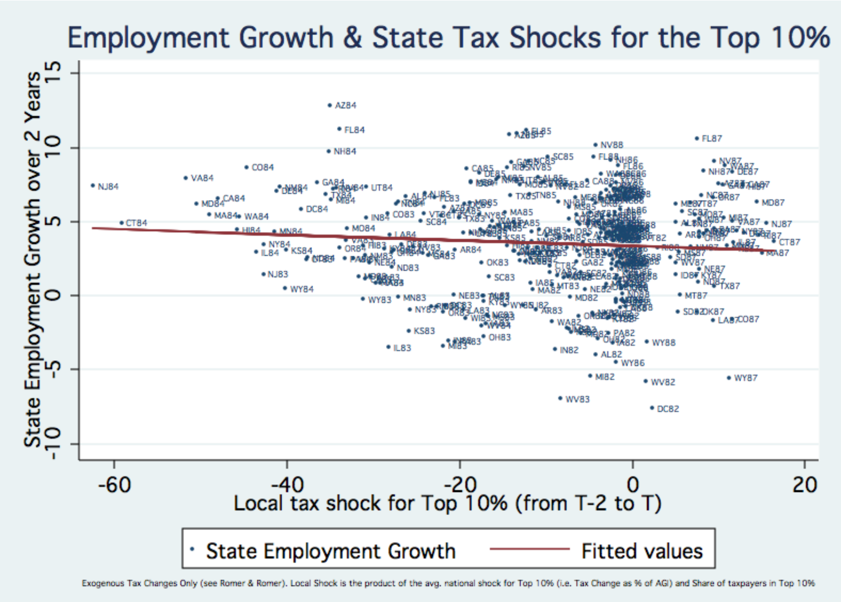
VARIABLES	(1) $Growth_E$	(2) $Growth_E$	(3) $Growth_E$	(4) $Growth_E$	(5) $Growth_E$	(6) $Growth_E$
$\sum_{t-2}^{t} \Delta Tax_{Top10,S}$	0.414***		0.916***	1.103***	0.0367	-0.00425
	(0.151)		(0.149)	(0.147)	(0.336)	(0.340)
$\sum_{t-2}^{t} \Delta Tax_{Bottom90,S}$		-2.329***	-2.651***	-2.807***	-2.207***	-2.074***
		(0.202)	(0.213)	(0.218)	(0.573)	(0.567)
Constant	0.311***	-0.145*	-0.137	1.784***	3.173***	3.015***
	(0.0705)	(0.0853)	(0.0844)	(0.430)	(0.261)	(0.297)
Control for State FX	N	N	N	Y	Y	Y
Control for State & Year FX	N	N	N	N	Y	Y
Observations	1,326	1,326	1,326	1,326	1,326	1,326
R-squared	0.766	0.782	0.786	0.797	0.880	0.881

Controlled for serial correlation by including Δ EmpGrowth_{t-k} for $k \in (1, 2, 3)$ in regressions .

Controlled for squared and cubic lags in (6), i.e. $(\Delta\ \text{EmpGrowth}_{t-1})^j$ for $j \in (2, 3)$

Robust standard errors in parentheses. Clustered by state in (5) and (6). *** $p<0.01$, ** $p<0.05$, * $p<0.1$

State Data: Employment & Bartik Top 10%



State Data: Employment & Bartik Top 10%

VARIABLES	(1) $Growth_E$	(2) $Growth_E$	(3) $Growth_E$	(4) $Growth_E$	(5) $Growth_E$	(6) $Growth_E$
$\sum_{t-2}^{t} TaxShock_{Top10,S}$		-0.00371	0.0119**	0.0181***	-0.0288**	-0.0282**
		(0.00504)	(0.00506)	(0.00523)	(0.0140)	(0.0140)
$\sum_{t-2}^{t} TaxShock_{Bottom90,S}$	-0.0866***		-0.0897***	-0.0913***	-0.503**	-0.486**
	(0.00720)		(0.00752)	(0.00766)	(0.209)	(0.210)
Constant	-0.246***	0.267***	-0.221**	1.613***	2.268***	2.175***
	(0.0876)	(0.0753)	(0.0892)	(0.430)	(0.247)	(0.293)
Control for State FX	N	N	N	Y	Y	Y
Control for State & Year FX	N	N	N	N	Y	Y
Observations	1,326	1,326	1,326	1,326	1,326	1,326
R-squared	0.786	0.765	0.787	0.796	0.880	0.881

Controlled for serial correlation by including Δ EmpGrowth$_{t-k}$ for $k \in (1, 2, 3)$ in regressions
Controlled for squared and cubic lags in (6), i.e. $(\Delta \text{ EmpGrowth}_{t-1})^j$ for $j \in (2, 3)$
Robust standard errors in parentheses. Clustered by state in (5). *** p<0.01, ** p<0.05, * p<0.1

Robustness: Different Income Groupings

How does effect vary over the income groups?

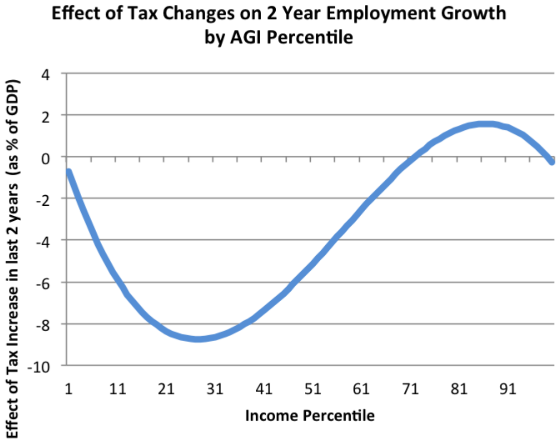
- A flexible third order approximation of the $\beta(I)$ function
- $\beta(I) = \theta_1 I + \theta_2 I^2 + \theta_3 I^3$
- Plug into estimating equation

$$Growth_E = \alpha + \beta_1 \Delta Tax_1 + \beta_2 \Delta Tax_2 + ... + \beta_{100} \Delta Tax_{100} + \tilde{\epsilon}$$

$$Growth_E = \alpha + (\theta_1 + \theta_2 + \theta_3) \Delta Tax_1 + (\theta_1 2 + \theta_2 2^2 + \theta_3 3^2) \Delta Tax_2 + ... + \tilde{\epsilon}$$

$$Growth_E = \alpha + \theta_1 \left(\sum_{I=1}^{100} I \Delta Tax_I \right) + \theta_2 \left(\sum_{I=1}^{100} I^2 \Delta Tax_I \right) + \theta_3 \left(\sum_{I=1}^{100} I^3 \Delta Tax_I \right) + \tilde{\epsilon}$$

Robustness: Different Income Groupings



This figure shows the third order approx of $\beta(I) \approx \hat{\theta}_1 I + \hat{\theta}_2 I^2 + \hat{\theta}_3 I^3$.[8]

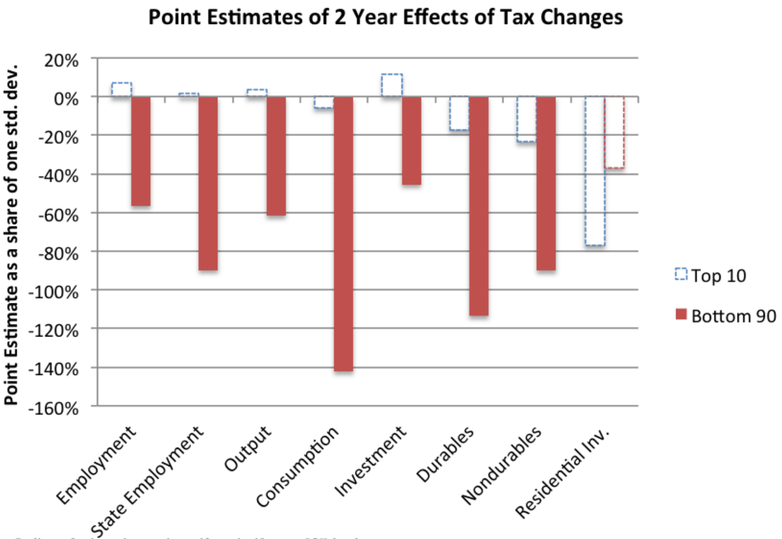
[8]The estimated effects of other controls, such as lagged GDP and non-income tax changes, are not included in the graph.

Next Steps

Things on the to do list:

1. **Effects in good and bad times** (state variation may be especially useful)
2. Distinguish between anticipated and unanticipated. Preliminary results consistent with liquidity constraint story.
3. Extend state bartik results using older employment data
4. Improve measure of \$200K+ using all available info from IRS SOI
5. Measurable longer term effects: New firm creation or patents by state
6. Calibrate using plausible magnitudes of liquidity constraints

Conclusion (1 of 2)



Note: Outlines of point estimates shown if not significant at 95% level.

Summary

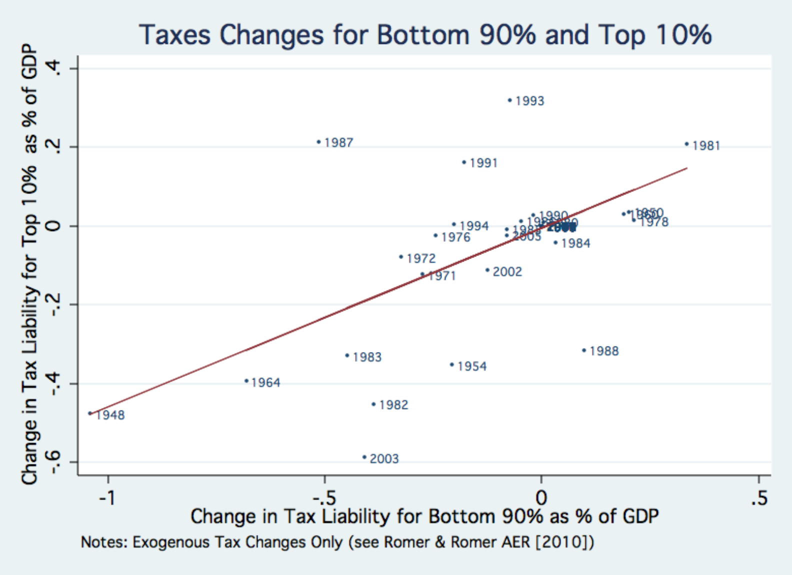
1. Construct a new measure of income tax changes
2. Show substantial heterogeneity in effects of fiscal policy
3. Find almost all of the stimulative effect of income tax cuts are from bottom 90% and empirical link between employment growth and tax changes for upper income earners is negligible at best
4. Suggest letting Bush tax cuts expire for $250K won't have substantial employment consequences over the business cycle

APPENDIX: National Summary Stats: 1945-2010

Variable	Mean	Std. Dev.	Min.	Max.	N
$\mathbb{I}$(Exogenous Tax Change)	0.424	0.498	0	1	66
$\mathbb{I}$(Payroll Tax Change)	0.242	0.432	0	1	66
2 year Change in Unemployment Rate	0.118	1.624	-2.767	4.658	63
2 year Growth in Employment	2.885	2.465	-4.334	8.218	63
2 year Growth in Real GDP	6.265	4.435	-11.74	17.156	64
2 year Growth in Consumption	7.005	3.245	-2.434	14.591	64
2 year Growth in Investment	10.242	22.899	-32.66	146.291	64
2 year Growth in Durable Goods Consumption	12.661	16.275	-10.313	111.883	64
2 year Growth in Non-durable Goods Cons.	5.101	2.649	-2.914	10.877	64
2 year Growth in Residential Investment	44.282	21.392	2.94	100	66
$\Delta Tax_{ROMER,t}$	-0.099	0.472	-1.858	0.858	66
$\Delta Tax_{INCOME,t}$	-0.089	0.33	-1.516	0.631	66
$\Delta Tax_{NONINCOME,t}$	-0.009	0.285	-0.869	0.643	66
$\Delta Tax_{Top30,t}$	-0.052	0.231	-0.833	0.58	66
$\Delta Tax_{Bottom70,t}$	-0.038	0.12	-0.691	0.153	66
$\sum_{t-2}^{t} \Delta Tax_{ROMER}$	-0.305	0.804	-2.609	1.009	64
$\sum_{t-2}^{t} \Delta Tax_{INCOME}$	-0.277	0.512	-1.625	0.631	64
$\sum_{t-2}^{t} \Delta Tax_{NONINCOME}$	-0.028	0.498	-1.169	0.955	64
$\sum_{t-2}^{t} \Delta Tax_{Top10}$	-0.081	0.267	-0.823	0.546	64
$\sum_{t-2}^{t} \Delta Tax_{Bottom90}$	-0.196	0.315	-1.04	0.34	64
$\sum_{t-2}^{t} \Delta Tax_{Top30}$	-0.16	0.372	-1.3	0.58	64
$\sum_{t-2}^{t} \Delta Tax_{Bottom70}$	-0.117	0.186	-0.691	0.153	64

Note that the units for all of the ΔTax variables are percent of GDP (i.e. $100 \times \frac{\Delta \tau}{Y}$).

APPENDIX: Frisch Waugh



APPENDIX: State Summary Stats: 1980-2010

Variable	Mean	Std. Dev.	Min.	Max.	N
Year_t	1995	8.947	1980	2010	1581
$\text{Unemployment Rate}_{s,t}$	5.977	2.126	2.242	17.45	1581
2 year Change in $\text{Unemployment Rate}_{s,t}$	0.108	1.731	-4.992	6.992	1479
2 year Change $\text{Employment Growth}_{s,t,}$	2.41	3.359	-10.185	15.157	1479
Normalized Share of Bottom 90% (i.e., $\gamma_{B90,s,t}/9$)	10.108	0.341	8.228	10.859	1581
Share of Top 10% (i.e., $\gamma_{T10,s,t}$)	9.08	2.98	1.795	25.983	1581
Tax Increase to AGI $\text{Ratio}_{Bottom90,t}$	-0.177	0.409	-1.222	0.787	1581
Tax Increase to AGI $\text{Ratio}_{Top10,t}$	-0.1	0.567	-1.912	1.071	1581
$\sum_{t-2}^{t}$ Local Tax $\text{Shock}_{Bottom90,s,t}$	-6.093	5.766	-17.495	2.04	1479
$\sum_{t-2}^{t}$ Local Tax $\text{Shock}_{Top10,s,t}$	-3.608	8.896	-50.226	15.878	1479
$\sum_{t-2}^{t} \Delta Tax_{Bottom90,S}$	-0.165	0.221	-0.837	0.481	1581
$\sum_{t-2}^{t} \Delta Tax_{Top10,S}$	-0.047	0.27	-1.115	1.002	1581

Note that the units for all of the ΔTax variables are percent of GDP_S in \$M (i.e. $100 \times \frac{\Delta\tau}{Y_S \times 10^6}$).