Impacts of Taxes on Firm Entry Rates along State Borders

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Midwest Econ Associaton
April 1st, 2016

Introduction & Motivation

- Do changes in tax and regulatory policy impact firm entry?
- Do firms have preferences for government provided amenities?
- Changing tax rates are a major policy lever for state officials looking to impact the economy, or raise tax revenue. Understanding these impacts are invaluable, especially for states that face balanced budget requirements, such that understanding the estimated dynamic effects of these changes is very important.
    - Two examples are tax cuts done by Gov. Brownback of Kansas, who expected large growth returns to tax cuts, but revenue hasn't recouped itself fast enough, and now requires massive restructuring of the budget. Alternatively, Sen. Bernie Sanders' requires raising new tax revenue to fund a variety of plans, but might impose large costs on the economy.

Addition to the Literature

Our motivation

- We add to the literature by using the longest array of top marginal tax rates used to date and buld on top of current regression discontinuity approaches.
  - This accounts for joint tax policy changes that policy makers may do to shif tax burdens around, as well as changes in tax policy aimed at affecting state revenue
- Many papers do not include marginal tax rates, where theory indicates firms and individuals respond to marginal rates when making entry decisions.
  - Economic theory shows that marginal rates enter into the first order conditions of firms and individuals looking on optimal location choice.

Literature Review

- Early papers used conditional logit models to estimate firm entry across all counties. Often found positive relationship between taxes and firm entry rates. Carlton (1979, 1983), Schmenner (1975, 1982).
- Modern papers have started to use border discontinuity effects to look at impacts of policies on firm entry rates. Chirinko and Wilson (2008), Rathelot and Sillard (2008), Duranton et al (2011), Rohlin, Rosenthal, and Ross (2014)
- Across all papers there has been a variety of taxes used.
  - Carlton (1983) used weighted top marginal tax corporate and income tax rates, and a second term for property tax rates.
  - Schmenner (1987) uses state and local property tax revenues per dollar of personal income.
  - Helms (1985) used a budget constraint to estimate the impacts of rising tax revenue on explanatory variables.

Data

- Total number of firm start ups in every continental US county
- Seven different state top marginal tax rates
  - property, income, capital gains, sales, corporate, workers compensation, unemployment insurance
- Log state expenditures per capita on education, highways, and welfare
- Scaled county geographic amenities: Pct of area that is water, average humidity in july, average temperature in january, topology score
- Additional (state level) Controls: County level real fuel prices, pct with high school education, population density, pct unionized, pct manufacturing

Regression Discontinuity Model pt I

- Naive estimation of firm entry decisions over all available counties doesn't account for policy changes that occur with respect to current economic behavior. High performing states may increase taxes to raise revenue, and low performing states may cut taxes to increase growth rates. This upwards biases traditional estimates.
- By assuming that state policy does not respond to shocks along state borders, we take the difference in matched county pairs along state pair borders. This controlls for shared macroeconomic shocks that occur on both sides of the border, as well as local economic shocks that are continuous around the border.

Regression Discontinuity Model pt II

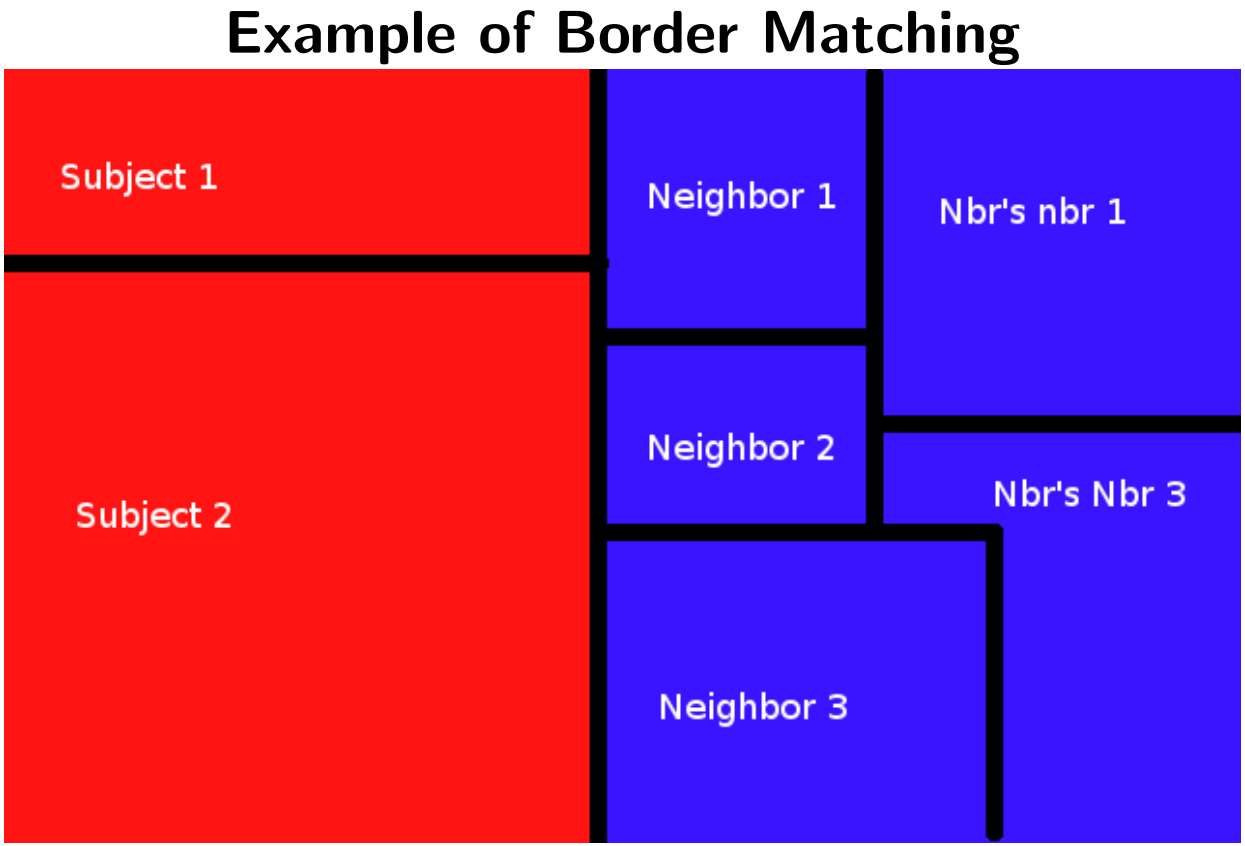


Figure : Red rectangles are subject counties, and blue are neighbor counties. In this example Subject 1 would be only matched to Neighbor 1, while "Subject 2" would be paired with Neighbor 1-3. Similarly, when we broaden the bandwidth, Subject 1 would be matched with Nbr's Nbr 1, whle Subject 2 would be paired

Regression Discontinuity Model pt III

- Assume for counties, we have local entry behavior defined by,

$$ln(n_{ijt}) = \gamma_j + X_{i,j,t-1}\beta + e_{ijt}$$

- n_{ijt} is the number of firms that entery in a county i in state j in time period t, γ is a constant, $X_{i,j,t-1}$ is a set of covariates with coefficient β, and e_{ijt} is a mean zero error term.
- Now define the variables

$$\ddot{ln}(n_{i,g,t}) = ln(n_{sub,A,t}) - ln(n_{nbr,B,t})$$

$$\ddot{x}_{g,t-1} = x_{A,t-1} - x_{B,t-1}$$

$$\ddot{\epsilon}_{i,g,t} = \epsilon_{sub,A,t} - \epsilon_{nbr,B,t}$$

Where i now indexes matched counties on either side of a state border. This leads to the differenced equation

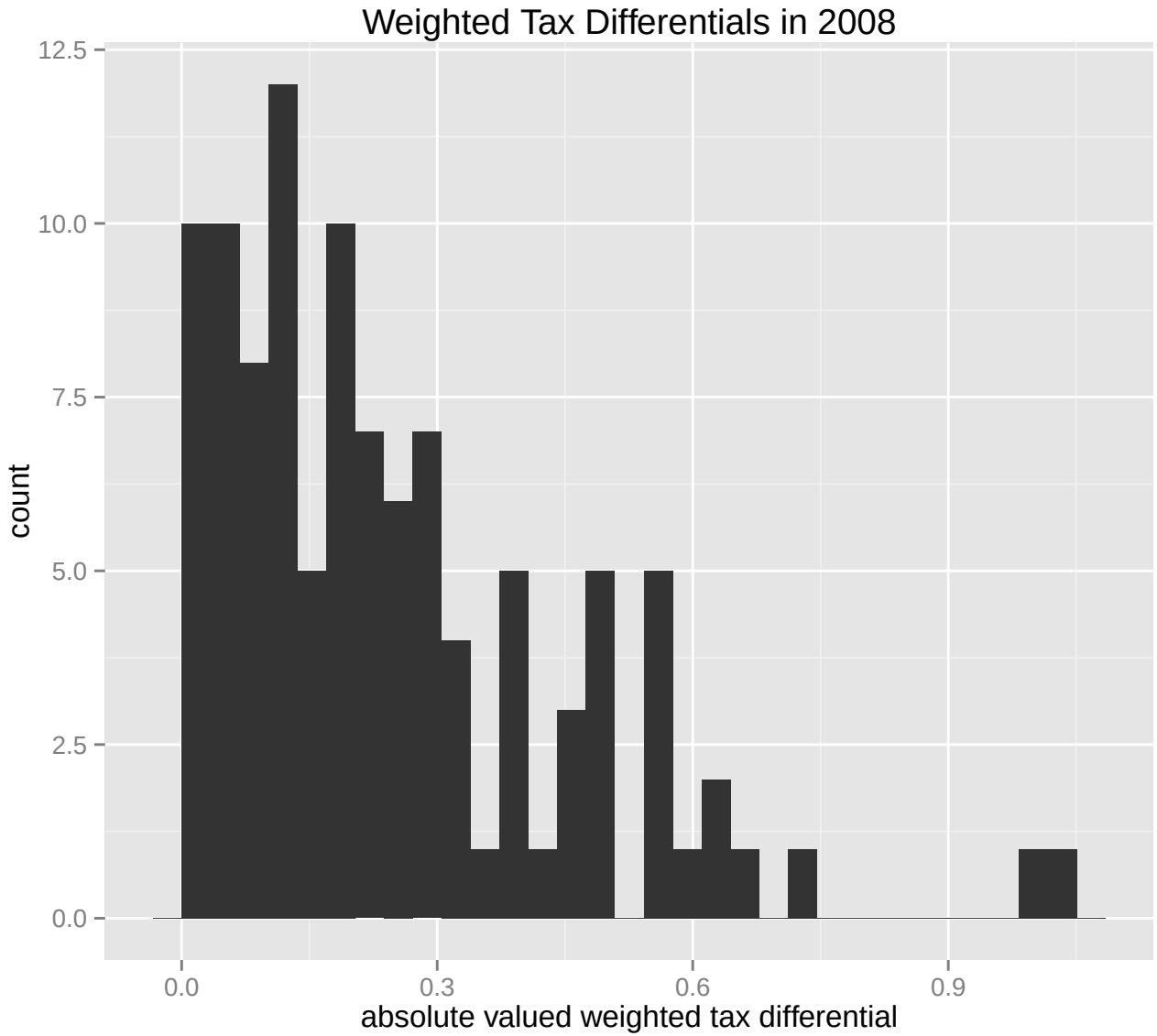
$$\ddot{ln}(n_{i,g,t}) = \gamma_A - \gamma_B + \ddot{X}_{g,t-1}\beta + \ddot{\epsilon}_{i,g,t} \quad (1)$$

RD Results

Table : Regression Discontinuity Models for Total Firm Births

	Dependent variable:			
	OLS	births ratio OLS	OLS	births_ratio FE
	(1)	(2)	(3)	(4)
Property Tax Difference	−0.206	−0.371**	−0.297**	0.027
	(0.151)	(0.147)	(0.150)	(0.122)
Income Tax Difference	−0.093***	−0.085***	−0.075***	−0.009
	(0.027)	(0.026)	(0.026)	(0.035)
Capital Gains Tax Difference	0.016	0.008	0.020	−0.002
	(0.023)	(0.023)	(0.024)	(0.012)
Sales Tax Difference	−0.112***	−0.101***	−0.087***	0.001
	(0.029)	(0.030)	(0.032)	(0.041)
Corp Tax Difference	0.023	0.018	0.011	−0.012
	(0.020)	(0.018)	(0.019)	(0.026)
Workers Comp Tax Difference	0.001	0.090	0.051	0.044
	(0.111)	(0.108)	(0.105)	(0.070)
Unemp. Tax Difference	0.008	0.012	−0.006	−0.002
	(0.040)	(0.036)	(0.038)	(0.017)
Educ Spending Per Cap Diff	−0.0002	−0.0003	−0.0002	−0.0002
	(0.0003)	(0.0003)	(0.0003)	(0.0002)
Highway Spending Per Cap Diff	0.0004	0.0004	0.0003	0.0001
	(0.0004)	(0.0004)	(0.0004)	(0.0002)
Welfare Spending Per Cap Diff	0.001**	0.001**	0.0004*	−0.00005
	(0.0003)	(0.0003)	(0.0003)	(0.0001)
Constant	−0.045	−0.055	−0.046	
	(0.084)	(0.086)	(0.087)	
controls	Yes	Yes	No	Yes
amenities	Yes	No	No	No

Some Comparisons: Weighted Tax Differentials



Some Comparisons Pt II

Table : Result Comparison for Estimated Firm Enry

mean firm entry	preffered side	abs weighted tax	preferred side	same?	sub state	nbr state
0.913	nbr	1.018	sub	diff	del.	new jersey
0.864	sub	0.998	sub	same	nh	vermont
0.477	sub	0.719	sub	same	maine	nh
0.033	sub	0.655	nbr	diff	nebraska	wyoming
0.219	nbr	0.637	nbr	same	delaware	pennsylvania
0.763	sub	0.636	sub	same	montana	north dakota
1.146	nbr	0.608	nbr	same	delaware	maryland
0.297	nbr	0.565	nbr	same	idaho	wyoming
0.295	nbr	0.558	nbr	same	california	oregon
1.743	sub	0.555	sub	same	colorado	kansas

Sensitivity Tests pt I

Table : Urban to Rural Estimates

	Dependent variable:			
	births ratio			
	In a MSA	Same MSA	Jointly Urban	Jointly Rural
	(1)	(2)	(3)	(4)
Property Tax Difference	−0.339	−0.153	−0.205	−0.390**
	(0.418)	(0.614)	(0.215)	(0.174)
Income Tax Difference	−0.183***	−0.309***	−0.124***	−0.041
	(0.068)	(0.097)	(0.042)	(0.039)
Capital Gains Tax Difference	0.117*	0.228***	0.074*	−0.019
	(0.063)	(0.077)	(0.039)	(0.026)
Sales Tax Difference	−0.132	−0.253***	−0.125***	−0.069
	(0.086)	(0.086)	(0.048)	(0.053)
Corp Tax Difference	0.020	0.031	−0.037	0.058**
	(0.048)	(0.073)	(0.028)	(0.026)
Workers Comp Tax Difference	0.425**	0.438	0.149	−0.109
	(0.182)	(0.293)	(0.131)	(0.163)
Unemp. Tax Difference	0.098*	0.084	0.031	−0.070
	(0.060)	(0.062)	(0.048)	(0.054)
Educ Spending Per Cap Diff	−0.001	−0.0004	−0.0001	−0.001*
	(0.001)	(0.001)	(0.0004)	(0.0004)
Highway Spending Per Cap Diff	−0.002*	−0.001	−0.00002	0.001**
	(0.001)	(0.001)	(0.001)	(0.001)
Welfare Spending Per Cap Diff	0.0001	−0.0001	0.0002	0.001*
	(0.001)	(0.001)	(0.0003)	(0.0004)
Constant	−0.248	−0.507*	−0.329***	0.381***
	(0.214)	(0.261)	(0.113)	(0.101)
Observations	2,223	1,383	8,180	4,935
R^2	0.117	0.168	0.050	0.089

Note: *p<0.1; **p<0.05; ***p<0.01

All models are estimated with Ordinary Least Squares and clustered standard errors at the state-pair level.

Similarly estimated models...

- ...for different two-digit NAICS industry codes
- ...for each year in our sample
  - Sales and property taxes remain negative and significant over all time periods. Income taxes start negative but insignificant, and become more negative and significant as time went on
- ...for differerent match lengths
  - We expected the impacts of taxes to go away as we matched counties further away from the border, as location specific terms would be a bigger driver of firm entry decisions
  - all our tax variables become insignificant in these models

Conclusion

Going back to our original two research questions, we see that:

- Property, sales, and income taxes across most specifications besides for our interaction term regressions.
- Property tax rates have a relatively high elasticity, where a 1% increase in relative property tax rates corresponds to a 0.49% decrease in relative firm start up rates. A 1% increase in relative sales and income tax rates correspond to a 0.08% decrease in relative firm start up rates.
- Government expenditures on infrastructure, welfare, and education does not seem to impact firm start up. rates.

Thank you for your time!