

# The Relationship between Taxes and Economic Growth among the 20 Largest Manufacturing States

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# Outline

- Objectives
- Empirical Strategy
- Study Region and Data
- Preliminary Findings
- Conclusion
- Next Steps

# Objectives

Is there statistical evidence to suggest a relationship between business taxes and economic growth?

- Existing research suggests that a ten percent decrease in taxes would cause a one to six percent increase in state economic growth.
- Existing research used average taxes when businesses are concerned with marginal taxes.
- We model the growth in value added for 15 manufacturing industries in the 20 largest manufacturing states as a function of product demand, worker wages, and the marginal business tax rates estimated from the representative firm method described in Peters and Fisher (2002 and 2004).

# Empirical Strategy

## Aggregated Model

$$1) \ln Y_{s,m,2000} - \ln Y_{s,m,1989} = \mathbf{X}_s \boldsymbol{\beta}_x + u_s$$

$$2) \ln Y_{s,m,2000} - \ln Y_{s,m,1989} = \mathbf{X}_s \boldsymbol{\beta}_x + \rho \mathbf{W} (\ln Y_{s,m,2000} - \ln Y_{s,m,1989}) + u_s$$

$$3) \quad \quad \quad u_s = \lambda \mathbf{W} u + \boldsymbol{\varepsilon}_s$$

## Industry Model

$$4) \ln Y_{i,s,2000} - \ln Y_{i,s,1989} = \mathbf{X}_{i,s} \boldsymbol{\beta}_x + F_i + u_{i,s}$$

$$5) \ln Y_{i,s,2000} - \ln Y_{i,s,1989} = \mathbf{X}_{i,s} \boldsymbol{\beta}_x + F_i + F_s + u_{i,s}$$

$$6) \quad \quad \quad u_{i,s} = v_s + \boldsymbol{\varepsilon}_{i,s}$$

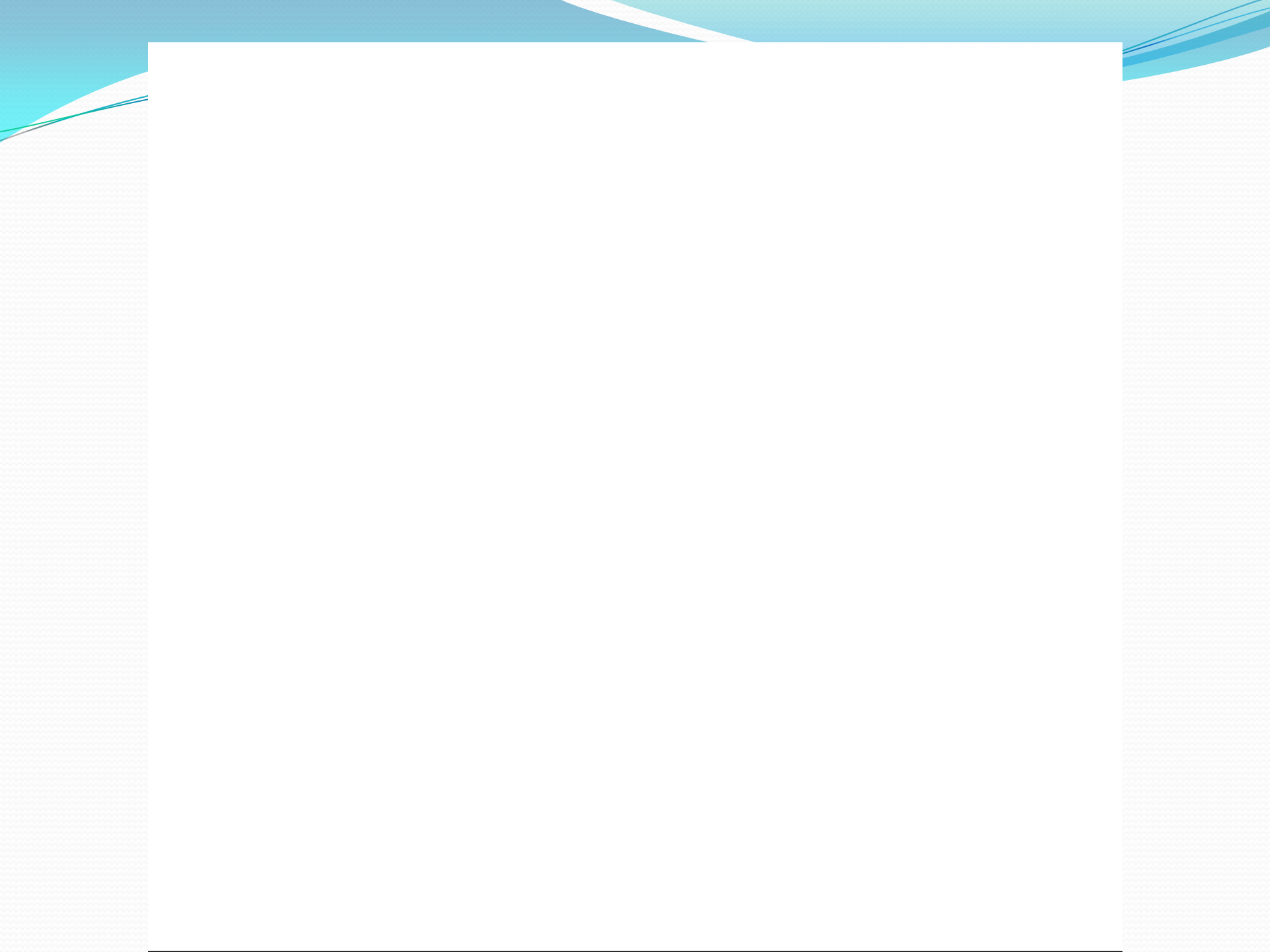
# Variables

## Dependent Variables ( $\ln y_{s,2000} - \ln y_{s,1989}$ )

Natural log of growth in industry value added 1989-2000 for industry models or manufacturing value added for aggregate models  
( $\ln growth_{s,2000}$ )

## Independent Variables ( $\mathbf{X}_{i,s}$ )

1. Natural log of expected state industry value added in 2000 given growth in national industry value added 1989 to 2000 ( $\ln shift_{i,s}$ )
2. Predicted natural log wage index for 1990 ( $\ln wage_{i,s}$ )
3. Natural log of marginal business tax rate in 1990 ( $\ln taxrate_{i,s}$ )



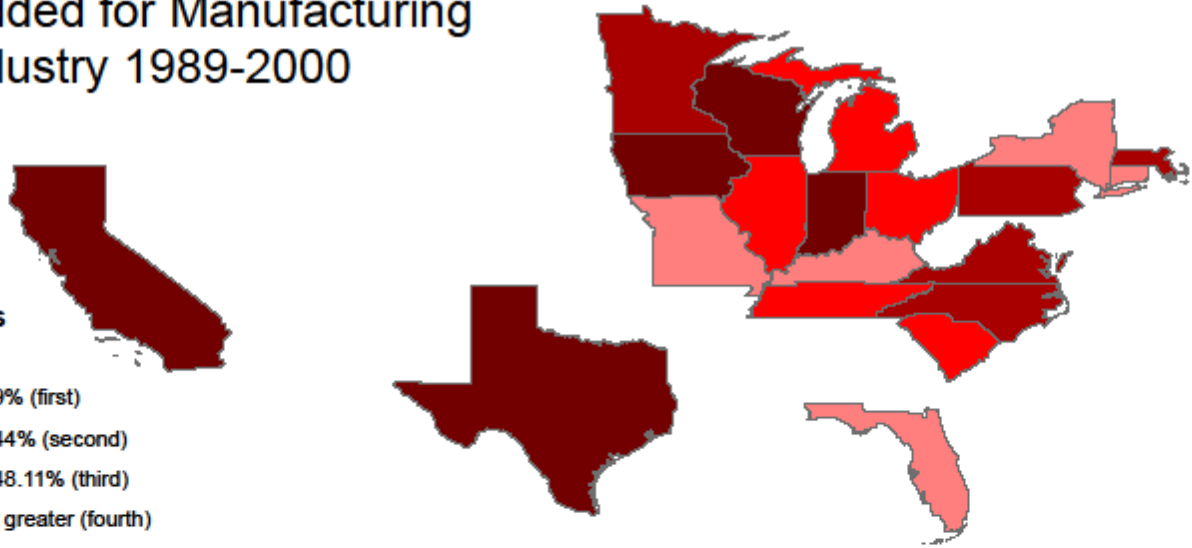
## Value Added for Manufacturing Industry 1989-2000

### Legend

#### United States

#### Value Added

- 0% - 20.99% (first)
- 21% - 29.44% (second)
- 29.45% - 48.11% (third)
- 48.12% or greater (fourth)



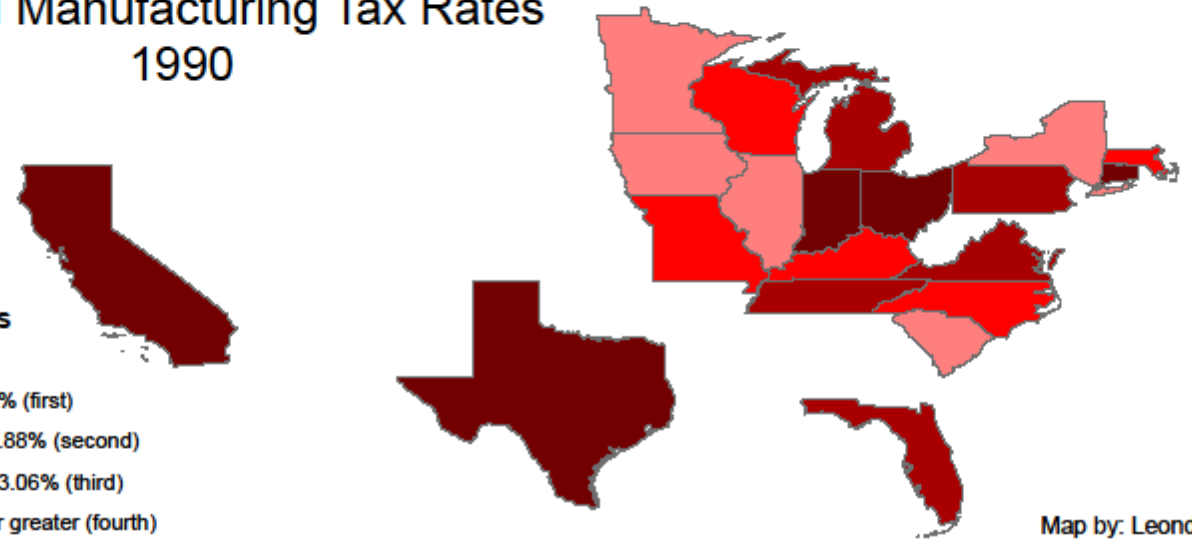
## Marginal Manufacturing Tax Rates 1990

### Legend

#### United States

#### Tax Rate

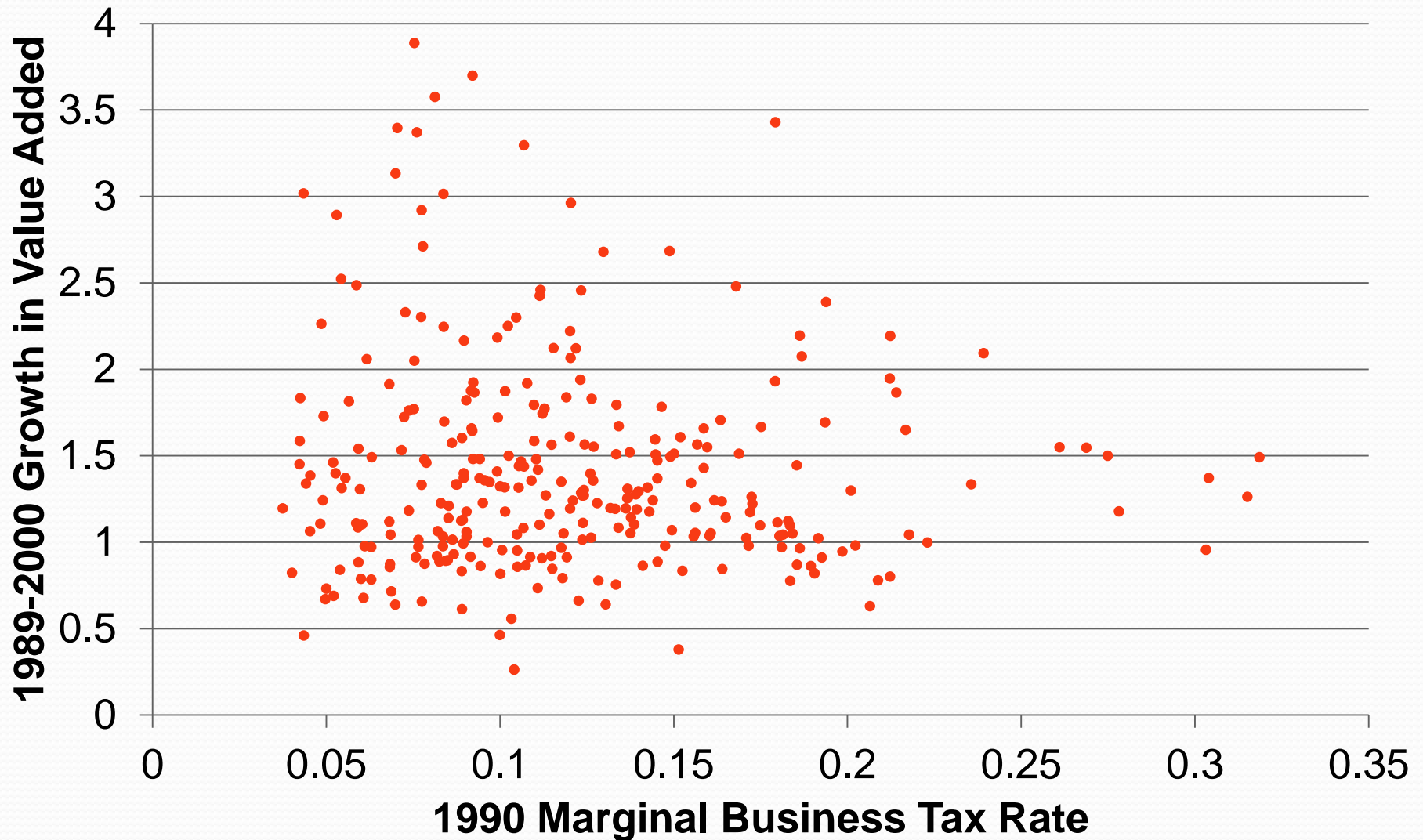
- 0% - 5.27% (first)
- 5.28% - 9.88% (second)
- 9.89% - 13.06% (third)
- 13.07% or greater (fourth)



Map by: Leondra S. Lawson

# 300 State-Industry Combinations

## Taxes and Growth



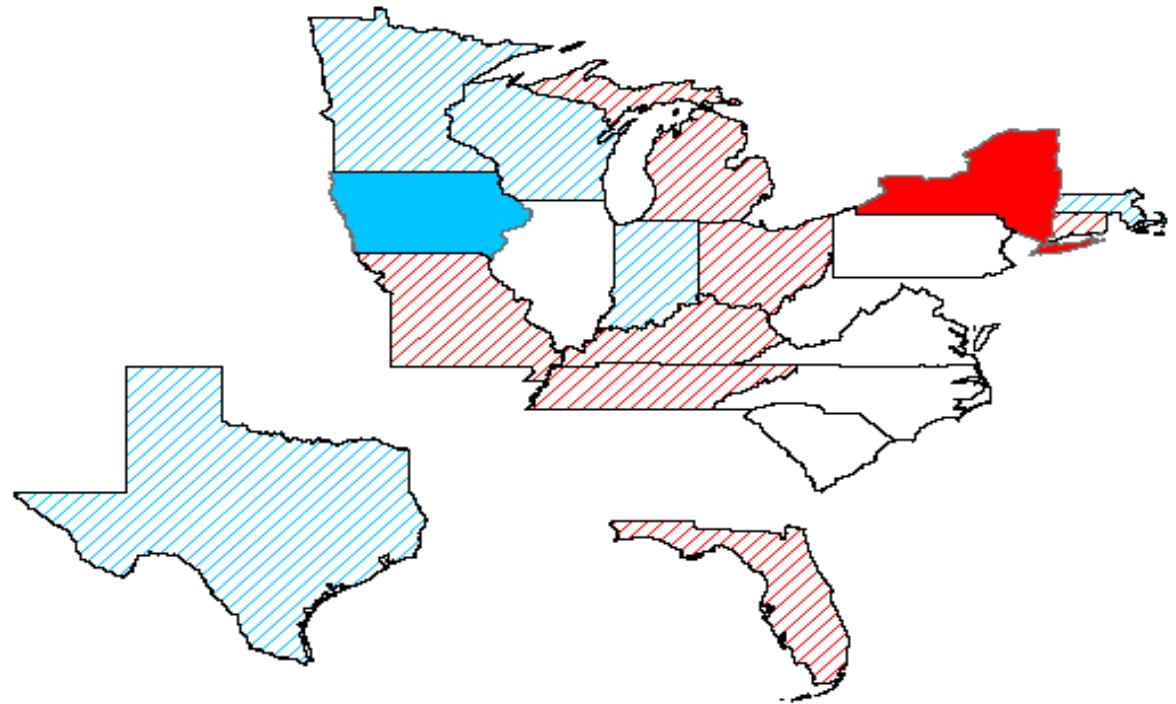




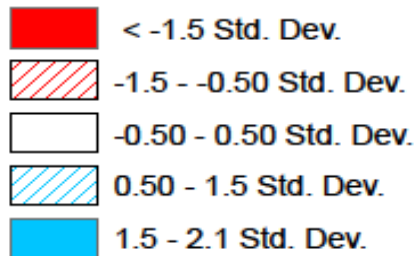
# Preliminary Findings

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	<b>Model 5</b>	<b>Model 6</b>
constant	-0.0601 (3.03532)	0.1206 (2.6999)	-0.0246 (2.6473)	1.2665 (0.6796)	1.6530 (0.9573)	1.3826 (0.7153)
$\ln shift_{i,s}$	0.0394 (0.0675)	0.0403 (0.0598)	0.0399 (0.0607)	-0.0383 (0.0241)	-0.0847 (0.0322)*	-0.0598 (0.0275)*
$\ln wage_{i,s}$	0.0757 (1.0971)	0.0323 (0.9720)	0.0541 (0.9563)	-0.2481 (0.2464)	-0.1671 (0.2800)	-0.2149 (0.2551)
$\ln taxrate_{i,s}$	0.1287 (0.1086)	0.1213 (0.0963)	0.1228 (0.0983)	0.0534 (0.0505)	0.0967 (0.1847)	0.0693 (0.0729)
$\rho$	n/a	-0.3581 (0.6589)	n/a	n/a	n/a	n/a
$\lambda$	n/a	n/a	-0.2181 (0.6280)	n/a	n/a	n/a
Industry fixed effects	n/a	n/a	n/a	yes	yes	yes
State fixed effects	n/a	n/a	n/a	no	yes	no
State random effects	n/a	n/a	n/a	no	no	yes
AIC/ (Pseudo) R <sup>2</sup>	AIC=-11.179	AIC=-9.4	AIC =-9.2698	R <sup>2</sup> =0.5107	R <sup>2</sup> =0.5869	R <sup>2</sup> =0.5369

# Residuals

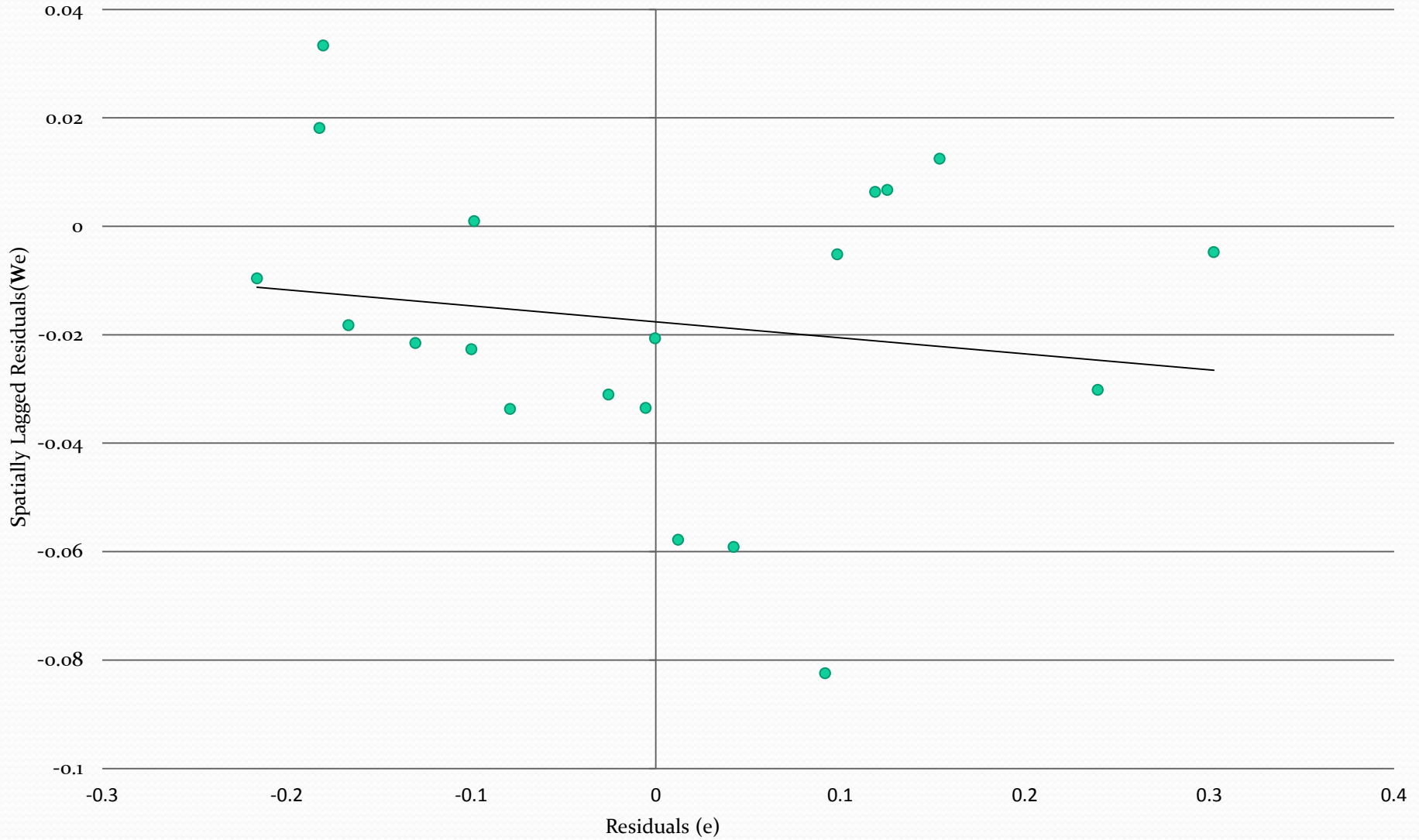


## Residuals



Map by: Leondra S. Lawson

# Spatial Autocorrelation



# Conclusion/Next Steps

- $H_0$ : taxes have no effect on growth
- Unable to reject  $H_0$
- We expect that the estimators are biased due to not accounting for public services such as education that are valued by firms.
- There also may be the possibility that in contrast to the assumption that taxes affect growth, growth may be influencing the tax rates.
- Instrumental Variables Estimator



**Thank You!!!**