Do Minimum Wages Increase Rents?

Evidence from US zipcodes and high frequency data

Gabriele Borg Diego Gentile Passaro Santiago Hermo

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Introduction

Motivation

Most research on the effects of minimum wage has focused on employment.

- Minimum wage policies are *place-based*
- Natural to expect broader effects in the local economy $\rightarrow$ housing market

A canonical version of monocentric city model suggests wage increases will pass-through to rents.

This paper

In this paper we estimate the effect of minimum wage policies on rents.

- Construct panel dataset at the zipcode-month level using Zillow data
- Show that the panel is representative of the U.S. urban rental market
- Estimate the effect of minimum wage on rents under different assumptions
- Explore heterogeneity of effects based on zipcode characteristics

We are also working on:

- Simple model of the rental market (preview today)
- Experienced versus actual minimum wage changes based on residence-workplace location

Model

Set-up

Partial-equilibrium model of a zipcode's housing market.

Supply side:

- $H(r)$: continuous measure of homogeneous housing units available for rent. Assume $H'(r) > 0$

Demand side:

- MW and non-MW households
- Monthly income: $\underline{w}$ and w
- Demand for housing is $\underline{H}(r, \underline{w})$ and $\overline{H}(r, w)$. Assumptions on demand:
  - the demand of housing is downward sloping: $\underline{H}_r(r, \underline{w}) < 0$ and $\overline{H}_r(r, w) < 0$
  - the demand for housing is increasing in income: $\underline{H}_w(r, \underline{w}) > 0$ and $\overline{H}_w(r, w) > 0$

Equilibrium

Assume equilibrium condition:

$$H(r) = \underline{H}(r, \underline{w}) + \overline{H}(r, w)$$

We are interested in the elasticity of rents to the minimum wage ρ. From the above condition:

$$\rho := \frac{d \ln r^*}{d \ln \underline{w}} = \frac{\underline{w}\ \underline{H}_w}{r\ H'(r) - r\ \underline{H}_r - r\ \overline{H}_r}$$

Note that, given assumptions, $\rho > 0$.

Data

Panel dataset

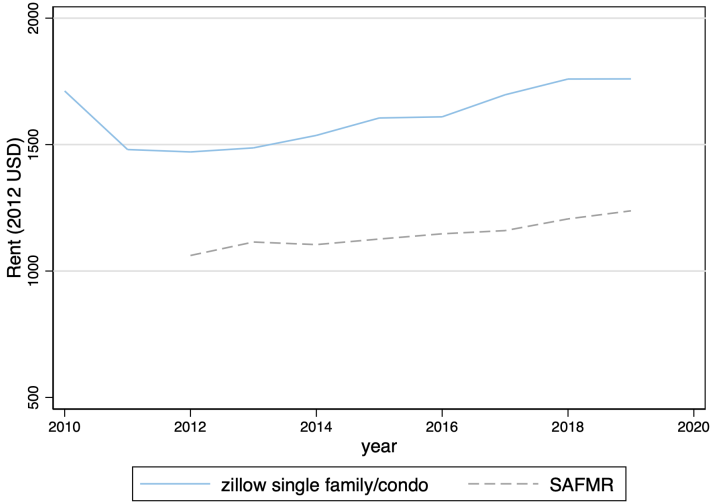
We build a panel at the zipcode-month level from January 2010 to December 2019:

- Minimum wage changes at the state and local levels
- Zillow data on rents (median price per square foot of SFCC)
- Zipcode characteristics from US Census
- Employment and Average Wages at the county level from QCEW
- Constructions permits from BPS (Building Permit Survey)
- Workplace and Residence of workers from LODES

Descriptive statistics

	U.S.	CBSA 100	Full Panel	Rent Panel
Zipcode	38,893	14,293	4,604	1,305
(%)	(1)	(0.367)	(0.118)	(0.034)
Population (Millions)	311.177	189.712	145.379	50.619
(%)	(1)	(0.61)	(0.467)	(0.163)
Housing units (Millions)	132.833	78.738	61.415	21.323
(%)	(1)	(0.593)	(0.462)	(0.161)
Median income (USD)	52,493	62,774	64,289	66,920
Houses for rent (%)	0.295	0.347	0.401	0.383
Urban population (%)	0.464	0.754	0.962	0.972
College Educated (%)	0.314	0.386	0.436	0.445
Black population (%)	0.086	0.124	0.145	0.166
Hispanic population (%)	0.097	0.136	0.17	0.192
Pop. in poverty (%)	0.154	0.143	0.143	0.133
Children 0-5 (%)	0.185	0.186	0.19	0.199
Elders 65+ (%)	0.15	0.13	0.124	0.11
Unemployed(%)	0.089	0.092	0.091	0.092
Work in same County (%)	0.701	0.684	0.755	0.756
State MW event (%)	.	.	0.862	0.875
County MW Event (%)	.	.	0.03	0.035
Local MW Event (%)	.	.	0.052	0.09
Median Rent psqft 2BR (USD)	.	.	1.775	1.975
(N)	.	.	(2,391)	(273)
Median Rent psqft MFR5PLUS (USD)	.	.	1.808	1.973
(N)	.	.	(3,365)	(417)
Median Rent psqft SFCC (USD)	.	.	1.479	1.275
(N)	.	.	(3,316)	(1,143)

National Time Series for Zillow and SAFMR data



Empirical Strategy and Results

Static Difference-in-Differences (DiD) model

Consider the model

$$\Delta y_{it} = \theta_t + \gamma_i + \beta \Delta \underline{w}_{it} + \Delta \epsilon_{it} \tag{1}$$

where:

- y_{it}: log rents
- θ_t and γ_i are monthly date and zipcode FE
- $\underline{w}_{it}$ is log actual minimum wage
- ϵ_{it} is an error term

Identifying assumption: within a zipcode $\Delta \underline{w}_{it}$ is mean independent of $\Delta \epsilon_{it}$ *conditional* on time fixed effects and a linear trend.

Dynamic models

Consider the model

$$\Delta y_{it} = \theta_t + \gamma_i + \sum_{r=-s}^{s} \beta_r \Delta \underline{w}_{i(t-r)} + \Delta \epsilon_{it} \ , \tag{2}$$

where:

-$\{\beta_r\}_{r=-s}^{s}$ are dynamic effects of leads and lags of the minimum wage

$$E\left[\Delta \epsilon_{it} \Delta \underline{w}_{it-r} | \theta_t, \gamma_i\right] = 0 \quad \forall r \in \{-s, ..., -1, 0, 1, ..., s\} \ .$$

Advantages of this specification:

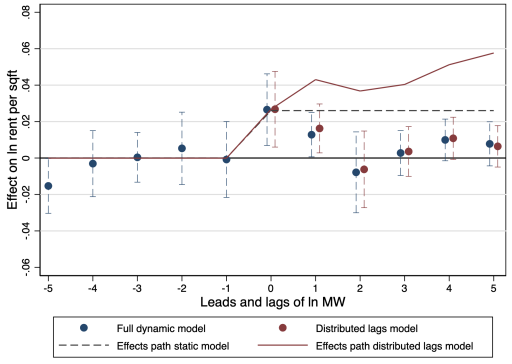
- Test pre-trends assumption
- Assess dynamics of the effect

Main Results: DiD

	(1)	(2)	(3)
$\Delta \ln(MW)_t$	0.0260**	0.0257**	0.0255**
	(0.0128)	(0.0120)	(0.0117)
Zipcode-specifc linear trend	No	Yes	Yes
Zipcode-specific quadratic trend	No	No	Yes
R-squared	0.022	0.024	0.026
Observations	112,232	112,232	112,232

Notes: The table reports coefficients from versions of the DiD model estimated on the balanced panel of zipcode-months that contains SFCC rental price. Column (1) does corresponds to a two-way fixed effects model estimated in first-differences. Column (2) includes zipcode-specific linear trends, and column (3) allows for zipcode specific quadratic trends. Standard errors clustered at the state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Main results: Dynamic Models



Notes: The plot shows the estimated coefficients for alternative models alongside 90 percent confidence intervals. The dashed line additionally reports the point estimate from the DiD. The solid red line show the point estimates for the cumulative effects. Standard errors clustered at the state level.

Heterogeneity

We interact the DiD model with indicators for quartiles of the distribution of zipcode characteristics.

	(1) Median Income	(2) Unemp. rate (%)	(3) College Grad. (%)	(4) African Am. (%)
$\Delta \ln(MW) \times 1^{st} qtl$	0.0395*	0.00357	0.0373*	0.0178
	(0.0223)	(0.0100)	(0.0196)	(0.0163)
$\Delta \ln(MW) \times 2^{nd} qtl$	0.0202	0.0355	0.0473**	0.0218
	(0.0144)	(0.0228)	(0.0222)	(0.0163)
$\Delta \ln(MW) \times 3^{rd} qtl$	0.0304	0.0269	0.0258	0.0231*
	(0.0252)	(0.0248)	(0.0214)	(0.0133)
$\Delta \ln(MW) \times 4^{th} qtl$	0.0133	0.0452**	-0.000369	0.0419**
	(0.0130)	(0.0173)	(0.0116)	(0.0164)
R-squared	0.024	0.024	0.024	0.024
Observations	112,232	112,232	112,232	112,232