Impacts of Taxes on Firm Entry Rates along State Borders

A Border Discontinuity Approach

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Introduction

Our paper studies the following two problems

- Do changes in tax and regulatory policy impact firm entry?
- Do firms have preferences for government provided amenities?

How we accomplish this task

- We take differences in firm startup rates between matched county-pairs on either side of a state border.
- This model relies on entrepreneuers picking firm entry locations between a close set of possible locations along state borders.
- We employ the difference in top marginal tax rates as the relevant tax rates that many entrepreneurs pay.

Motivation

Our motivation

- Older papers explored firm entry across all counties, but policy endogeneity between tax rates and economic activity upwards biases these estimates. Border discontinuity approaches solve this problem.
- Many papers do not include marginal tax rates, or only include a few tax types.
- Theory indicates that marginal rates are what matter, and tax rates might be jointly changed in order to achieve policy goals. We see this empirically as there is very strong correlations among certain tax rates leading to plausible ommitted variable bias. Thus adding in a longer array of tax types might fix issues with ommitted variable bias.

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 top marginal tax rates for corporate and income tax, but weighted them together, as well as 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.
- all three approaches have modern equivalents, though theory shows that marginal tax rates are what matter!

Theory Pt I

- Wages and capital costs are adjusted to local tax and location specific measures affecting firm level productivity. If markets are competitive firms will make zero economic profit in the long run, but demand or policy shocks leave short term profits.
- If a regime changes its taxes, higher production costs and lower profits exist in that county. Thus that market will deter a relative amount of firms from entering as firms enter and bid up prices on the other side.
- Firms make decisions based on information from the previous year, as governments might concurrently change policy along with market entry, and there are time costs associated with starting up a firm.

Theory Pt II

Assumption

Assume that a firms' profit can be expressed as a linear function, for a given location, state, and time pair denoted (i, j, t),

$$\pi_{i,j,t} = \gamma + \beta_i + \beta_j + X_{i,t-1}\beta_1 + X_{j,t-1}\beta_2 + \epsilon_{i,j,t} \tag{1}$$

$$E[\epsilon_{ijt}] = 0 \tag{2}$$

$X_{i,t-1}$ *is a* $1 \times K_1$ *row vector of location specific terms, and* $X_{j,t=1}$ *is a* $1 \times K_2$ *row vector of state specific terms, and* β_i, β_j *are location and state specific fixed effects.*

Theory Pt III

Now let us focus on a market that is defined by the interval $[-1, 1]$, such that for $i \in [-1, 0)$ a firm is in state A, and for $i \in [0, 1]$, they are in state B. Therefore, if a firm has two choices, $y \in [-1, 0)$ and $\hat{y} \in [0, 1]$, then the firm chooses y over $\hat{y}$ if

$$E[\pi_{y,A,t} - \pi_{\hat{y},B,t}] > 0 \tag{3}$$

Assumption

β_i and $X_{i,t-1}$ are continuous locally on $[-1, 1]$, such that for any $\epsilon > 0$, where $\max\{|\beta_i - \beta_j|, |(X_{y,t-1} - X_{\hat{y},t-1})|\} < \frac{\epsilon}{2}$, then there exists a δ such that $|y - \hat{y}| < \delta$

Then we see that as $y, \hat{y} \to 0$ the choice becomes;

$$E[\pi_{y,A,t} - \pi_{\hat{y},B,t}] = (X_{A,t-1} - X_{B,t-1})\beta_2 > 0$$

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
- Additional (state level) Controls: County level real fuel prices, pct with high school education, population density, pct unionized, pct manufacturing

Example of Border Matching

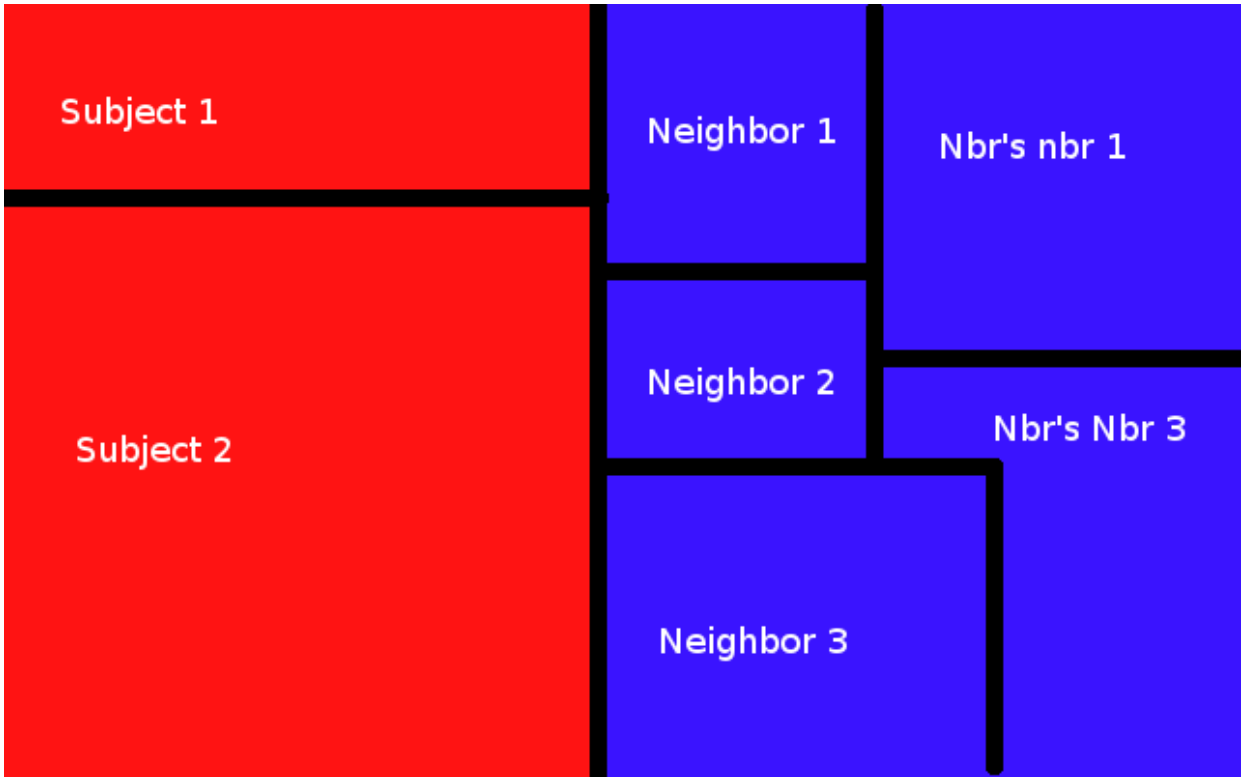


Figure : Red rectangles are subject counties, and blue are neighbor counties. In this example Subject 1 would be only matched to Neighbor 1, while "Subject 2" would be paired with Neighbor 1-3. Similarly, when we broaden the bandwidth, Subject 1 would be matched with Nbr's Nbr 1, whle Subject 2 would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

Regression Discontinuity Model pt I

- From our theory we show how the location effect drops out as we approach the border. we primarily estimate two models, first, a model without fixed effects,

$$\ddot{ln}(n_{i,g,t}) = \ddot{x}_{g,t-1}\beta_2 + \ddot{\epsilon}_{i,g,t} \tag{4}$$

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

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

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

- Secondly, we estimate a model that allows for an intercept for each state-pair.

$$\ddot{\ln}(n_{i,g,t}) = \beta_A - \beta_B + \ddot{X}_{g,t-1}\beta_2 + \ddot{\epsilon}_{i,g,t} \tag{5}$$

RD Results

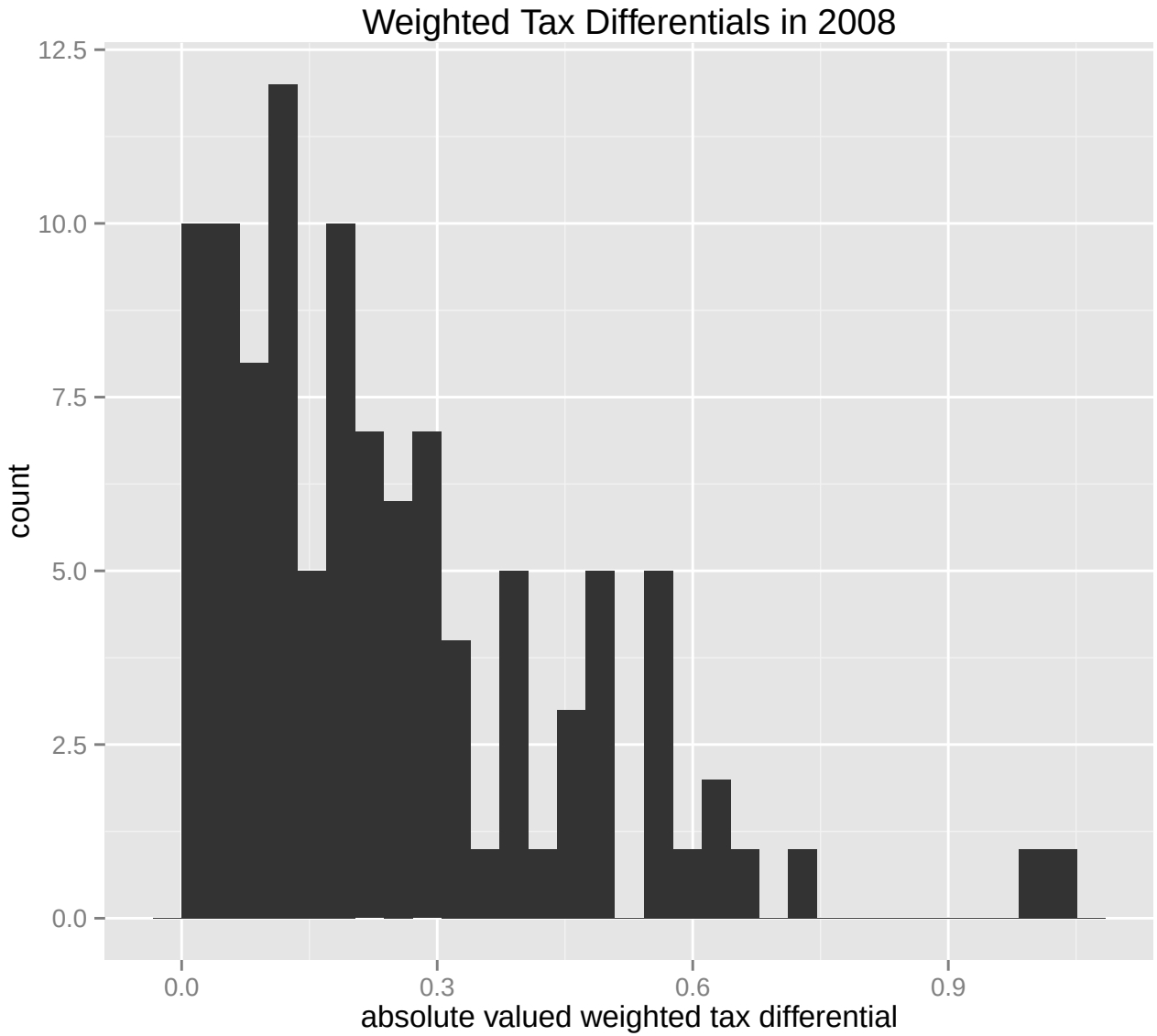
Table : Regression Discontinuity Models for Total Firm Births

	Dependent variable:			
	births ratio			births_ratio
	OLS	OLS	OLS	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

Sensitivity Tests

- Stability of coefficients across years.
- Symmetry of coefficients across borders.
- Stability of coefficients across NAICS sub-codes.
- Extending the distance between matched pairs.
- Working on estimating main model for each US region.

Some Comparisons: Weighted Tax Differentials



Some Comparisons Pt II

Table : Result Comparison for Total Firm Births

mean firm entry	preffered side	abs weighted tax	preferred side	same?	sub state	nbr state
2.591	nbr	0.010	sub	different	kansas	nebraska
2.260	nbr	0.016	nbr	same	maryland	west virginia
2.194	sub	0.294	sub	same	alabama	georgia
2.126	sub	0.205	nbr	different	minnesota	wisconsin
1.808	sub	0.097	nbr	different	ohio	pennsylvania
1.743	sub	0.555	sub	same	colorado	kansas
1.568	nbr	0.105	nbr	same	arizona	nevada
1.513	nbr	0.256	sub	different	idaho	utah
1.477	sub	0.119	sub	same	oklahoma	texas
1.376	nbr	0.015	nbr	same	kentucky	west virginia

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!