- MVEA Discussant
  - Results for employment
    - Might have used total employment, rather than change in employment.
- SEA Discussant
  - Agrawal, "Local Fiscal Competition: An Application to Sales Taxation with Multiple Federations," JUE (forthcoming)
  - Estimates for MSA's
  - Estimates for Urban/Rural areas
  - Estimates for each Region
  - Estimates for Recipricol Agreements
  - some clarifications (taxes, assignment procedure
- Georgeanne Edits
  - COMPLETED: Lit Review, Theory, Data, Conclusions
  - TODO: empirical design, results, introduction

Table 1: Regression Discontinuity Models for Total Firm Births

	Dependent variable:					
	births ratio				births_ratio	
	OLS	OLS	OLS	OLS	FE	FE
	(1)	(2)	(3)	(4)	(5)	(6)
Property Tax Difference	−0.206	−0.371**	−0.136	−0.297**	0.025	0.027
	(0.151)	(0.147)	(0.148)	(0.150)	(0.119)	(0.122)
Income Tax Difference	−0.093***	−0.085***	−0.088***	−0.075***	−0.011	−0.009
	(0.027)	(0.026)	(0.028)	(0.026)	(0.034)	(0.035)
Capital Gains Tax Difference	0.016	0.008	0.028	0.020	−0.001	−0.002
	(0.023)	(0.023)	(0.024)	(0.024)	(0.012)	(0.012)
Sales Tax Difference	−0.112***	−0.101***	−0.110***	−0.087***	0.002	0.001
	(0.029)	(0.030)	(0.029)	(0.032)	(0.040)	(0.041)
Corp Tax Difference	0.023	0.018	0.015	0.011	−0.013	−0.012
	(0.020)	(0.018)	(0.020)	(0.019)	(0.026)	(0.026)
Workers Comp Tax Difference	0.001	0.090	−0.007	0.051	0.040	0.044
	(0.111)	(0.108)	(0.096)	(0.105)	(0.069)	(0.070)
Unemp. Tax Difference	0.008	0.012	−0.002	−0.006	−0.002	−0.002
	(0.040)	(0.036)	(0.042)	(0.038)	(0.017)	(0.017)
Educ Spending Per Cap Diff	−0.0002	−0.0003	−0.0002	−0.0002	−0.0002	−0.0002
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0002)
Highway Spending Per Cap Diff	0.0004	0.0004	0.0002	0.0003	0.0001	0.0001
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0002)	(0.0002)
Welfare Spending Per Cap Diff	0.001**	0.001**	0.001**	0.0004*	−0.00005	−0.00005
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0001)	(0.0001)
Constant	−0.045	−0.055	−0.037	−0.046		
	(0.084)	(0.086)	(0.088)	(0.087)		
controls	Yes	Yes	No	No	Yes	Yes
amenities	Yes	No	Yes	No	Yes	No

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Table 2: Regression Discontinuity Models for Total New Employment

	Dependent variable:			
	total employment ratio		lntotemp_ratio	
	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
Property Tax Difference	0.019	−0.064	0.037	0.036
	(0.103)	(0.102)	(0.114)	(0.114)
Income Tax Difference	−0.009	−0.014	−0.040	−0.040
	(0.027)	(0.030)	(0.033)	(0.033)
Capital Gains Tax Difference	0.007	0.005	−0.012	−0.012
	(0.023)	(0.024)	(0.012)	(0.012)
Sales Tax Difference	−0.013	−0.009	−0.018	−0.018
	(0.019)	(0.017)	(0.040)	(0.040)
Corp Tax Difference	−0.013	−0.014	−0.046*	−0.046*
	(0.017)	(0.016)	(0.025)	(0.025)
Workers Comp Tax Difference	0.048	0.106	−0.067	−0.068
	(0.085)	(0.075)	(0.066)	(0.066)
Unemp. Tax Difference	0.085**	0.089***	0.015	0.015
	(0.035)	(0.034)	(0.017)	(0.017)
Educ Spending Per Cap Diff	0.0003	0.0003	0.0001	0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Highway Spending Per Cap Diff	−0.0003	−0.0003	−0.001***	−0.001***
	(0.0004)	(0.0003)	(0.0002)	(0.0002)
Welfare Spending Per Cap Diff	0.00002	0.0001	−0.0002	−0.0002
	(0.0002)	(0.0002)	(0.0001)	(0.0001)
Constant	0.070	0.062		
	(0.055)	(0.054)		
controls	Yes	No	Yes	Yes
amenities	Yes	No	Yes	No

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Table 3: Regional Estates for Total Firm Births

	Dependent variable:			
	births ratio			
	Northeast	Midwest	South	West
	(1)	(2)	(3)	(4)
Property Tax Difference	0.069	0.008	−0.200	−1.324***
	(0.202)	(0.186)	(0.280)	(0.397)
Income Tax Difference	0.103**	−0.016	−0.125***	−0.222**
	(0.051)	(0.037)	(0.039)	(0.104)
Capital Gains Tax Difference	−0.149***	0.010	0.076*	0.035
	(0.050)	(0.029)	(0.040)	(0.039)
Sales Tax Difference	−0.110*	−0.334***	−0.166*	−0.090*
	(0.060)	(0.095)	(0.086)	(0.052)
Corp Tax Difference	0.256***	−0.010	−0.038	0.225***
	(0.063)	(0.024)	(0.041)	(0.068)
Workers Comp Tax Difference	−0.183	0.219*	0.276	0.008
	(0.202)	(0.114)	(0.202)	(0.240)
Unemp. Tax Difference	−0.094	0.041	−0.018	−0.119
	(0.092)	(0.059)	(0.046)	(0.086)
Educ Spending Per Cap Diff	−0.001**	0.0003	−0.001	−0.001
	(0.0005)	(0.0004)	(0.0005)	(0.001)
Highway Spending Per Cap Diff	0.001	0.001	−0.001	0.0004
	(0.001)	(0.001)	(0.001)	(0.001)
Welfare Spending Per Cap Diff	0.001***	0.001*	0.0004	0.00002
	(0.0002)	(0.0004)	(0.0004)	(0.0004)
Constant	0.502***	0.040	−0.119	−0.680
	(0.104)	(0.091)	(0.147)	(0.437)

Table 4: MSA Estates for Total Firm Births

	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)

Table 5: Counties with Income Tax Agreements for Total Firm Births

	Dependent variable:			
	births ratio		births_ratio	
	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)
Property Tax Difference	0.272	0.283	0.105	0.100
	(0.297)	(0.314)	(0.278)	(0.286)
Income Tax Difference	−0.116	−0.193**	0.012	0.017
	(0.081)	(0.076)	(0.126)	(0.129)
Capital Gains Tax Difference	0.071*	0.147**	0.002	−0.003
	(0.037)	(0.068)	(0.072)	(0.074)
Sales Tax Difference	−0.014	−0.090	0.043	0.044
	(0.064)	(0.088)	(0.076)	(0.078)
Corp Tax Difference	0.080*	0.059	−0.008	−0.007
	(0.043)	(0.036)	(0.040)	(0.041)
Workers Comp Tax Difference	0.392***	0.050	0.075	0.071
	(0.126)	(0.185)	(0.166)	(0.171)
Unemp. Tax Difference	−0.083	−0.016	0.023	0.021
	(0.071)	(0.088)	(0.049)	(0.050)
Educ Spending Per Cap Diff	0.0004	0.00003	−0.0001	−0.0001
	(0.0005)	(0.001)	(0.0004)	(0.0005)
Highway Spending Per Cap Diff	−0.001	−0.001	−0.0001	−0.0001
	(0.001)	(0.001)	(0.0005)	(0.001)
Welfare Spending Per Cap Diff	0.001**	0.0003	−0.00003	−0.00003
	(0.0003)	(0.0005)	(0.0003)	(0.0003)
Constant	−0.086	−0.221		
	(0.226)	(0.169)		
controls	Yes	No	Yes	Yes
amenities	Yes	No	Yes	No

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4 Resampling Procedure

First, let $i = 1, ..., N$ be all of our matched county pairs, and $t = 1, ..., T$ be each time period. We can then write our model as,

$y_{it} = X_{it}\beta + e_{it}$ Where y_{it} is the difference in logged firm start up rates, and X_{it} is our differenced independent variables.

Then, our model becomes the usual POLS estimator.

$$\hat{\beta} = (\frac{1}{TN}\sum_{t=1}^{T}\sum_{i=1}^{N} x_{it}'x_{it})^{-1}(\frac{1}{TN}\sum_{t=1}^{T}\sum_{i=1}^{N} x_{it}'y_{it})$$

Let us assume for simplicitly we only have state level independent variables (which is true for most of our estimated models). Then, let $g = 1, ..., G$ be the number of *state-pairs* in our sample, and $k = 1, ..., N_g$ be the state-pair specific number of matched county pairs. Letting $\bar{G} = \sum_{g=1}^{G} N_g/G$ be the average number of state-pair matched county pairs, note that $N = \sum_{g=1}^{G} N_g$. Therefore, $N = \frac{\sum_{g=1}^{G} N_g}{G} G = \bar{G}G$

we can rewrite our modeol to be, $y_{kgt} = X_{gt}\beta + e_{igt}$, and our estimator to be

$$\hat{\beta} = (\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} \frac{N_g}{\bar{G}} x_{gt}'x_{gt})^{-1}(\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} x_{gt}'\frac{(\sum_{k=1}^{N_g} y_{kgt})}{\bar{G}})$$

Now, we can plug back in our original model,

$$\begin{aligned}
\hat{\beta} &= (\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} \frac{N_g}{\bar{G}} x_{gt}'x_{gt})^{-1}(\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} x_{gt}'\frac{(\sum_{k=1}^{N_g} x_{gt}\beta + e_{kgt})}{\bar{G}}) \\
&= (\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} \frac{N_g}{\bar{G}} x_{gt}'x_{gt})^{-1}(\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} \frac{N_g}{\bar{G}} x_{gt}'x_{gt}\beta + x_{gt}'\frac{(\sum_{k=1}^{N_g} e_{kgt})}{\bar{G}}) \\
&= \beta + (\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} \frac{N_g}{\bar{G}} x_{gt}'x_{gt})^{-1}(\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} x_{gt}'\frac{(\sum_{k=1}^{N_g} e_{kgt})}{\bar{G}})
\end{aligned}$$

The result of this is that we see that our estimator appears to be a weighted estimate of the data in our sample. In particular, counties that have more than $\bar{G}$ worth of observations get underweighted compared to their mean, and counties that have less than $\bar{G}$ worth of matched county pairs get overweighted compared to their mean.

An example of this would be, imagine we only had 4 states in our sample, Texas-Oklahoma, and Maryland-Delaware. TX-OK has 35 matched county pairs per year, and MD-DL has 2. As a result, the mean is 17.5. Then, when we go to compute our estimate, the estimator over emphasizes interactions along TX-OK's border, and underweights interactions along MD-DL's border. (We can see this when I went to do the Rural v Urban estimates, and how property tax appeared. Many of the states with higher observation counts appear in more rural counties.

As a result, I (starting last spring) was also calculating a Donald and Lang (2007) two-stage estimator. The first stage is to simply take averages along each border, and then take the difference. This leads to the alternative estimator,

Now note that $E(y_{tg})$ is the average for each side of the border. By construction, this is equal to,

$$E(y_{tg}) = x_{tg}\beta + E(e_{tg})$$

Thus this model requires the same assumptions we make for our first model. We can then compute the estimator as follows.

$$
\begin{aligned}
\hat{\beta}' &= (\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} x'_{tg}x_{tg})^{-1}(\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} x'_{tg}E(y_{tg})) \\
&= (\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} x'_{tg}x_{tg})^{-1}(\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} x'_{tg}x_{tg}\beta + x'_{tg}E(e_{tg})) \\
&= \beta + (\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} x'_{tg}x_{tg})^{-1}(\frac{1}{TG}\sum_{t=1}^{T}\sum_{g=1}^{G} x'_{tg}E(e_{tg}))
\end{aligned}
$$