Effect of Child Care Regulations on Child Care Markets: Evidence from Policy Discontinuity at the Border

Won Lee, First 5 California

Aaron Sojourner, W. E. Upjohn Institute for Employment Research

Elizabeth E. Davis, University of Minnesota

Jonathan Borowsky, University of Minnesota

11/22/2024

2024 APPAM Research Conference, National Harbor, MD

Motivation and relevance 1

- In 2019, almost 60% of children under age 6 attended one or more weekly nonparental care setting (USDOE, 2021)
  - States have adopted regulations that set minimum standards for child care facilities and programs
  - Structural features of care settings thought to be related to quality and safety, such as Staff-to-Child Ratio (SCR)
- Policy relevance
  - Understanding the role of regulation on the market is important as it might impact supply and price of care
  - Increasing interest in expansion of child care by deregulation
- SCR strictness impacts childcare establishments through opposing forces
  - #1: ↑ employment, ↑ service quality → ↑ demand for ECE ↑ Q
  - #2: ↑ service costs → ↓ supply curve, ↓ demand for ECE employment ↓ Q
  - #2a: ↑ service costs → ↓ affordability of ECE → ↑ alternative care ↓ Q
  - The combined effect of these two opposing forces requires empirical investigation

Motivation and relevance 1

- In 2019, almost 60% of children under age 6 attended one or more weekly nonparental care setting (USDOE, 2021)
  - States have adopted regulations that set minimum standards for child care facilities and programs
  - Structural features of care settings thought to be related to quality and safety, such as Staff-to-Child Ratio (SCR)
- Policy relevance
  - Understanding the role of regulation on the market is important as it might impact supply and price of care
  - Increasing interest in expansion of child care by deregulation
- SCR strictness impacts childcare establishments through opposing forces
  - #1: ↑ employment, ↑ service quality → ↑ demand for ECE ↑ Q
  - #2: ↑ service costs → ↓ supply curve, ↓ demand for ECE employment ↓ Q
  - #2a: ↑ service costs → ↓ affordability of ECE → ↑ alternative care ↓ Q
  - The combined effect of these two opposing forces requires empirical investigation

Motivation and relevance 1

- In 2019, almost 60% of children under age 6 attended one or more weekly nonparental care setting (USDOE, 2021)
  - States have adopted regulations that set minimum standards for child care facilities and programs
  - Structural features of care settings thought to be related to quality and safety, such as Staff-to-Child Ratio (SCR)
- Policy relevance
  - Understanding the role of regulation on the market is important as it might impact supply and price of care
  - Increasing interest in expansion of child care by deregulation
- SCR strictness impacts childcare establishments through opposing forces
  - #1: ↑ employment, ↑ service quality → ↑ demand for ECE ↑ Q
  - #2: ↑ service costs → ↓ supply curve, ↓ demand for ECE employment ↓ Q
  - #2a: ↑ service costs → ↓ affordability of ECE → ↑ alternative care ↓ Q
  - The combined effect of these two opposing forces requires empirical investigation

Motivation and relevance 1

- In 2019, almost 60% of children under age 6 attended one or more weekly nonparental care setting (USDOE, 2021)
  - States have adopted regulations that set minimum standards for child care facilities and programs
  - Structural features of care settings thought to be related to quality and safety, such as Staff-to-Child Ratio (SCR)
- Policy relevance
  - Understanding the role of regulation on the market is important as it might impact supply and price of care
  - Increasing interest in expansion of child care by deregulation
- SCR strictness impacts childcare establishments through opposing forces
  - #1: ↑ employment, ↑ service quality → ↑ demand for ECE ↑ Q
  - #2: ↑ service costs → ↓ supply curve, ↓ demand for ECE employment ↓ Q
  - #2a: ↑ service costs → ↓ affordability of ECE → ↑ alternative care ↓ Q
  - The combined effect of these two opposing forces requires empirical investigation

Motivation and relevance 2

- Relatively few empirical studies
  - Hotz and Xiao (2011)
    - Establishment-level panel data on child care centers from 1987 to 1997, finds:
      - stricter state regulation of staff-child ratios led to a decrease in the number of child care center establishments particularly in poor communities.
      - improved quality of care proxied by the share of child care centers with national accreditation, particularly in higher income areas.

This study

- Re-examine Hotz and Xiao (2011)'s results using more recent data and three different quasi-experimental designs
  - 1. Two-way fixed effects design based on the county-level data
    - 2011, 2014, 2017 County Business Patterns data on childcare industry establishments, employment, and payroll
  - 2. Border regression discontinuity based on small geographic unit data within 10 miles of the border line
    - U.S. childcare provider's exact location from Dun & Bradstreet (D&B) and estimates SCR effects focusing on fineresolution differences across state borders
    - The effect of stricter regulations on the number of establishments, their payroll and number of employees
  - 3. Synthetic control based on state-level data
    - Aggregated from 2011 to 2021 data from County Business Patterns data on childcare industry establishments, employment, and payroll
    - Exact date of the policy change is known and uses a synthetic control group approach

Summary statistics for county-level analysis

Variable	Mean	Std. Dev.	Min.	Max.	N
Outcomes from CBP					
N Establishments per 100 families	0.519	0.308	0.031	5.882	6504
N Employees per 100 families	4.113	3.168	0	35.795	6504
Payroll per employee (1000s)	13.025	7.389	0	73	6504
Staff turnover rate	0.107	0.072	0	0.875	6504
Policy data from NARA					
Child-staff ratio(raw)	8.864	1.979	0	12	6479
Staff-child ratio(raw)	0.115	0.026	0	0.167	6504

Note: The balanced panel analytic dataset includes 2,168 counties, each with more than one observation across three years from 2011 to 2017, yielding a total of 6,504 county-year observations for the analysis. The outcome variables consist of annual payroll per employee, employment counts, and the number of establishments by size, all obtained from County Business Patterns (CBP) data, along with turnover rates sourced from the Census Quarterly Workforce Indicators data. State-level policy variables, the staff-to-child ratio, are obtained from National Association for Regulatory Administration (NARA). Demographic controls are based on county-level ACS 5-year estimates for the 2011, 2014, and 2017 snapshots.

County-year level analysis: Effect of staff-to-child ratio on N of employees per 100 families, N of establishments per 100 families, annual payroll per Employee, and staff turnover rate

	Dependent variables			
	N Employee	N Establishment	Payroll per employee	Staff turnover rate
	(1)	(2)	(3)	(4)
Staff-child ratio	-20.556	-0.645	-82.769	0.205
	(23.547)	(2.414)	(54.754)	(0.709)
Demog controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes
R-squared	0.792	0.873	0.716	0.622
N	6504	6504	6504	6504

Note: A larger staff-to-child ratio implies stricter regulations.; * p<.1, ** p<.05, *** p<.01; Robust standard errors are clustered at the county level.; The estimation uses a two-way fixed effects model, incorporating both county and year fixed effects, to explain county-year payroll per employee, the number of establishments per family, and the staff turnover ratio as functions of a state-level policy variable, the staff-child ratio (D_{ct}), while controlling for socio-demographic characteristics and job availability within the county:

$$Y_{ct} = \alpha_1 D_{ct} + \alpha_2 X_{ct} + \gamma_c + \tau_t + \epsilon_{ct} \quad (3)$$

Estimates were obtained using Stata's reghdfe command. In column (3), the coefficient of -82.769 for the staff-child ratio indicates that a one standard deviation increase (0.023) in the child-staff ratio is associated with an approximate decrease of -1.90 or $1,900 (=0.023*-82.769), in payroll per employee, representing about 14% of the mean annual payroll per employee ($13,068). However, none of the estimated effects are statistically significant at conventional levels.

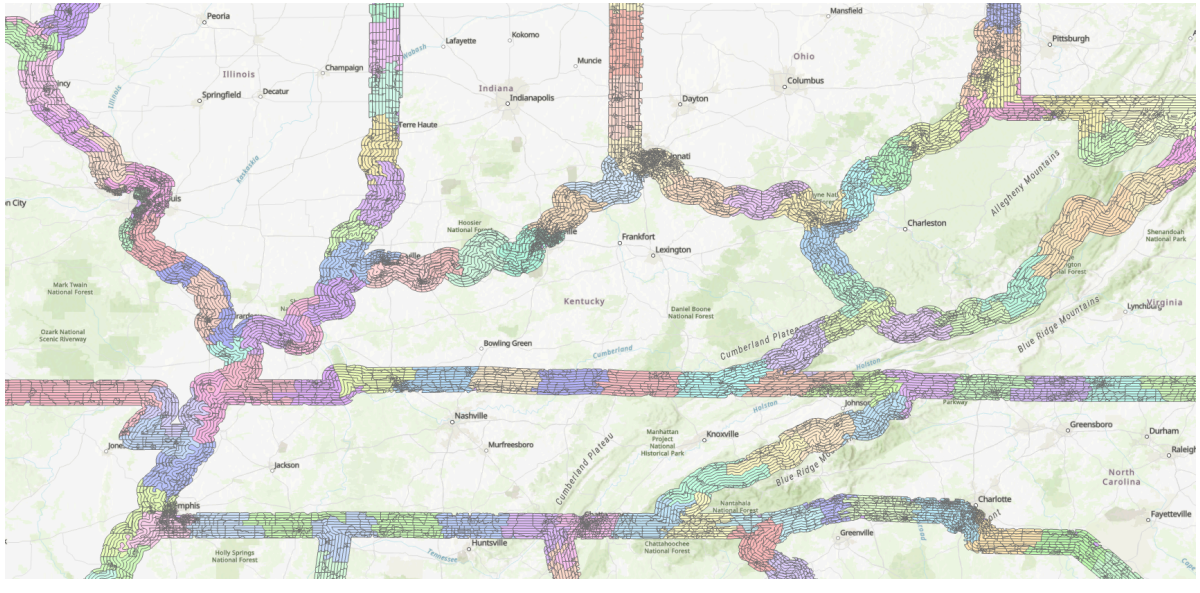
County-year level analysis: Effect of staff-to-child ratio on N of establishment per 100 families, by income tercile

	Dependent variables			
	N Employee	N Establishment	Payroll per employee	Staff turnover rate
	(1)	(2)	(3)	(4)
Top tercile				
Staff-child ratio	-9.201	0.507	-47.653	1.420
	(25.523)	(3.679)	(54.176)	(1.207)
2nd tercile				
Staff-child ratio	-33.499	-1.276	-151.078	-0.383
	(45.830)	(4.840)	(93.082)	(0.989)
Bottom tercile				
Staff-child ratio	-21.360	-2.731	-65.426	-1.179
	(64.696)	(3.145)	(169.384)	(1.079)
Demog controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes

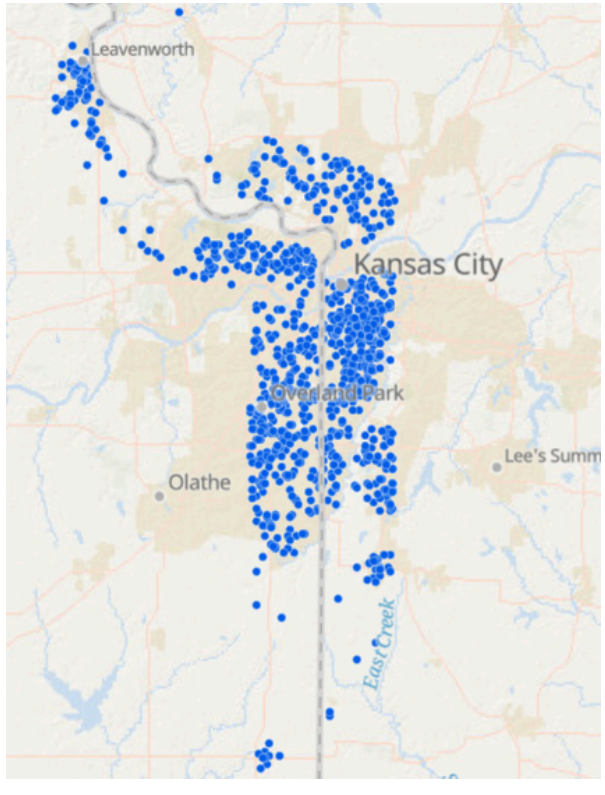
Note: The sample was divided into three groups based on the average median income at the county level over the study window. A larger staff-to-child ratio implies stricter regulations.; * p<.1, ** p<.05, *** p<.01; Robust standard errors are clustered at the county level.; The estimation uses a two-way fixed effects model, incorporating both county and year fixed effects, to explain county-year payroll per employee, the number of establishments per family, and the staff turnover ratio as functions of a state-level policy variable, the staff-child ratio (D_{ct}), while controlling for socio-demographic characteristics and job availability within the county:

Illustration of zones near the state border with distance-based subzones

Constructed zones for analysis



Provider-level D&B data near state border



- Zones were created using the "Build Balanced Zones" tool in ArcGIS (Genetic Algorithm); parameters: number of zones, size, etc.
- Zones are adjacent to the state border, limited to a 10-mile distance from the border line. Each state-zone is further partitioned into 5 subzones (2-mile blocks).
- Provider-level data from D&B is aggregated to each subzone for analysis.

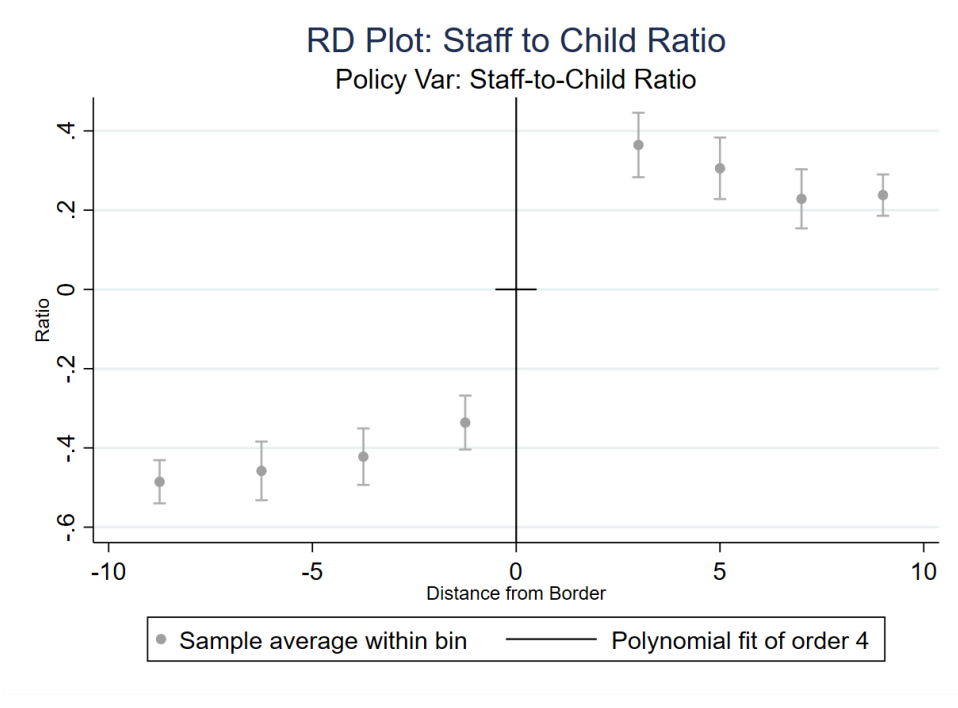
Summary statistics for regression discontinuity design

Variable	Mean	Std. Dev.	Min.	Max.	N
Outcomes from DNB					
N employees per 100 families	45.705	150.869	0	4580.152	5775
N establishments per 100 families	6.415	15.057	0.282	500	5775
Sales volume ($10000s) per 100 families	204.53	2305.191	0	131714.844	5775
Policy data from NARA					
Treatment dummy (Higher SCR Zone)	0.468	0.499	0	1	5775
Miles from border	-0.312	6.529	-10	10	5775
Staff child ratio (Raw)	0.12	0.024	0	0.167	5775

Note: There are a total of 311 zones with at least one childcare provider, resulting in 658 zone-state combinations, and 2,268 zone-state-miles-to-border units (2, 4, 6, 8 and 10 miles) leading to 5,775 zone-state-miles-to-border-unit-year observations that include at least one childcare provider. The unit of analysis is the zone-state-subzone combination, which divides zones based on state borders and distance to border. The outcome variables are the total number of childcare sector employees per family, Sales volume per family, and number of establishments per family, sourced from DNB data. The policy variables at the state level include the staff-to-child ratio (center-based), obtained from NARA. Demographic controls at the zone level are derived from Block-group level ACS data, the 2013-2017 ACS 5-year estimates.

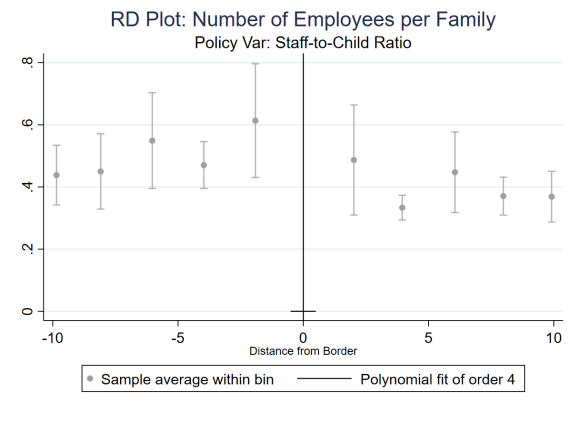
RDD analysis: Discontinuity at the border (Staff to Child Ratio)

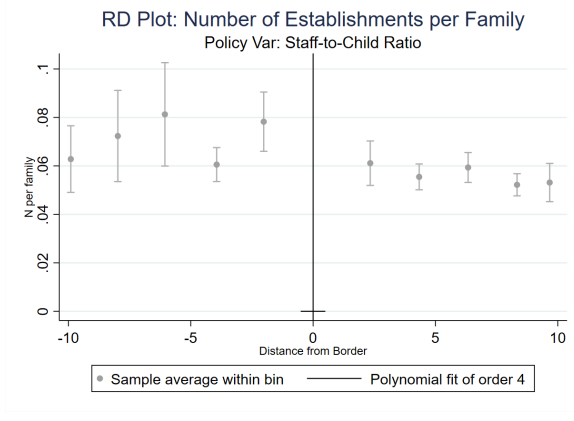
Large discontinuity in policy at the border

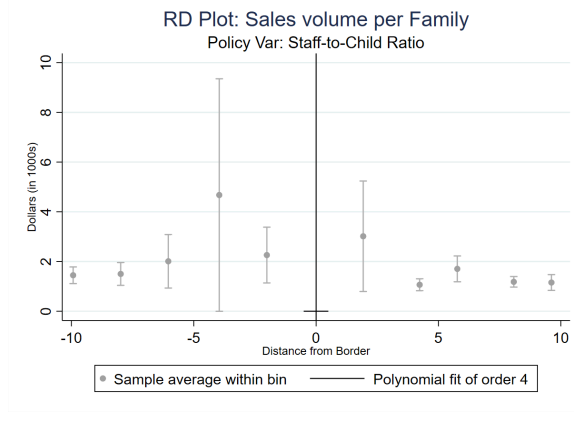


RDD analysis: Discontinuity at the border (Outcomes)

Not much difference in outcomes at the border







RDD analysis: Effect of staff-to-child ratio on N establishments per 100 families, N of employees per 100 families, and sales volume per 100 families, by income tercile

	Dependent variables		
	N Establishment	N Employee	Sales Volume
	(1)	(2)	(3)
Top tercile			
Treated (higher SCR)	-3.652	-0.152	-318.922
	(5.686)	(0.282)	(316.565)
2nd tercile			
	-3.185	0.727	202.933
	(7.719)	(0.683)	(218.158)
Bottom tercile			
	2.886	1.897***	-32.011
	(11.810)	(0.700)	(77.350)
Demog controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes

Note: The sample was divided into three groups based on the average median income at the zone level over the study window. A larger staff-to-child ratio implies stricter regulations.; * p<.1, ** p<.05, *** p<.01; Robust standard errors are clustered at the sub-zone level.; The table presents estimated effect of change in policy by income level of the local markets. The sample was divided into four groups according to the zone-level average median income. Each zone represents a local geographic area with shared state boundaries throughout the study period.

Synthetic control estimation - Louisiana policy change in 2015

Figure 1: Effect on N Establishments

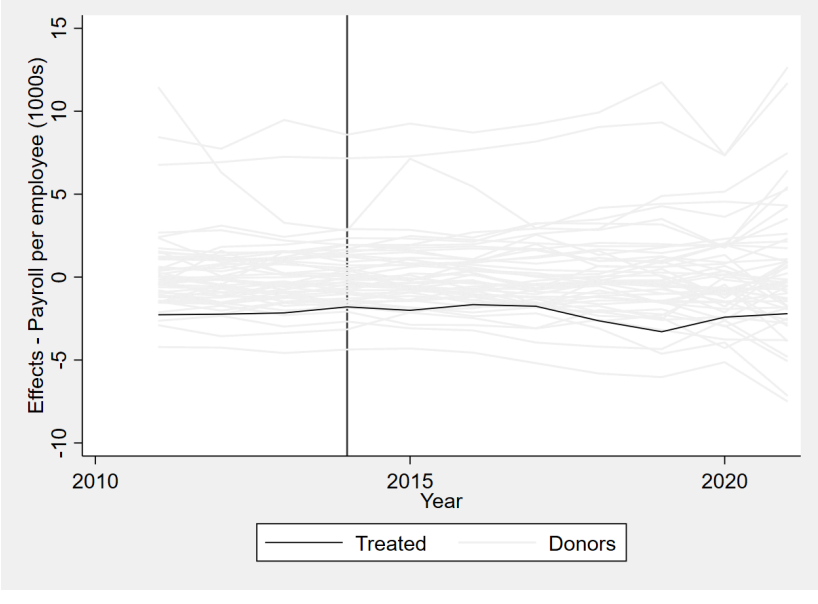
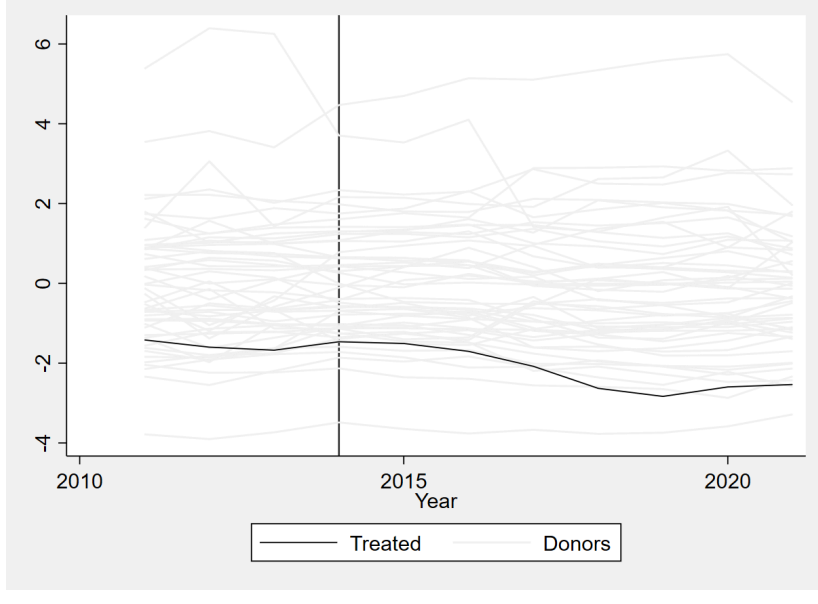


Figure 2: Effect on N Employees



Conclusion

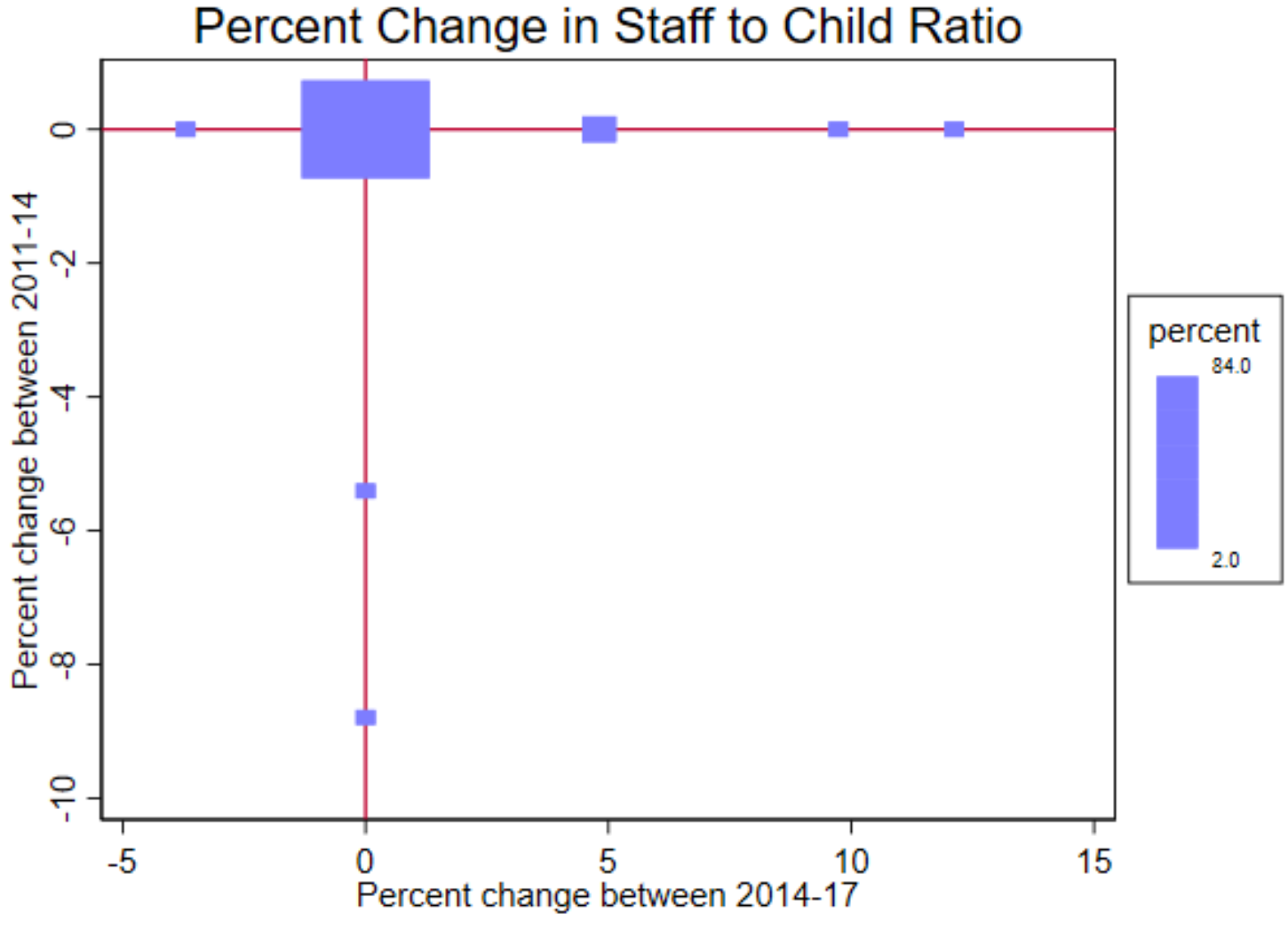
Estimated coefficient on Staff-Child Ratio (sign and significance) in Each Specification

		This Study		
	Hotz & Xiao 2011	**County Level**	**State Border RDD**	**Synthetic Control**
N of establishments	(-) S.	(-) N.S.	(-) N.S.	(-) N.S.
N of Employment	n/a	(-) N.S.	(-) N.S.	(-) N.S.
N of establishments in low-income areas	(-) S.	(-) N.S.	(-) N.S.	
N of Employment in low-income areas			(+) S.	
Payroll per employee		(-) N.S.		
Staff-Turnover rate		(+) N.S.		

Note: S. indicates statistical significance at conventional levels; N.S., if otherwise.

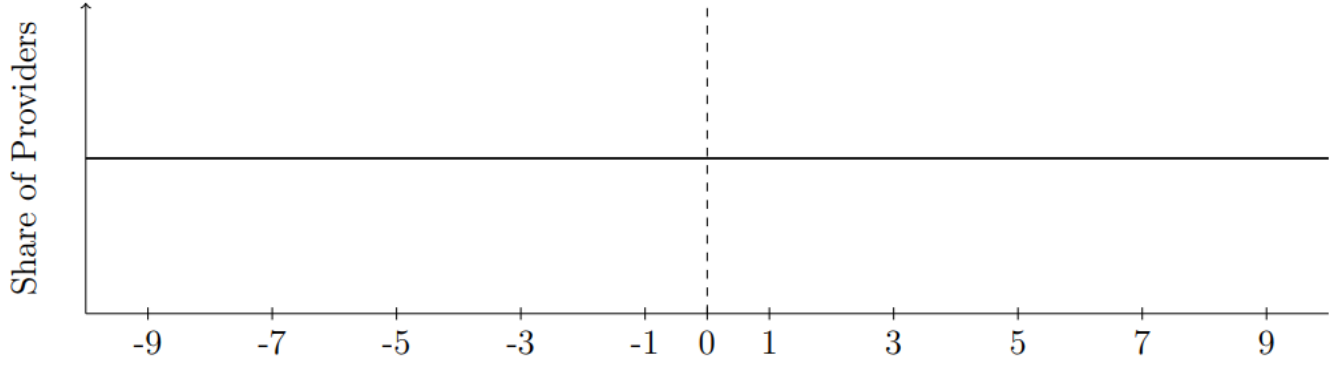
- Analysis of data from 2011–2017 shows limited evidence that SCR significantly impacts overall market outcomes
- The signs of the estimates generally align with findings from Hotz and Xiao (2011), indicating that stricter policies increase service costs and reduce demand
- RDD analysis reveals an increase in childcare employment in lower-income areas
- Going forward, plan to add more years of data to increase power (requires identifying exact year of policy change)

Appendix: Variation in the policy variable (Staff to child ratio)

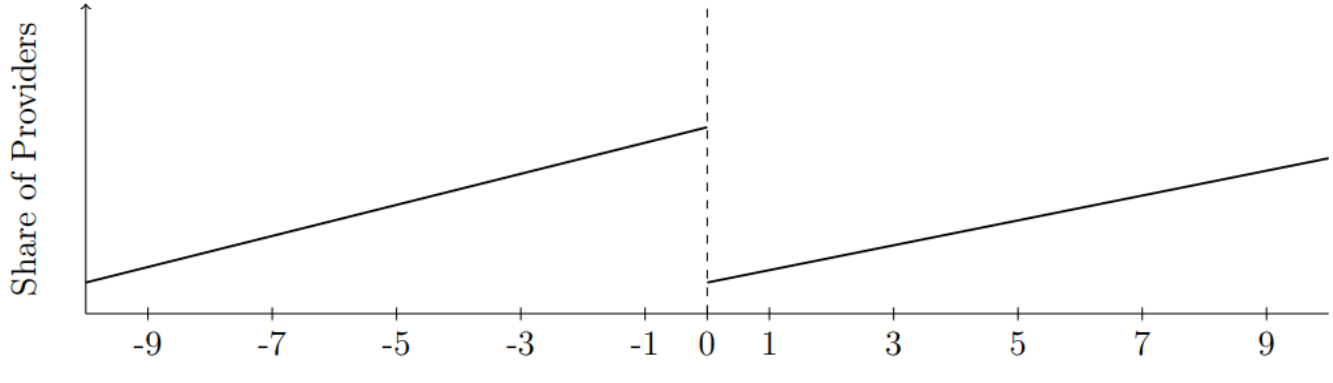


Appendix: Hypothetical spatial distributions of providers near state border

by effect of state regulation on supply location and population distribution



(a) Difference in regulation does not affect supply



(b) Difference in regulation drives supply toward less-strict state

Note: distance normalized as positive into the state with the more strict regulation.