

# **The Minimum Wage, Self-Employment, and the Online Gig Economy**

Job Market Paper

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## Research Question

- Do minimum wage increases impact the exempt labor market?
- Does this effect vary by the concentration of local labor markets?
- Does this effect vary between traditional exempt work and the online gig economy?

# Introduction

- Minimum wage policies create both exempt and nonexempt labor markets, and this division has changed over time<sup>1</sup>
- Systemic differences in policies and organizational structure exist between these two markets <sup>2</sup>
- Mixed findings on the effect of minimum wage policies across numerous outcomes<sup>3</sup>
- Both null effects on employment and heterogeneous effects across individual workers and labor market competitiveness have been found<sup>4</sup>

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<sup>1</sup>Derenoncourt and Montialoux (2018)

<sup>2</sup>Simon (1991); Malone, Yates and Benjamin (1994); Harris and Krueger (2015); Sundararajan (2016); Bracha and Burke (2016); Hyman (2018)

<sup>3</sup>Lester (1941); Stigler (1946); Cullen (1961); Grossman (1978); Rottenberg (1981); Card and Krueger (1995); Neumark and Wascher (2007); Waltman (2008); Belman and Wolfson (2014)

<sup>4</sup>Bhaskar, Manning and To (2002); Dube, Lester and Reich (2010); Alan (2011); Lester (2011); Jardim et al. (2018); Dube et al. (2018); Sokolova and Sorensen (2018); Caliendo et al. (2018); Caldwell and Oehlsen (2018); Pörtner and Hassairi (2018); Cengiz et al. (2019); Azar et al. (2019)

- The “Fight for 15”’s impact on local and state minimum wages
- Development and Expansion of “Gig work” as a supplemental source of income<sup>5</sup>
- Introduction of local and state policies governing online gig work and combating misclassification
- New types of social support for the self-employed and independent contractors, including the CARES ACT Pandemic Unemployment Assistance (PUA)

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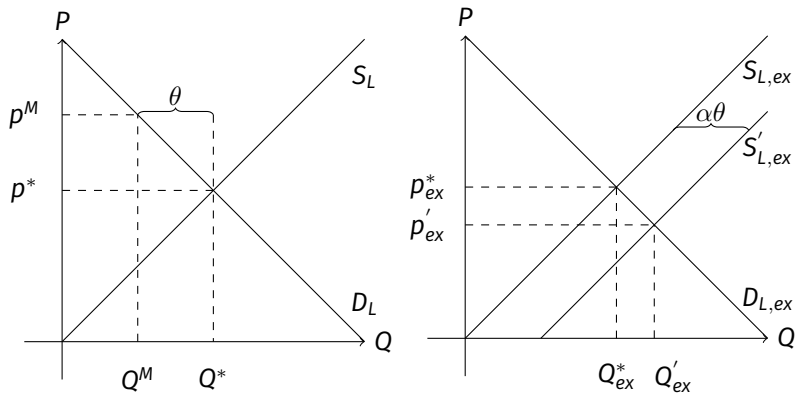
<sup>5</sup>Abraham et al. (2018); Mas and Pallais (2020)

# Theoretical Background

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- Competitive Markets:
  - Negative effects on the extensive and intensive margin of employment in the nonexempt market
  - Some of those negatively effected can transition into the exempt market
  - How large of a transition will depend on the barriers to exit and entry between markets
- Oligopsonistic Markets:
  - No effects, or positive effects, on the extensive and intensive margin of employment in the nonexempt market
  - Incentive to transition into the nonexempt market due to an increased return to work
  - income and substitution effects may lead to uncertain results

# Theoretical Background



**Figure 1:** An illustration of the competitive model of the minimum wage with both a nonexempt (left) and exempt (right) labor market viewed as commodities.

- Nonemployer Statistics
  - Count of nonemployer establishments and total receipts taken in at the county-industry-year level
  - A nonemployer establishment has no paid employees, annual business receipts of 1,000 dollars or more, and is subject to federal income taxes.
  - Unincorporated self employed including independent contractors, exempt from minimum wage
  - Data ranges from 2000 to 2018
- County Business Patterns
  - Count of employer establishments at the county-industry-year level
  - Used to construct a measure of local labor market concentration (HHI)

- Minimum Wage
  - Coded at the county level, inclusive of federal, state, and local minimum wages
  - Defined as the highest minimum wage active in a county on January 1st of that year
- Development of the online gig economy
  - Geographic and time varying rollout of Uber within the US
  - Coding for the treatment of Uber is at core-based statistical areas (CBSAs)
- County Labor Force
  - Included using the Bureau of Labor Statistics Local Area Unemployment Statistics

Number of nonemployer establishments per labor market participant in a county in a given NAICS industry:

$$e_{cit} = \frac{E_{cit}}{L_{ct}}$$

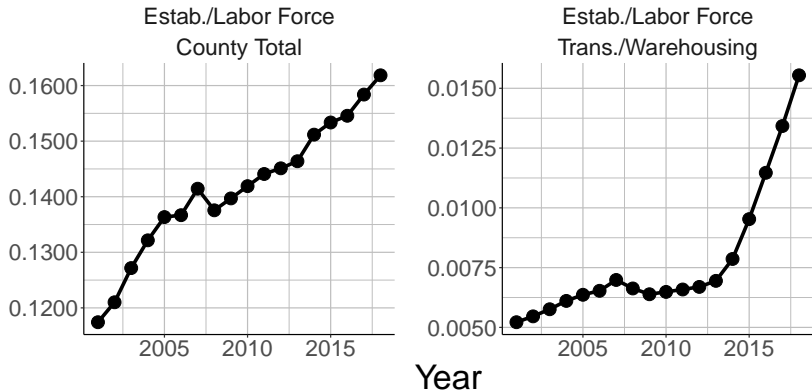
Average receipts of nonemployer establishments in a county in a given NAICS industry:

$$r_{cit} = \frac{R_{cit}}{E_{cit}}$$

Herfindahl-Hirschman Index (HHI):

- Using the CBP, Assume each establishment has the minimum number of employees in their firm size category
- Square the market share of employment in each firm and then sum the resulting shares
- The quantile measure of HHI is correlated with the size of the labor market

## Trends in Nonemployer Establishments



**Figure 2:** The trend in  $e_{cit}$  for the aggregated total of all nonemployer establishments and transportation and warehousing services.

Methods used for Estimating the effect of State and local minimum wages on nonemployer establishments:

- Two-way Fixed Effect Model [Critique of Two-Way fixed effects](#)
- DIDM (de Chaisemartin and d'Haultfoeuille, 2019) [Info](#)
- Group-Time ATT (Callaway and Sant'Anna, 2019) [Info](#)
- Generalized Synthetic Control (Xu, 2017) [Info](#)
- Synthetic DID (Arkhangelsky et al., 2019) [Info](#)

**Table 1: Average Treatment Effects, All Nonemployer Establishments** Plot

NAICS 00		<i>Establishments/Labor Force, <math>e_{cit}</math></i>		
Method	Treatment	(Pre 2007)	(Full)	(Post 2009)
Two-Way	Real Min. Wage	0.0000 (0.0008)	0.0005 (0.0006)	0.0007 (0.0007)
Two-Way	Unadjusted Min. Wage	0.0000 (0.0011)	0.0004 (0.0008)	0.0007 (0.0006)
DIDM <span style="background-color: #cccccc; border-radius: 50%; padding: 2px;">Info</span>	Unadjusted Min. Wage	-0.0003 (0.0006)	0.0011* (.0006)	0.0029** (0.0014)
Group-Time ATT <span style="background-color: #cccccc; border-radius: 50%; padding: 2px;">Info</span>	First Min. Wage inc.	-0.0011 (0.0007)	- -	0.0021*** (0.0005)
Gen. Synth. Control <span style="background-color: #cccccc; border-radius: 50%; padding: 2px;">Info</span>	Local Min. Wage	- -	0.0046** (0.0023)	- -
Synth. DID <span style="background-color: #cccccc; border-radius: 50%; padding: 2px;">Info</span>	Local Min. Wage (2015)	- -	0.0022*** (0.0004)	- -

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

**Table 2:** Average Treatment Effects, All Nonemployer Establishments Plot

NAICS 00		Average Receipts, $r_{cit}$		
Method	Treatment	(Pre 2007)	(Full)	(Post 2009)
Two-Way	Real Min. Wage	-227.0 (261.7)	-29.2 (152.9)	31.0 (155.8)
Two-Way	Unadjusted Min. Wage	-284.0 (310.4)	-70.7 (173.2)	24.3 (149.2)
DID <a href="#">Info</a>	Unadjusted Min. Wage	-136.3 (233.6)	14.8 (236.1)	84.0 (388.0)
Group-Time ATT <a href="#">Info</a>	First Min. Wage inc.	-440.2 (324.1)	-	136.5 (168.6)
Gen. Synth. Control <a href="#">Info</a>	Local Min. Wage	-	119.4 (1,469.0)	-
Synth. DID <a href="#">Info</a>	Local Min. Wage (2015)	-	408.3* (214.4)	-

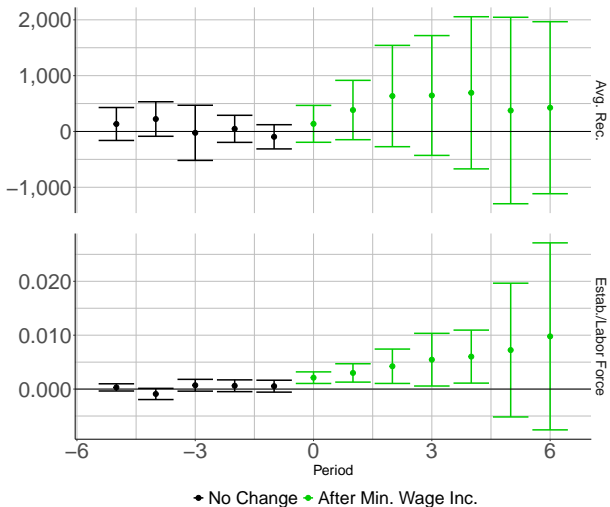
\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$

## Summary:

- The two-way fixed approach underestimates the effect on both the number of nonemployer establishments per member of the labor force and the average receipts of establishments
- The post-2009 period has larger positive effect estimates on the number of nonemployer establishments per member of the labor force
- ATE on the number of nonemployer establishments per member of the labor force,  $e_{cit}$ , of a dollar increase in the minimum wage is 0.0029
  - 1.96% increase in the stock of nonemployer establishments
  - 474,266 additional nonemployer establishments using 2019's Labor Force

# Results: Parallel Trends

**Figure 3:** Callaway and Sant'Anna (2019) for the 2010-2018 Sample, Group-Time ATT



## Results: Interactions

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One of the limitations of de Chaisemartin and d'Haultfoeuille (2019)'s estimator is an inability to test for interaction effects on the primary treatment.

- I use sub samples of the data to explore the relationship between the real minimum wage and labor market concentration in Table 3 by splitting the data by the average county HHI quantile
- I return to the two-way fixed effect model to estimate the interaction between the minimum wage, labor market concentration, and if Uber is active in Table 4 using transportation and warehousing services

# Results: Labor Market Concentration

**Table 3:** de Chaisemartin and d'Haultfoeuille (2019) Estimates by Labor Market Concentration, All Nonemployer Establishments

NAICS 00	Establishments/Labor Force, $e_{cit}$			
	Bottom Quartile	2nd Quartile	3rd Quartile	Top Quartile
2010-2018	0.0030** (0.0015)	0.0019 (0.0013)	-0.0008 (0.0016)	-0.0024 (0.0030)
Full Sample	0.0014* (0.0008)	-0.0000 (0.0006)	-0.0005 (0.0006)	-0.0019 (0.0011)
2001-2007	0.0002 (0.0009)	-0.0011** (0.0004)	-0.0004 (0.0007)	-0.0018 (0.0011)
	Average Receipts, $r_{cit}$			
2010-2018	239.0 (280.7)	95.9 (552.5)	1483.3 (971.1)	683.5 (1046.0)
Full Sample	90.1 (208.5)	-8.6 (414.2)	47.1 (356.4)	99.5 (383.3)
2001-2007	-36.3 (238.1)	-270.2 (444.7)	-419.4 (279.5)	-416.9 (427.1)

# Results: Online Gig Economy

**Table 4:** Two-way FE Estimates, Transportation and Warehousing Summary

NAICS 48-49	Establishments/Labor Force, $e_{cit}$			
	(1)	(2)	(3)	(4)
$\Delta M$	0.001*** (0.0002)	-0.0002*** (0.0001)	0.001*** (0.0003)	-0.0002*** (0.0001)
$\Delta M * \text{Uber Active}$		0.002*** (0.001)		0.003** (0.001)
$\Delta M * \text{HHI Quantile}$			-0.00002** (0.00001)	0.00000 (0.00000)
$\Delta M * \text{HHI Quantile} * \text{Uber Active}$				-0.0001* (0.00004)
	Average Receipts, $r_{cit}$			
$\Delta M$	-1,207.5 (728.6)	-127.9 (335.1)	-1,445.4 (870.5)	-363.0 (400.3)
$\Delta M * \text{Uber Active}$		-2,939.4 (1,780.1)		-1,597.7 (1,844.4)
$\Delta M * \text{HHI Quantile}$			16.9 (14.8)	13.2 (9.1)
$\Delta M * \text{HHI Quantile} * \text{Uber Active}$				-121.0** (47.5)

- Low Labor Market Concentration:
  - Positive effect on the number of nonemployer establishments
  - Null effect on average receipts
  - Uber being active drives the positive effect among transportation and warehousing services
- High Labor Market Concentration:
  - Null Effect on the number of nonemployer establishments and average receipts
  - A decrease in # Transportation and Warehousing nonemployer establishments with Uber active
  - A decrease in the average receipts of Transportation and Warehousing services

I estimate the effect a \$15 federal minimum wage on aggregate nonemployer establishments.

- Due to variation in local and state minimum wages, not every county would experience an equal change as a result of a federal increase
- A shift to a \$15 federal dollar minimum wage in 2018 would have resulted in an additional 2,995,842 nonemployer establishments
- an 11.7% increase relative to the 25,679,509 nonemployer establishments in the sample in 2018.

These results indicate that:

1. The minimum wage induces individuals to take up exempted work
2. The minimum wage has differing effects across labor market concentration
3. The presence of a low-barrier exempt labor market, indicated by the presence of Uber, is responsible for the majority of the effect among transportation and warehousing services
4. Analysis of minimum wage policies, particularly within less concentrated cities, need to account for differences between exempt and nonexempt work, and the potential for transition between the two markets

# Thank You!



Please feel free to reach out with any and all feedback at [bglasner@uw.edu](mailto:bglasner@uw.edu) or [bglasner.com](http://bglasner.com)

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Figure 4:

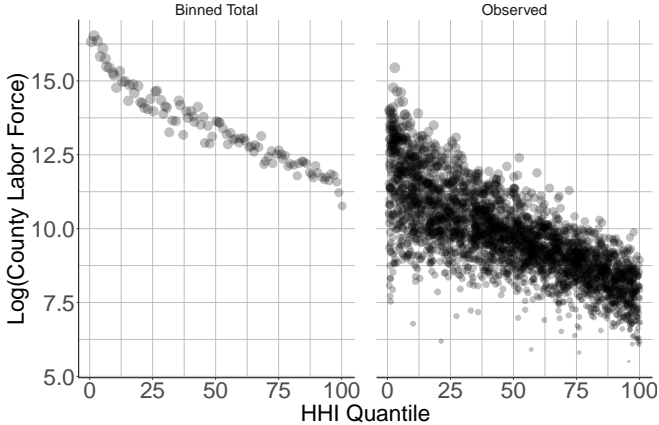
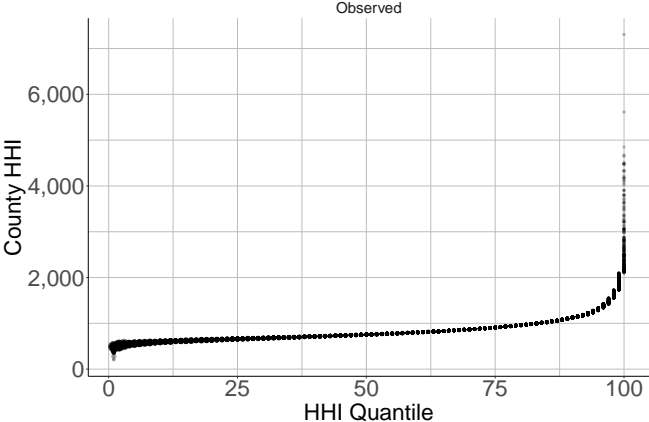
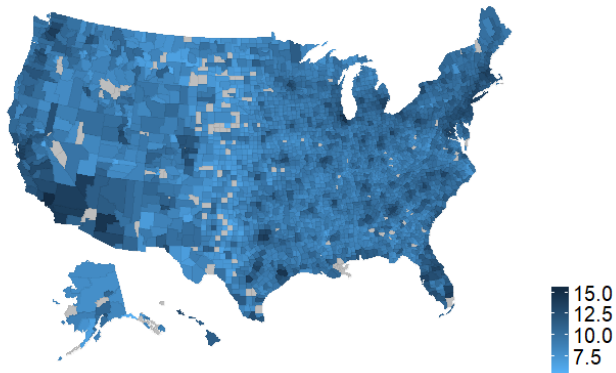


Figure 5:



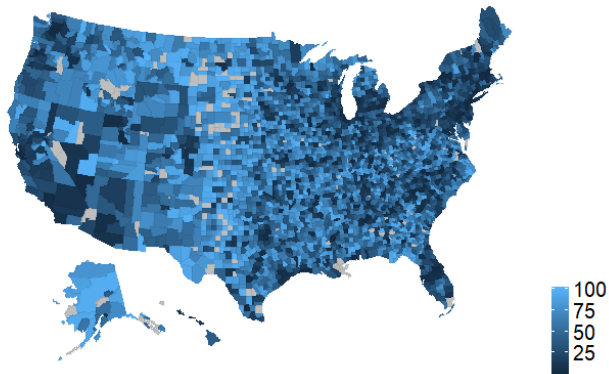
**Figure 6:**

Geographic Distribution of Log(Labor Force) in 2018



**Figure 7:**

Geographic Distribution of HHI Quantiles in 2018



## Appendix: Data & Methods

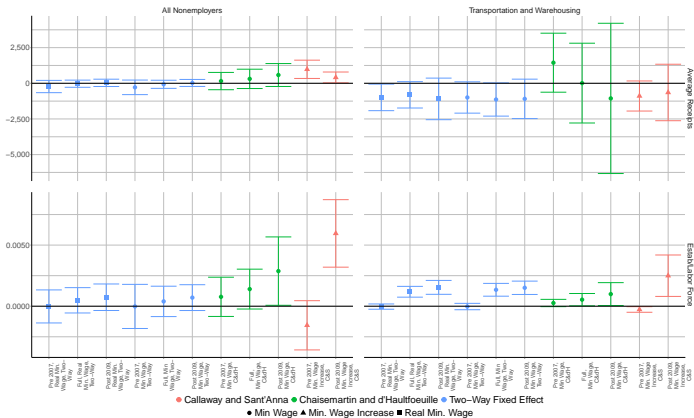
Primary two-way fixed effect model and variables:

- $Y_{cit}$  -  $e_{cit}$  or  $r_{cit}$
- $\Delta M_{ct}$  - Change in the minimum wage in county  $c$  and year  $t$
- $U_{ct}$  - Is Uber active, dummy variable
- $HHI_{ct}$  - HHI quantile (lower quantile is more competitive)
- $\alpha_c$  - County fixed effects
- $\tau_t$  - Year fixed effects

$$\begin{aligned} Y_{cit} = & \beta_0 + \beta_1 \Delta M_{ct} + \beta_2 U_{ct} + \beta_3 HHI_{ct} + \\ & \beta_4 (U_{ct} * \Delta M_{ct}) + \beta_5 (HHI_{ct} * \Delta M_{ct}) + \beta_6 (U_{ct} * HHI_{ct}) + \\ & \beta_7 (HHI_{ct} * U_{ct} * \Delta M_{ct}) + \\ & \alpha_c + \tau_t + \mu_{cit} \end{aligned} \tag{1}$$

Clustered standard errors at the state level and weighted by the county labor force

# Appendix: Results



## Appendix: Results

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de Chaisemartin and d'Haultfoeuille (2019) demonstrate that two-way fixed effect models can produce negative weights, resulting in biased average treatment effect estimates. A linear regression coefficient may produce a negative result even if all of the average treatment estimates are positive:

- I redefine the treatment as the unadjusted minimum wage, as a staggered adoption design needs to identify a steady control group in each period when a treatment occurs
- Using the real minimum wage prevents a steady counterfactual from being identified due to annual inflation adjustments
- To avoid a conflation between the transition from the real minimum wage to the unadjusted minimum wage and a change in methodology, I also present the results of the unadjusted minimum wage from equation (1) in Figure 36.

## Appendix: Results

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Callaway and Sant'Anna (2019) is an event study design on an indicator for when treatment is first introduced. As such, I alter my

- Treatment to be a variable for when the first minimum wage increase occurs for a given county in two different samples split by the federal minimum wage increases between 2007 and 2009
- This method will not be as effective at estimating the average treatment effect of the minimum but it is included to support the parallel trends assumption of the two-way fixed effect model

The Callaway and Sant'Anna (2019) method presents the first year's treatment effect while using an event study design with both pre and post treatment effect estimates, as shown in Figure 21. The reported ATE is for period zero, the year when the treatment is first introduced.

## Appendix: Results: Online Gig Economy

Table 4 shows the results of four two-way fixed effect models intended to study how the online gig economy interacts with the minimum wage and labor market concentration.

- I find a significant positive relationship between the minimum wage and the number of nonemployer establishments per member of the labor force, and an insignificant negative relationship for average receipts
- The positive effect is driven by the Uber interaction with the minimum wage
- This positive effect is weakened as labor markets become more concentrated
- Less concentrated labor markets with Uber active are most likely to see significant increase in participation in exempt work following minimum wage increases

Pre-treatment matching on:

- Establishments per member of the labor force or average receipts
- County unemployment rate
- County population
- County labor force
- County HHI
- State minimum wage
- Previous changes in the minimum wage
- If Uber is active, and when it became active

- Method: Generalized synthetic control design on local minimum wage changes<sup>67</sup>
- Treatment: Does a county or metropolitan area have a local minimum wage (binary)
- Application of synthetic control designs for the analysis of local minimum wage policies<sup>8</sup>

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<sup>6</sup>Bai (2009); Gobillon and Magnac (2016); Xu (2017)

<sup>7</sup>I use the R package "gsynth" to create a two-way synthetic control, with an EM algorithm, non-parametric inference, 500 state level clustered bootstraps to create standard errors, and weighted treatments by the average county labor force.

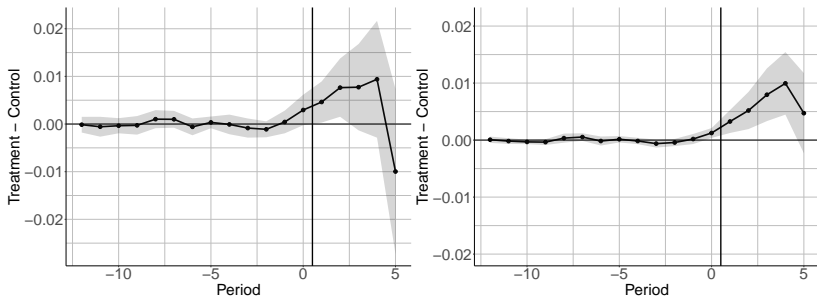
<sup>8</sup>Dube and Zipperer (2015); Powell (2017); Jardim et al. (2017)

**Table 5:** Local Minimum Wage Increases

FIPS State - County	County Name, State	Year of Adoption	HHI Quantile
6-1	Alameda, CA	2015	7
6-13	Contra Costa, CA	2015	11
6-73	San Diego, CA	2015	4
6-85	Santa Clara, CA	2014	1
17-31	Cook, IL	2017	2
19-103	Johnson, IA	2016	3
21-111	Jefferson, KY	2016	6
21-67	Fayette, KY	2017	9
23-5 '	Cumberland County, ME	2016	10
24-31	Montgomery, MD	2015	6
24-33	Prince Georges, MD	2015	20
35-13	Dona Ana, NM	2015	38
53-33	King, WA	2014	2
53-53	Pierce, WA	2017	9

## Establishments/Labor Force

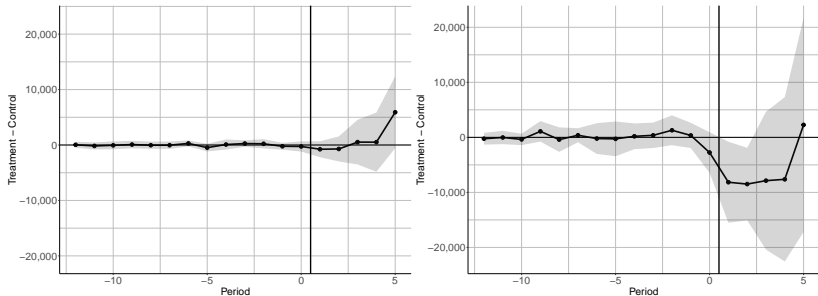
### All Nonemployer Establishments Transportation and Warehousing



**Figure 8:** These figures illustrate the average effect of the treatment on the treated (ATT) for  $e_{cit}$  for both transportation and warehousing services and all nonemployer establishments.

## Average Receipts

### All Nonemployer Establishments Transportation and Warehousing



**Figure 9:** These figures illustrate the average effect of the treatment on the treated (ATT) for  $r_{cit}$  for both transportation and warehousing services and all nonemployer establishments.

## Appendix: Synthetic Diff-in-Diff

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Arkhangelsky et al. (2019)'s method is a unit and time weighted version of the standard Difference In Differences (DID) estimator. The Synthetic Difference In Differences (SDID) estimator is consistent under a wide variety of weighting schemes given a well-specified fixed effects model

- Treatment in this case is the introduction of a local minimum wage in 2015, as this is the largest year of local increases.
- Counties which introduced local minimum wages before or after 2015 are dropped from the sample
- This method's package on R is not currently able to support multiple treatment periods.