LOST in America: Evidence on Local Sales Taxes from National Panel Data

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November 23, 2013

Introduction

- Despite the dramatic variation across jurisdictions and across time in local sales tax rates across the United States, few empirical studies exploit this variation to estimate behavioral responses to local tax rates.
- The main reason for excluding local tax variation is not a result of their lack of importance, but rather because of an absence of comprehensive national panel data on local sales tax rates across the country.
- The absence of such a panel prevents us from studying central problems in regional economics and in local public finance.
- This study uses proprietary data to construct such a panel of local sales tax rates.

Justification for National Panel Data

1. Without local tax data, the researcher cannot accurately measure tax discontinuities that vary at borders.
2. Cross-state comparisons cannot be made concerning factors influencing the variance of LOST.
3. National panel data allows the researcher to exploit variation in state level policies that affect tax rates within the state
4. The data will also be useful to incorporate sales tax components into price indexes essential to measuring quality of life across cities. The ACCRA price indexes are not adjusted for sales taxes.

Goals of the Paper

1. I will describe the institutional features of LOST on a state-by-state basis.
2. I develop state-by-year (and month) local sales tax rate indexes.
3. I use the indexes to document ten stylized facts regarding LOST.
4. I show that the tax rate series can be used to empirically study outcomes across states. The application I study is tax competition.

Literature Review

- Single state studies of tax competition
  - Luna (2003), Rogers (2004), Zhoa (2005), Luna, Bruce, and Hawkins (2007), Sjoquist, Smith, Wallace, and Walker (2007), Burge and Rogers (2011), Burge and Piper (2012)
- Tax Incidence and Behavioral Responses
  - Mikesell (1970), Fox (1986), Walsh and Jones (1988), Poterba (1996), Besley and Rosen (1999), Goolsbee (2000), Ballard and Lee (2007), Cole (2009), Tosun and Skidmore (2007), Thompson and Rohlin (2012), Rohlin, Rosenthal, and Ross (2012), Einav, Knoepfle Levin and Sundaresan (2013)
- National Cross-sectional Data: All Levels
  - Agrawal (2011), Agrawal (2012), Agrawal (2013)
- Panel Data: Some Types of Jurisdictions
  - Shon (2013), Thompson and Rohlin (2013)
- Panel Data: All Levels of Jurisdictions
  - THIS PAPER!

Institutional Details

- Over 8000 counties and local governments set local option sales taxes (LOST).
  - Allowed in over thirty states
  - Range between 0% and 6%
  - Between 1% and 52% of municipal revenue
- Many institutional details across states.

Institutional Details

- As noted in Slemrod and Gillitzer (2013), states design tax systems, not just tax rates. Some components of the state sales tax systems include:
- Statutory tax rates vary across states.
- What is included in the taxable base varies – especially with respect to the treatment of food purchases.
- Some states do not allow for local sales tax rates.
- The levels of government that are designated taxing authority by the state may include town, county, and district governments.
- Some states cap localities by dictating a maximum LOST rate.
- In some states localities have the authority to set any rate they want while in others, they must pass tax rates in certain increments, such as 1/4 percentage point changes.

The Data

- The data set contains all state, county, town, and district taxes at a level that distinguishes the tax rate within a town by zip codes.
- The data runs from 2003 to 2011 and is high frequency – at the monthly level.
- The data are from a proprietary firm, but required over one year of cleaning to create consistent boundaries and matches with Census data.
- I match each town and county to a Census place and a Census county in the ACS.

Creating State and National Aggregates

- The ideal measure of the effective tax rate for a resident of a particular state would account for tax evasion opportunities – whether they be on the Internet or in neighboring jurisdictions.
- However, cross-border flows across all 25,000 localities in the United States are not observable to the researcher.
- This leads to a necessary assumption to create a state level aggregate of local sales taxes: that shopping occurs and is taxed in the place of residence. This assumption is similarly equivalent to assuming that the use tax is effectively enforced.
- I weight by population. The patterns are robust to using unweighted statistics.

Creating State and National Aggregates

$$\bar{\tau_{k,t}} = \frac{\sum_{i \in \Theta_k} \tau_{i,k,t} p_{i,k}}{\sum_{i \in \Theta_k} p_{i,k}}$$

$$\hat{Var}(\tau_{i,k,t}) = \frac{\sum_{j \in \Theta_k} p_{i,j,k} (\tau_{i,k,t} - \bar{\tau_{k,t}})^2}{(\sum_{i \in \Theta_k} p_{i,k}) - bc}$$

Data Released in Paper

Table 2: Tax Rates and SDs for December 2011

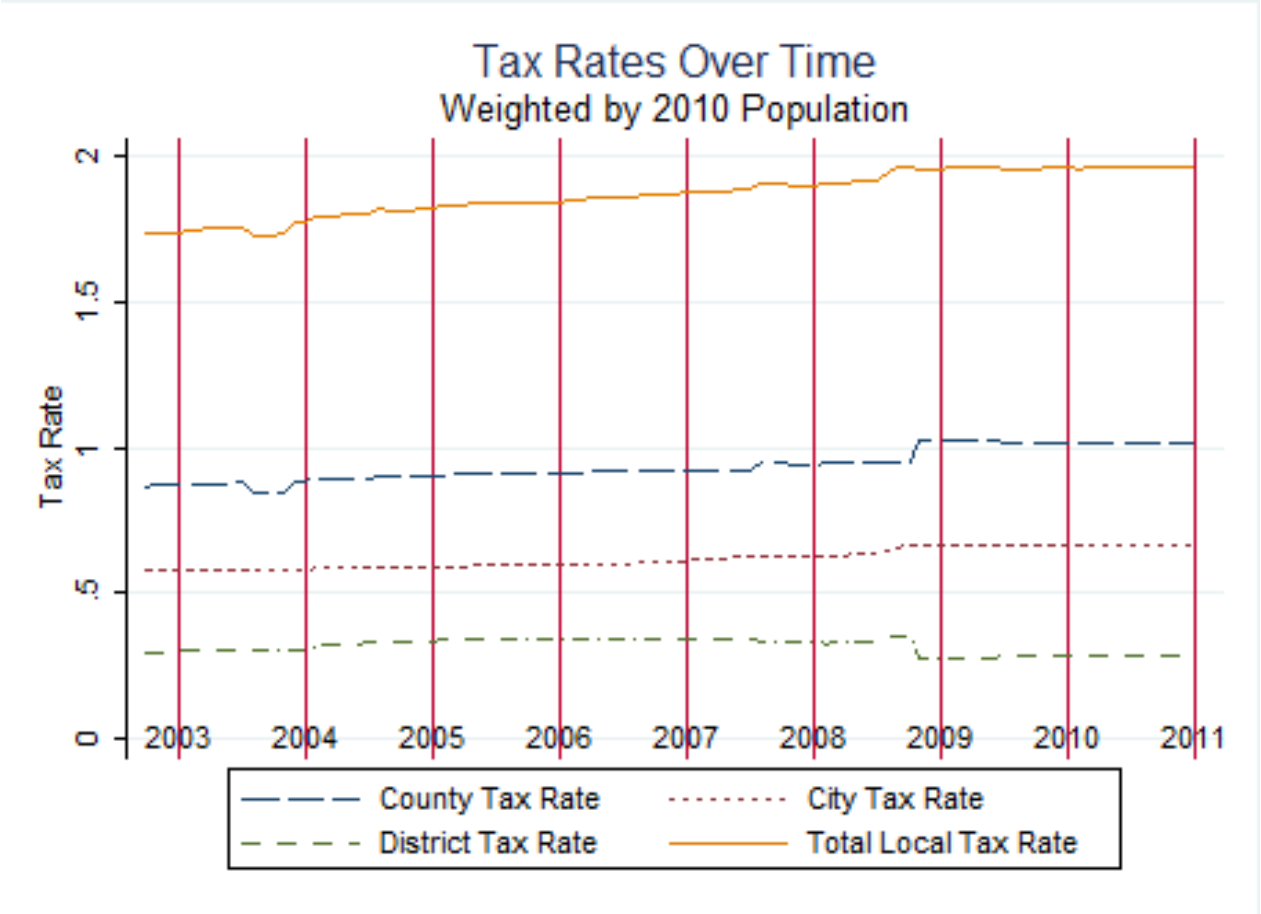
State	State Rate	Total Local	County	Town	District	sd(Total Local)	sd(County)	sd(Town)	sd(District)
Alabama	4	3.999	1.603	2.189	0.206	1.528	0.986	1.674	0.415
Alaska	0	1.155	0.56	0.595	0	2.05	1.396	1.519	0
Arizona	6.6	2.307	0.698	1.609	0	0.856	0.191	0.832	0
Arkansas	6	2.123	1.216	0.907	0	0.95	0.539	0.841	0
California	6.25	1.864	1	0.059	0.806	0.541	0	0.181	0.534
Colorado	2.9	4.012	0.719	2.502	0.792	1.431	0.606	1.434	0.543
Connecticut	6.35	0	0	0	0	0	0	0	0
Delaware	0	0	0	0	0	0	0	0	0
District of Columbia	6	0	0	0	0	0	0	0	0
Florida	6	0.647	0.647	0	0	0.467	0.467	0	0
Georgia	4	2.827	2.784	0.043	0	0.479	0.412	0.204	0
Hawaii	4	0.35	0.35	0	0	0.229	0.229	0	0
Idaho	6	0.019	0.013	0.006	0	0.117	0.078	0.088	0
Illinois	6.25	2.007	0.649	0.732	0.625	1.206	0.576	0.563	0.44
Indiana	7	0	0	0	0	0	0	0	0
Iowa	6	0.796	0.788	0.008	0	0.397	0.403	0.085	0
Kansas	6.3	1.836	1.036	0.789	0.011	0.708	0.354	0.664	0.045
Kentucky	6	0	0	0	0	0	0	0	0
Louisiana	4	4.666	2.243	1.747	0.676	0.64	2.11	2.283	1.347
Maine	5	0	0	0	0	0	0	0	0
Maryland	6	0	0	0	0	0	0	0	0
Massachusetts	6.25	0	0	0	0	0	0	0	0
Michigan	6	0	0	0	0	0	0	0	0
Minnesota	6.875	0.276	0.034	0.118	0.124	0.294	0.069	0.231	0.125
Mississippi	7	0.003	0	0.003	0	0.027	0	0.027	0
Missouri	4.225	3.223	1.306	1.528	0.389	0.845	0.477	1.07	0.534
Montana	0	0	0	0	0	0	0	0	0
Nebraska	5.5	1.049	0.002	1.047	0	0.655	0.032	0.657	0
Nevada	4.6	3.328	3.289	0	0.039	0.326	0.361	0	0.091
New Hampshire	0	0	0	0	0	0	0	0	0
New Jersey	7	0	0	0	0	0	0	0	0
New Mexico	5.125	2.163	0.26	1.838	0.064	0.967	0.449	1.19	0.182
New York	4	4.477	2.228	1.996	0.252	0.482	2.003	2.204	0.176
North Carolina	4.75	2.103	2.055	0	0.048	0.165	0.103	0	0.148
North Dakota	5	1.257	0.135	1.122	0	0.914	0.223	0.832	0
Ohio	5.5	1.279	1.263	0	0.015	0.445	0.455	0	0.118
Oklahoma	4.5	3.427	0.721	2.706	0	1.351	0.559	1.526	0
Oregon	0	0	0	0	0	0	0	0	0
Pennsylvania	6	0.337	0.337	0	0	0.681	0.681	0	0
Rhode Island	7	0	0	0	0	0	0	0	0
South Carolina	6	1.172	0.261	0.269	0.642	0.854	0.436	0.507	0.629
South Dakota	4	1.673	0	1.521	0.152	0.93	0	0.831	0.716
Tennessee	7	2.421	2.39	0.031	0	0.241	0.318	0.244	0
Texas	6.25	1.596	0.13	1.037	0.429	0.656	0.22	0.672	0.438
Utah	4.7	1.968	1.071	0.324	0.573	0.29	0.471	0.468	0.286
Vermont	6	0.16	0	0.16	0	0.339	0	0.339	0
Virginia	4	1	0.693	0.307	0	0	0.461	0.461	0
Washington	6.5	2.233	0.277	1.728	0.228	0.59	0.553	1.085	0.542
West Virginia	6	0.002	0	0.002	0	0.04	0	0.04	0
Wisconsin	5	0.425	0.373	0	0.053	0.2	0.218	0	0.106
Wyoming	4	1.418	1.418	0	0	0.72	0.72	0	0
US	5.508	1.602	0.827	0.542	0.234	1.475	1.06	1.116	0.454

The first five numerical columns presents the weighted average of the state, total local (county + town + district), county, town, and district tax rates. The final four columns presents the weighted standard deviations of these rates within a state. All population weights are from the 2010 ACS.

National Time Series

Fact 1

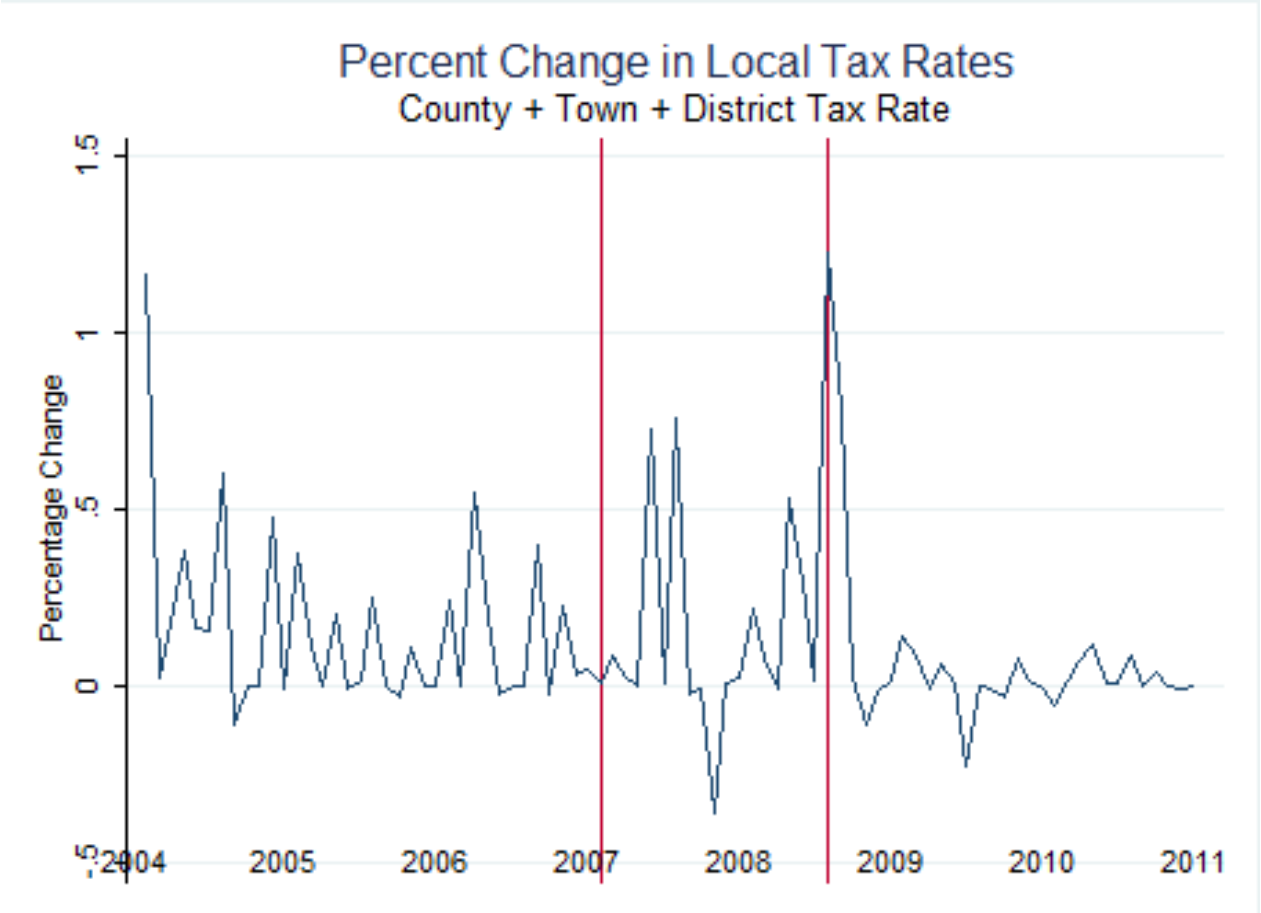
Local sales tax rates have increased over the last decade. The percentage change of local sales tax rates – driven mostly by increases in county and town tax rates – has exceed the percentage change in state tax rates.



National Time Series

Fact 2

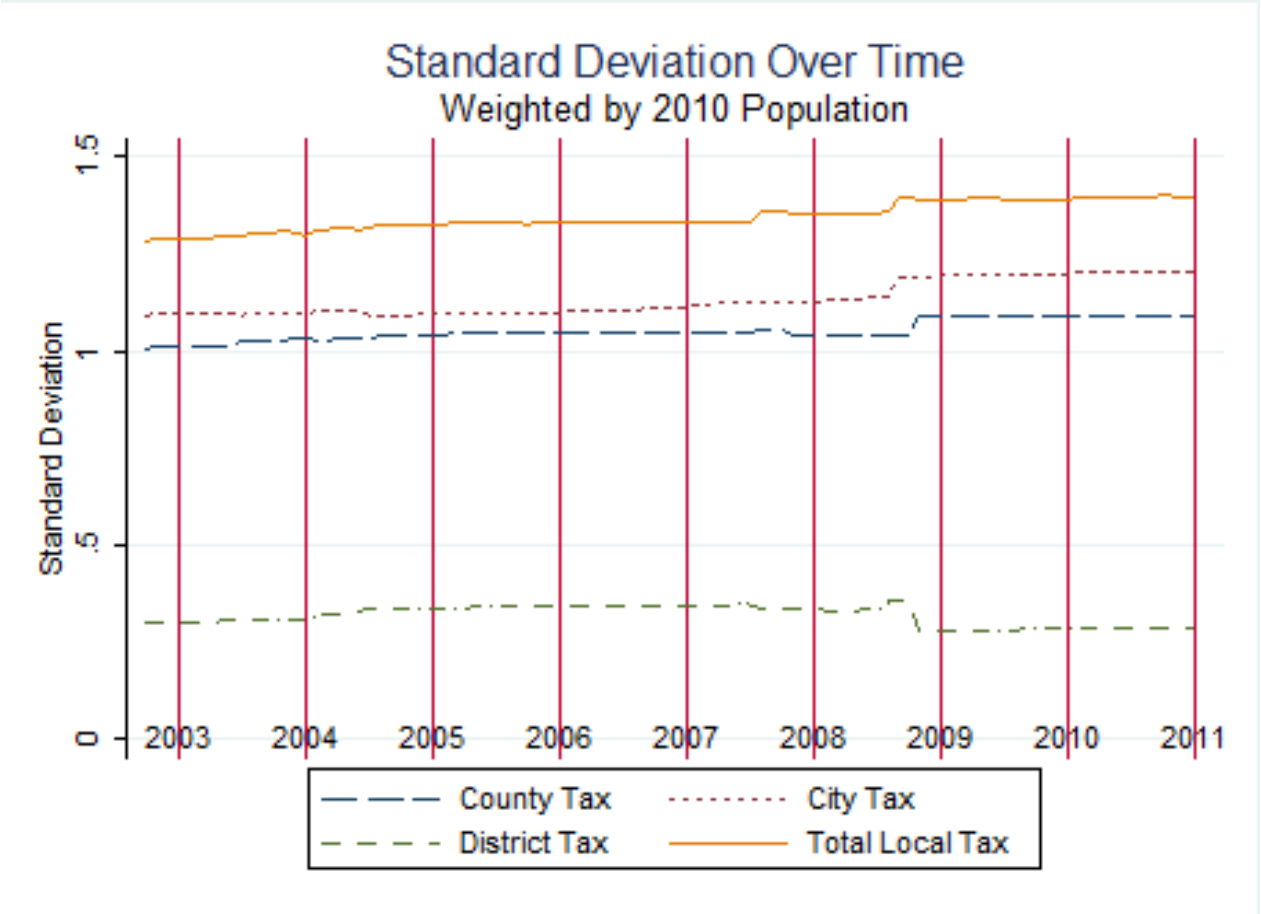
Local sales tax rates have been more stable in the months following the Great Recession than they were prior to or during the recession.



National Time Series

Fact 3

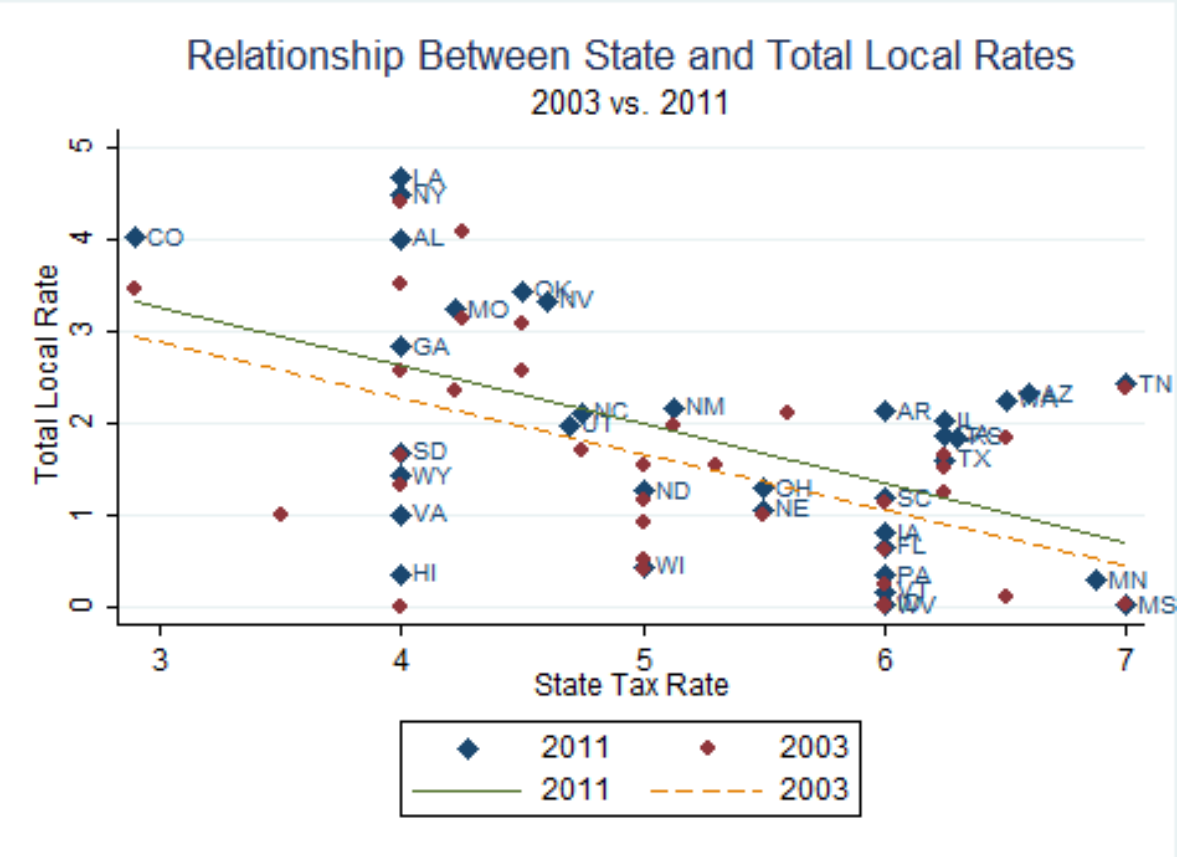
The dispersion of local sales tax rates has increased over time. The dispersion in county and city tax rates increased at the same rate. The dispersion in district tax rates has not changed much overtime.



Cross-State Comparisons

Fact 4

Local tax rates are higher in low-tax states than local tax rates in high-tax states.

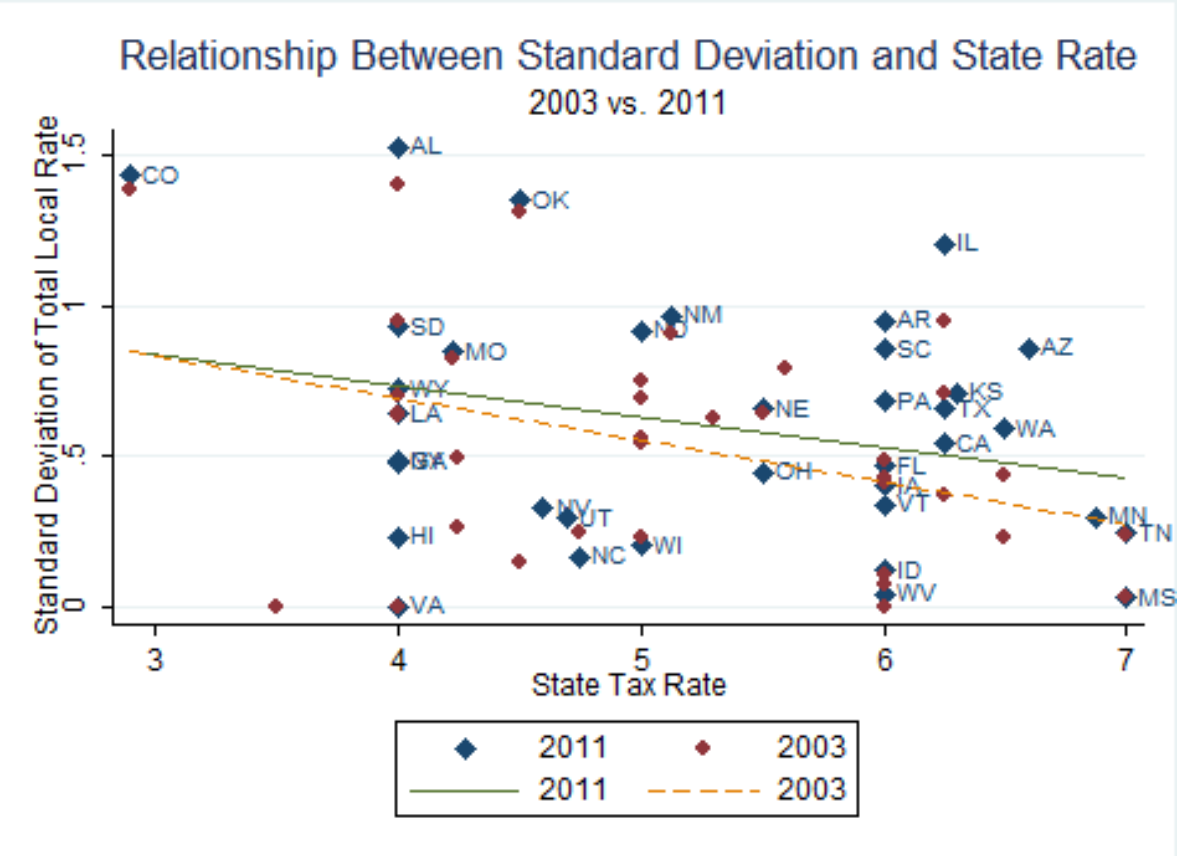


$$2011: \quad y = 5.18 - .64x \quad (p = .002)$$
$$2003: \quad y = 4.70 - .61x \quad (p = .003)$$

Cross-State Comparisons

Fact 5

The dispersion of local sales tax rates is greatest in states with low-sales tax rates at the state level and in states with high average local tax rates.

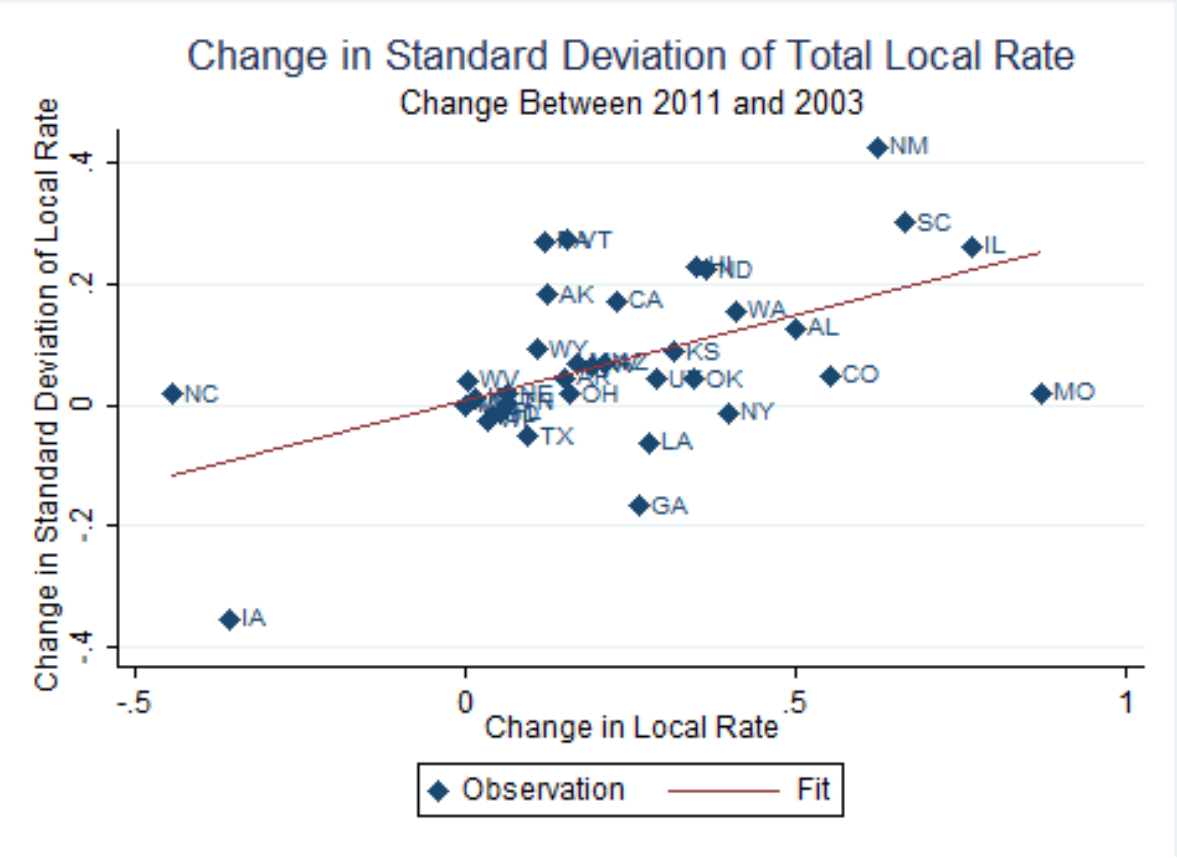


$$2011: \quad y = 1.15 - .10x \quad (p = .122)$$
$$2003: \quad y = 1.25 - .14x \quad (p = .041)$$

Cross-State Comparisons

Fact 6

The dispersion of local sales tax rates has increased the most in states where local tax rates increased the most.

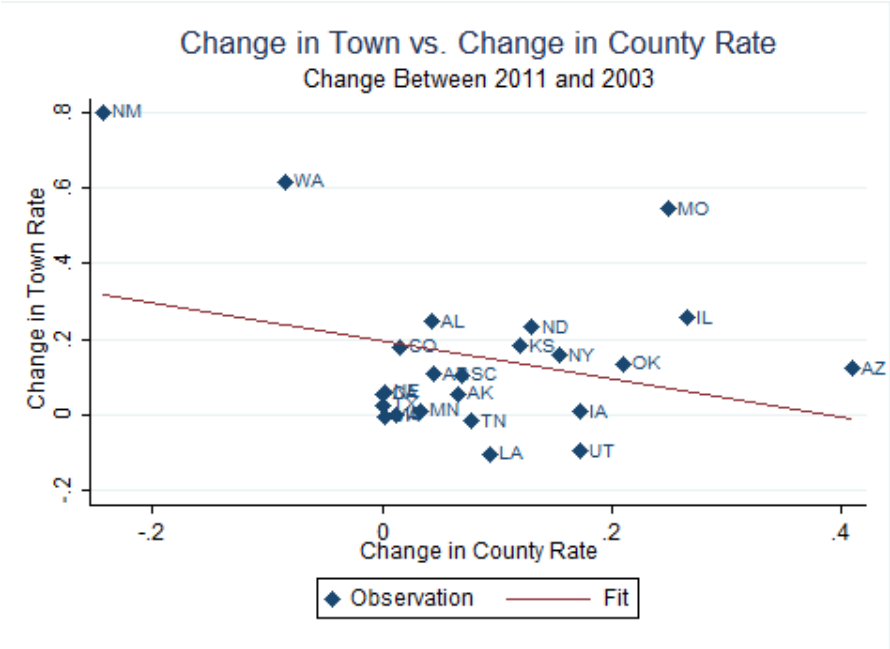


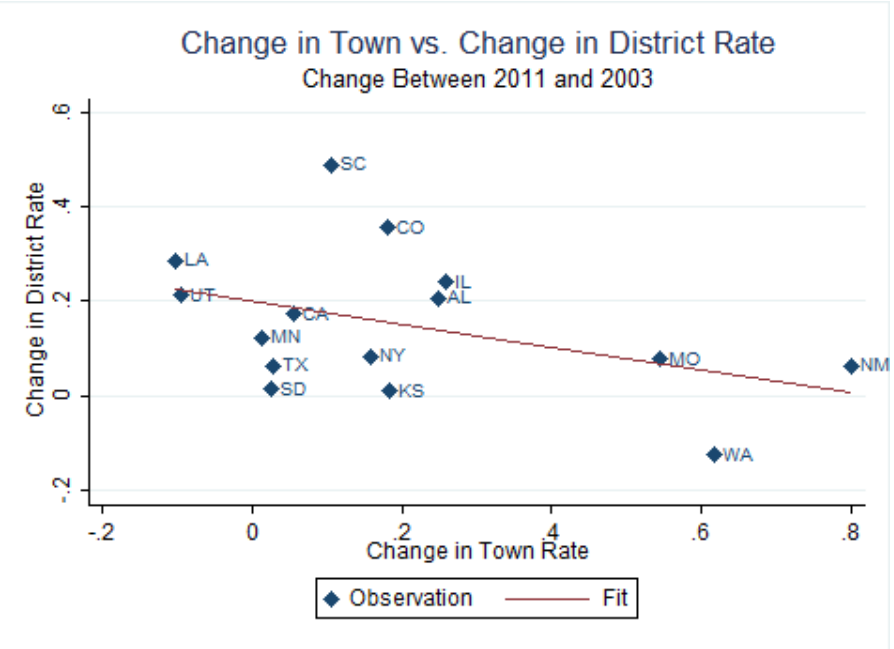
$$y = .01 + .28x \quad (p = .012)$$

Cross-State Comparisons

Fact 7

Changes in municipal tax rates and changes in county tax rates are negatively related. Changes in municipal tax rates and changes in district tax rates are negatively related.



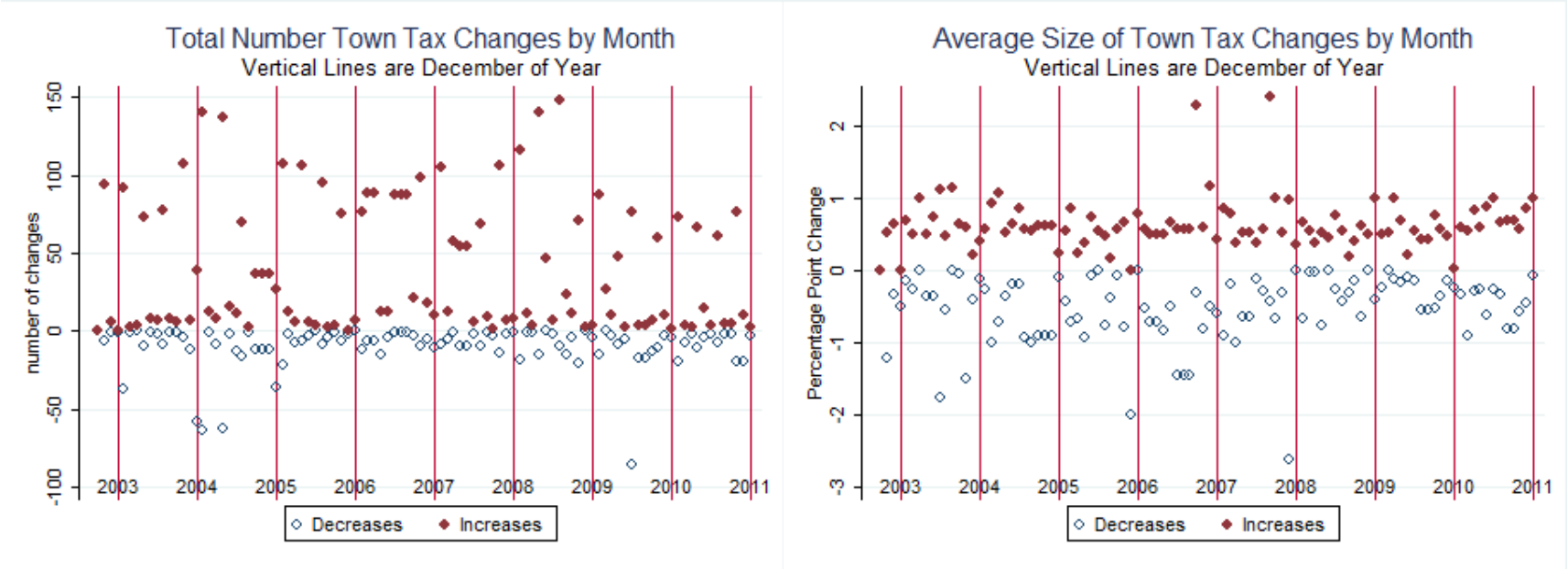


$$y = .20 - .50x \quad (p = .364) \qquad y = .20 - .24x \quad (p = .044)$$

Dynamics

Fact 8

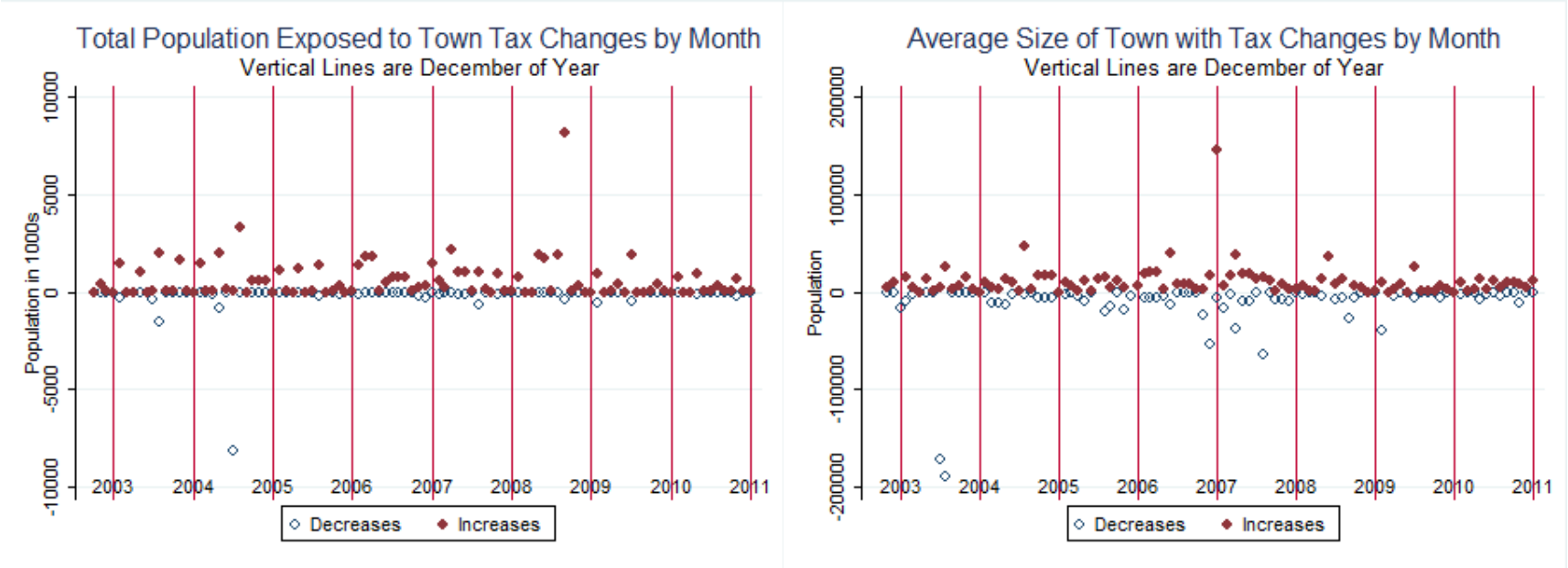
Over the period 2003 to 2011 approximately 25% of towns in states with LOST change their municipal tax rate. Approximately 2/3 of counties change their tax rates over the same period. Approximately 35% of county tax rate changes are decreases in the tax rate and approximately 20% of town tax rate changes are decreases.



Dynamics

Fact 9

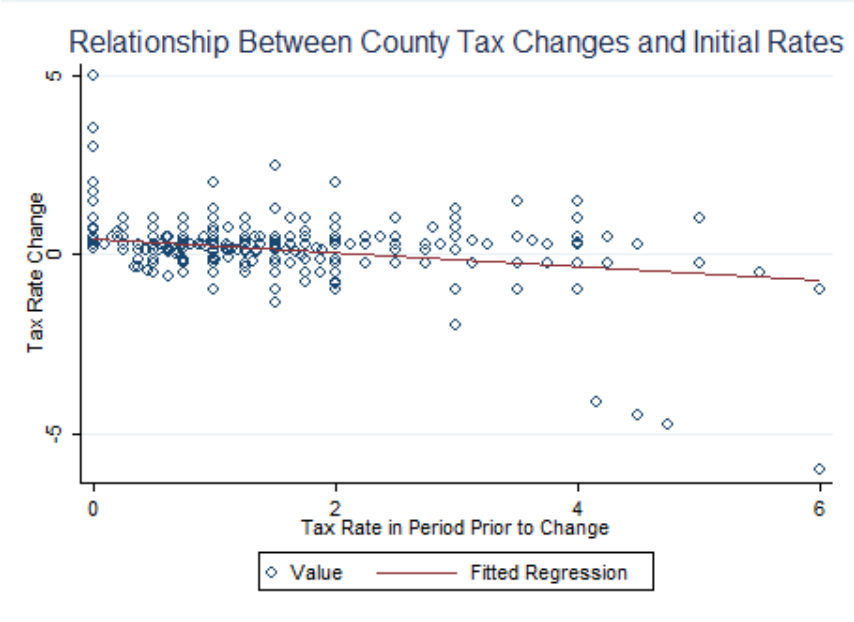
Although the number of tax rate changes is relatively small, tax rate changes disproportionately occur in large towns and counties, which implies that a large fraction of the United States population gets exposed to changes in LOST in a given year.

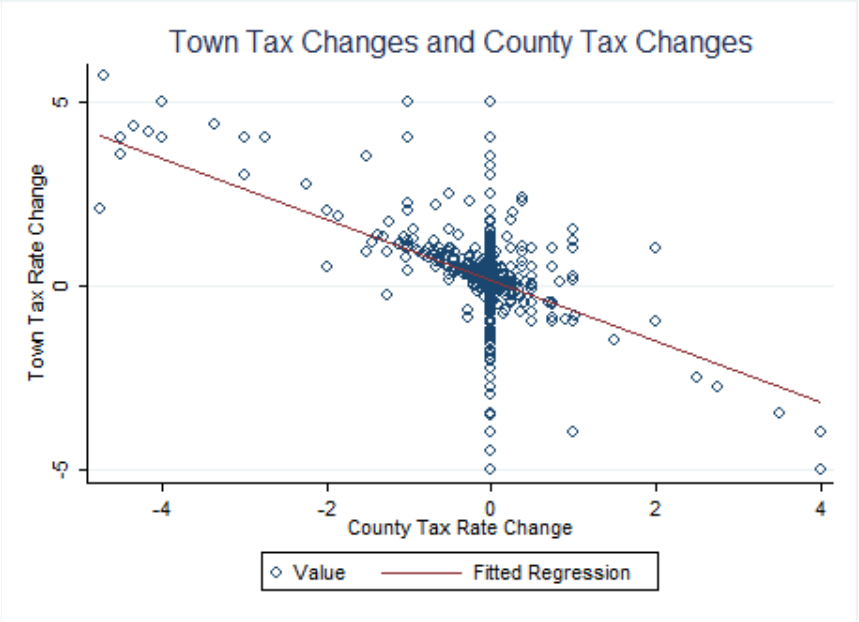


Dynamics

Fact 10

When towns lower their tax rate, counties often contemporaneously increase their tax rate; when towns increase their tax rate, counties of decrease their tax rate.





$$y = .44 - .19x \quad (p = .00) \qquad y = .14 - .83x \quad (p = .00)$$

A Tax Competition Application: Tax Systems

- Traditionally, it is assumed that states select their state tax rate in competition with other states.
- But, what if states do not choose the state tax rate, but rather the tax system as a whole?
- In the U.S. Supreme Court ruling *Clinton v. Cedar Rapids and the Missouri River Railroad*, the Court wrote that:

  "Municipal corporations owe their origin to, and derive their powers and rights wholly from, the legislature. It breathes into them the breath of life, without which they cannot exist. As it creates, so may it destroy. If it may destroy, it may abridge and control."

A Tax Competition Application: Tax Systems

- I raise the principle underlying Dillon's Rule to simply motivate the premise that although most state governments do not dictate the level of LOST rates, they do control whether or not municipalities and counties are allowed to set local tax rates; other state restrictions on LOST also may implicitly dictate the level of local rates in the state.
- Through these constraints, states can dictate whether or not the average municipal tax rate in a state will be high or low – or in states that prohibit LOST, that it will be zero.
- This would suggest that a state is not only picking its state tax rate in competition with its neighbors, but rather, its total effective tax rate for an average consumer in its state.

A Tax Competition Application: Tax Systems

$$\tau_{it} = \alpha + \delta\tau_{it-1} + \rho\sum_{j=1}^{N} w_{ij}\tau_{it} + \sum_{k=1}^{K} x_{itk}\beta_k + \sum_{k=1}^{K}\sum_{j=1}^{N} w_{ij}x_{jtk}\mu_k + \zeta_i + \gamma_t + \varepsilon_{it}$$

where

$$w_{ij} = \begin{cases} \frac{1}{m_i} & \text{if } j \in M_i \\ 0 & \text{if } j \notin M_i \end{cases}$$

A Tax Competition Application: Results

	Without ACS Controls: Full Sample				With ACS Controls: Sample Starts in 2005			
	State Tax Rate		Total Tax Rate		State Tax Rate		Total Tax Rate	
	(1')	(2')	(3')	(4')	(5')	(6')	(7')	(8')
ρ: spatial lag coefficient	.109***	.074***	.068***	.072***	.107***	.069***	.063***	.068***
	(.006)	(.010)	(.011)	(.011)	(.014)	(.013)	(.014)	(.014)
δ: time lag coefficient	.949***	.948***	.953***	.948***	.933***	.930***	.938***	.934***
	(.006)	(.008)	(.007)	(.007)	(.007)	(.010)	(.008)	(.007)
tax rate at lower level		-.033*		.039***		-.044*		.051***
		(.030)		(.012)		(.025)		(.020)
neighbor tax at lower level		.023		.039		.038		.080*
		(.030)		(.030)		(.046)		(.048)
Number of Observations	4851	4851	4851	4851	3479	3479	3479	3479
R^2	.996	.996	.997	.998	.341	.277	.381	.458

Conclusion

- This aggregated data created in this paper should be useful to researchers who
  - (1) seek to more accurately measure the average tax differential at state borders,
  - (2) wish to more accurately measure state variation in tax policy over time and across states,
  - (3) desire to create more accurate price indexes that included state and local tax rate burdens, and
  - (4) seek to better understand the time paths and dynamics of local tax setting behavior and competition.

Future Work

- Dynamic tax competition and sales taxes?
- Business cycles and sales taxes?