City Minimum Wages

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LAMES

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The views expressed are those of the author and not necessarily those of Banco de México.

Research Summary

- **What I do**
  - Analyze the effects of city level minimum wage policies on migration, commuting and employment
- **How I do it**
  - Reduced form evidence of the local effect of minimum wages on commuting and migration
  - Quantitative spatial equilibrium model with minimum wages
  - Take model to US cities data and produce counterfactuals for upcoming minimum wage changes
- **What I find**
  - 10 % higher minimum wage - 3 % lower low-wage commuting into city
  - Commuting effects consistent with employment relocation towards areas that do not increase the minimum wage
  - No statistically significant effects on migration
  - Nonlinear effects of minimum wages on commuting and employment for areas that are planning changes

Motivation: Local Minimum Wage Policies

- Federal minimum wage in the US constant at $7.25 / hour since 2009.
- "Fight for 15" movement trying to increase the minimum wage at the federal level.
- Local minimum wage policies spreading through US cities: New York, Seattle, Baltimore.
- Labor supply effects depend on linkages of cities to surroundings
  - Commuting
  - Migration
- Many other supply and demand side effects (not analyzed here)

Research Questions

1. How do city labor markets react to minimum wage changes in spatial equilibrium?
2. What can we expect from future local minimum wage policies in terms of these adjustment margins?

Contribution

- Reduced-form evidence on the effect of minimum wages on commuting and migration
  - Cadena (2015), Monras (2016), Kuehn(2016), McKinnish(2017), Shirley(2018)
  - Use state borders to estimate commuting and migration effects
  - Lower level of spatial aggregation
- Spatial model of minimum wages, commuting and migration
  - Moretti (2010), Kline and Moretti (2013), Ahlfeldt et al. (2015), Monte et al (2016), Zhang(2018)
  - First to introduce unemployment in modern quantitative urban models
- Model-based counterfactuals for US cities
  - Jardim et. al (2017), Zhang(2018), Beaudry et al. (2018)
  - First to model spillover response for upcoming minimum wage changes

Reduced Form Analysis

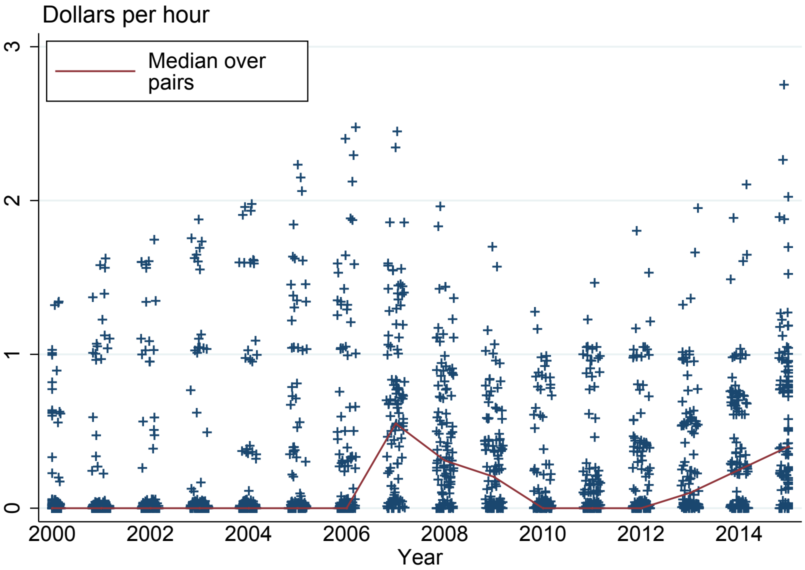
State Border Design

- Would like evidence on city borders
- However, there are only a few city level minimum wage policies and they are too recent
- Reduced form analysis of changes around state borders when state minimum wages change
- Advantages:
  - Long history of state minimum wage changes
  - State-wide minimum wage policy less correlated with conditions at the border

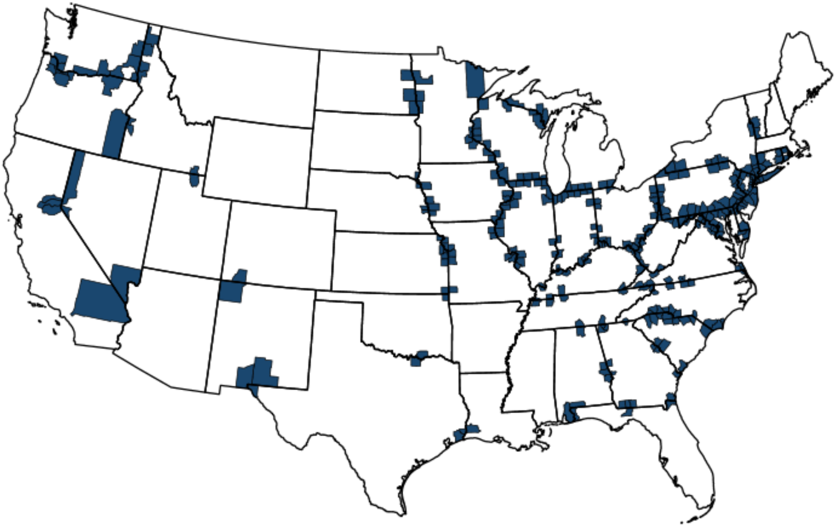
Data and Sample

- Commuting and employment: LEHD Origin-Destination Employment Statistics (LODES) 2002-2015
  - Number of workers by residence and workplace census block (pairs). Yearly.
  - Administrative data, about 95 % of jobs in US. Has imputation
  - Wage categories: $<$ \$1250 monthly, \$1251 to \$3333, $>$ \$3333. (Federal MW $\approx$ 1160 monthly)
- Focus on
  - Connected borders that have commuting
  - Narrow bands (11km) around border, add to county of work-county of residence-year level
- State Minimum Wages from Neumark et. al (2014), Dube et. al (2010,2014), Clemens et al. (2018)
- Covariates from other sources: Population, Employment, EITCs, Establishment Counts, Gas Prices, Corporate Taxes

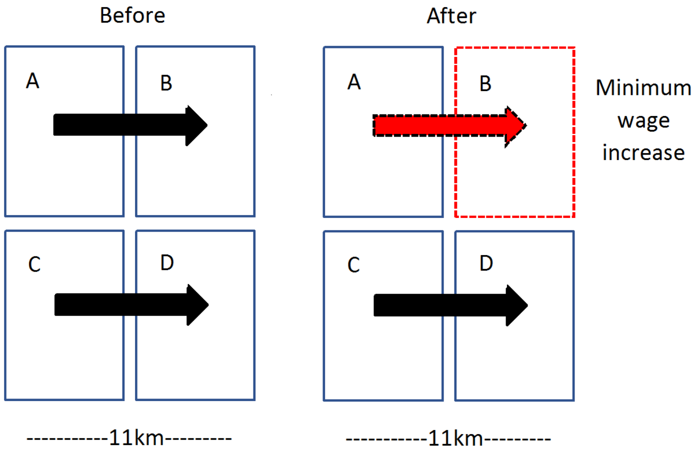
Difference in Minimum Wage Between Neighbor States



Counties in sample



Empirical Research Design - Panel



Within Design

Regression Strategy

- Panel design

$$Y_{nit} = \beta_0 + \beta_n ln(minwage_{nt}) + \beta_i ln(minwage_{it}) + \gamma_{ni} + \delta_t + \Phi_n X_{nt} + \Phi_w X_{it} + \epsilon_{nit}$$

- Y_{nit} :
  - Commuting from county *n* to *i* in year *t* in narrow band from border
  - Difference in low-wage employment and resident shares between *n* and *i*
- $minwage_{nt}$, $minwage_{it}$ minimum wages in residence and workplace
- X_{nt}, X_{it} Controls in residence and workplace

Low Wage Commuting - Panel Design

	Log Low Wage Commuters - 11 Km to Border					
	(1)	(2)	(3)	(4)	(5)	(6)
Log MW Residence	0.30	-0.01	0.03	-0.03	0.07	-0.02
	(0.36)	(0.14)	(0.11)	(0.12)	(0.12)	(0.12)
Log MW Workplace	-0.70*	-0.36***	-0.33***	-0.25**	-0.27**	-0.30***
	(0.40)	(0.10)	(0.10)	(0.10)	(0.12)	(0.09)
Adj R sq.	0.002	0.965	0.967	0.969	0.968	0.976
N	6,780	6,773	6,773	6,773	6,773	6,773
Work counties	265	264	264	264	264	264
Res counties	303	298	298	298	298	298
Work, res effects		Yes	Yes	Yes	Yes	Yes
Year effects		Yes	Yes	Yes		Yes
Controls			Yes	Yes	Yes	Yes
State trends				Yes		
Census div x year effects					Yes	
Work, res trends						Yes
Mean dep. var.	396.9	397.3	397.3	397.3	397.3	397.3

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

Excludes pairs with average commuting below 150 a year. Excludes AK, AZ, AR, DC, MA, MS, NH, WY. Standard errors calculated with multidimensional clustering at border segment, county of work, county of residence and county pair level. Controls include: Population by age groups, lagged state employment, gas prices, state EITCs, establishment counts, corporate taxes.

Within design High wage commuting

Employment Sorting

Difference in low wage employment shares			
	(1)	(2)	(3)
	11 Km	11 Km	11 Km
Log MW Residence	0.02	0.04***	0.00
	(0.01)	(0.01)	(0.01)
Log MW Workplace	-0.02	-0.02*	-0.04**
	(0.01)	(0.01)	(0.02)
Adj R sq.	0.855	0.863	0.881
N	4,414	4,096	4,096
Work counties	191	190	190
Res counties	213	211	211
Work, res effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Controls		Yes	Yes
Census div x year effects			Yes
Mean dep. var.	-0.01	-0.01	-0.01

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

Excludes pairs with average commuting below 150 a year. Excludes AK, AZ, AR, DC, MA, MS, NH, WY. Standard errors calculated with multidimensional clustering at border segment, county of work, county of residence and county pair level. Controls include: Population by age groups, lagged state employment, gas prices, state EITCs, establishment counts, corporate taxes, total employment in area.

Residence Sorting

Dependent variable: Difference in low wage resident shares

	(1)	(2)	(3)
	11 Km	11 Km	11 Km
Log MW Residence	0.00	0.02	-0.02
	(0.01)	(0.01)	(0.01)
Log MW Workplace	0.01	0.01	-0.01
	(0.01)	(0.02)	(0.02)
Adj R sq.	0.935	0.942	0.947
N	4,418	4,100	4,100
Work counties	191	190	190
Res counties	213	211	211
Work, res effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Controls		Yes	Yes
Census div x year effects			Yes
Mean dep. var.	-0.01	-0.00	-0.00

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

Excludes pairs with average commuting below 150 a year. Excludes AK, AZ, AR, DC, MA, MS, NH, WY. Standard errors calculated with multidimensional clustering at border segment, county of work, county of residence and county pair level. Controls include: Population by age groups, lagged state employment, gas prices, state EITCs, establishment counts, corporate taxes, total employment in area.

Summary of Results

- Large, negative elasticity of low wage commuting to minimum wages
- Low wage employment sorting away from minimum wage increases
- Limited evidence of residence sorting

Model

Framework

- N locations indexed by n, i. In this example: 2 locations.
- Mass of L individuals with different skill levels s: $L^{\updownarrow}, L^{\Updownarrow}, L^{\langle}$
- Each individual chooses a location n to live and a location i to search

	Search 1	Search 2
Live 1	V_{11}	V_{12}
Live 1	V_{21}	V_{22}

Indirect Utility

$$V_{ni}^s = \underbrace{z_{ni}^s}_{\text{Preference}} \frac{\overbrace{\tilde{w}_{ni}^s}^{\text{Expected wage}}}{(1 + \underbrace{\rho_i^s}_{\text{Employment probability}} \underbrace{\kappa_{ni}}_{\text{Commuting cost}})\underbrace{Q_n^{1-\beta}}_{\text{Rent}}}$$

$$\tilde{w}_{ni}^s = \rho_i^s \underbrace{w_i^s}_{\text{Wage}} + (1 - \rho_i^s) \underbrace{R_n}_{\text{Unemployment benefit}}$$

- z_{ni}^s induces heterogeneity in location choice

Market Setup

- Minimum wages in place in each region,assumed binding, treated as exogenous. Commuting costs and unemployment benefits.
- Wages for the other two categories taken as exogenous
- Firms produce with labor of different skills with a CRS production function
- Firms open vacancies in each region. Low skilled workers randomly matched to these vacancies
- Housing supplied inelastically and paid according to average income in each residential location

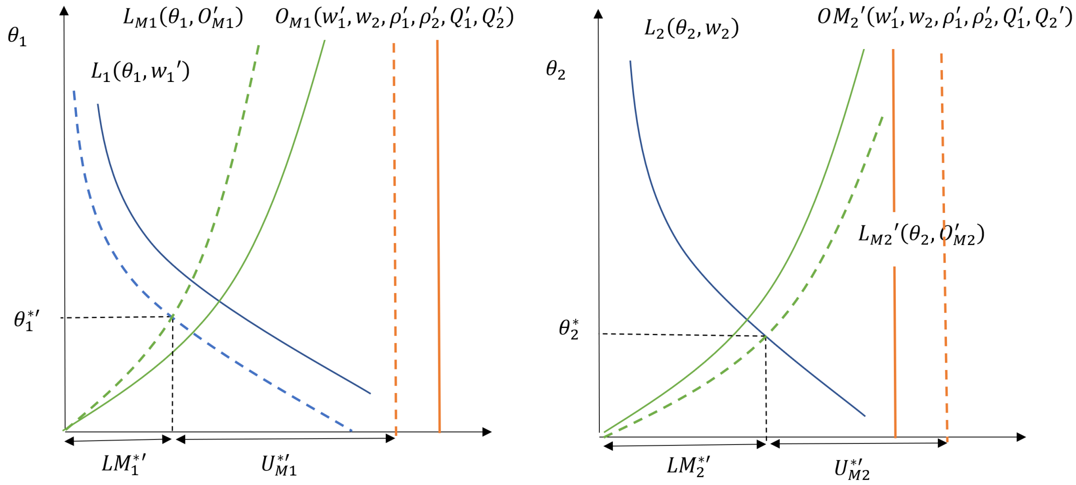
Equilibrium

- In equilibrium, in each workplace

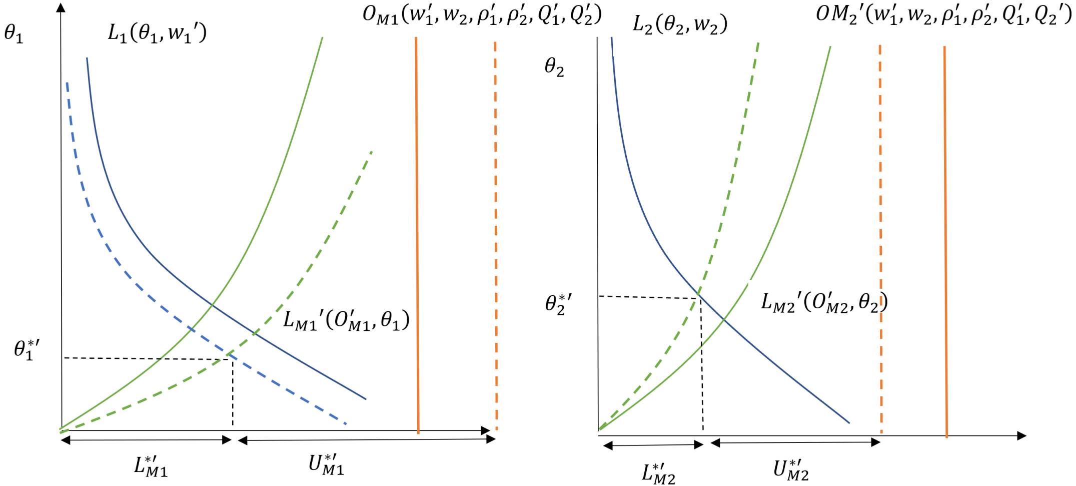
$$\frac{\text{Workers}}{\text{Searchers}} = \text{Job finding probability}$$

- An equilibrium in the model is a vector of housing prices, income, residents , workers, and job-seekers, of each worker type at each location such that:
  - Location choices are consistent with utility maximizing choice probabilities
  - The labor market is in equilibrium
  - Employment probabilities are consistent with ratios of search to employment
  - The housing market clears

Employment and commuting decrease in response to higher minimum wage



Employment and commuting increase in response to higher minimum wage



Effects of minimum wages

In partial equilibrium, search prob. elasticity further decomposed into

- Wage effect (+): Increased search in location with higher wages
- Employment effect (-): As labor demand goes down, employment probabilities go down and expected wages are lower
- Housing effect (?): Higher wages change the price of land everywhere and induce migration
- Overall effect is ambiguous

In general equilibrium, other commuting probabilities are also affected

Fitting the model and counterfactuals

Parametrization: Distribution of Preferences (a.k.a Extreme Value Magic)

- Assume z_{ni}^s has a Fréchet distribution (Eaton and Kortum 2002, Ahlfeldt et. al 2015)
$$G_{ni}^s(z) = exp(-T_n^s X_i^s z^{-\epsilon})$$
- T_n^s is a residential amenity: average preference for living in n
- X_i^s is a workplace amenity: average preference for working in i (or being unemployed)
- ϵ dispersion of preferences. Larger ϵ, lower dispersion of preferences, lower gains from commuting
- ϵ governs the size of the wage effect
- Closed-form solution for choice probabilities

Fitting the model

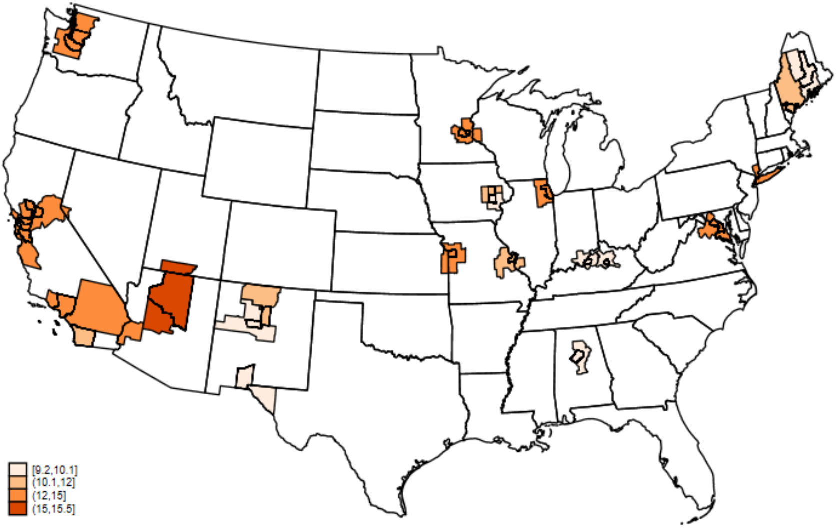
- T_n, X_i act as structural errors to fit data as equilibria of the model
- Estimate ϵ through two methods
  - Gravity equation estimation
  - Method of moments
- Calibrate remaining parameters: matching functions and employment probabilities for each area.

Identification

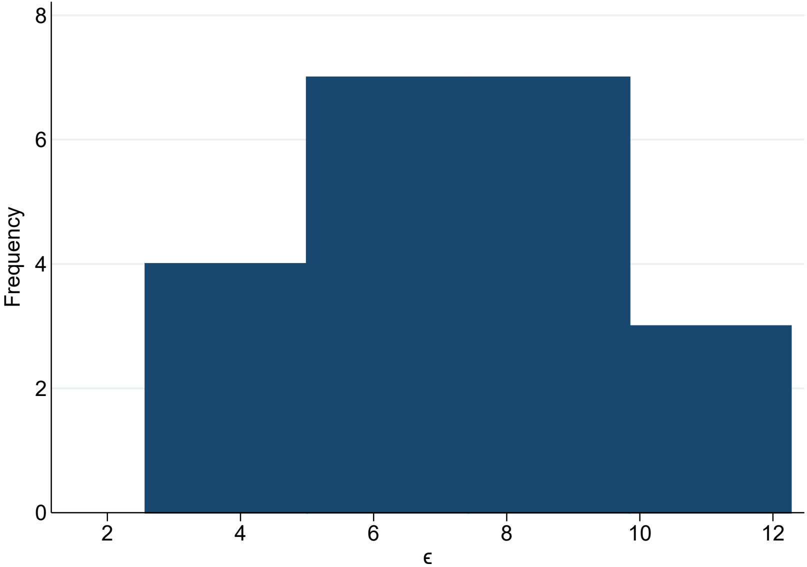
Building Counterfactuals

- Fit model to US cities considering minimum wage changes
- 51 cities, in 31 counties, in 23 commuting zones considering minimum wage increases. Examples:
  - Seattle increased to $15 in 2017
  - New York, increasing to $15 in 2018
- Consider each city and its commuting zone
- Locations are counties in the commuting zone

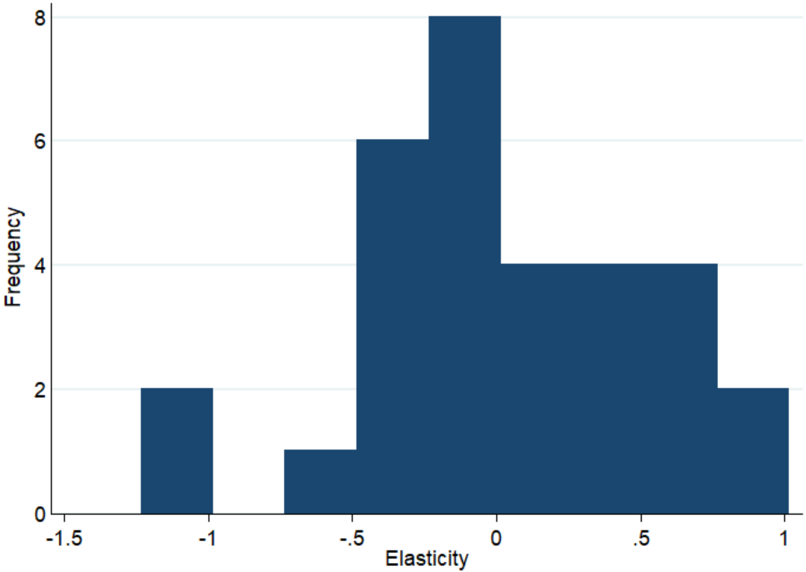
Commuting zones increasing minimum wages



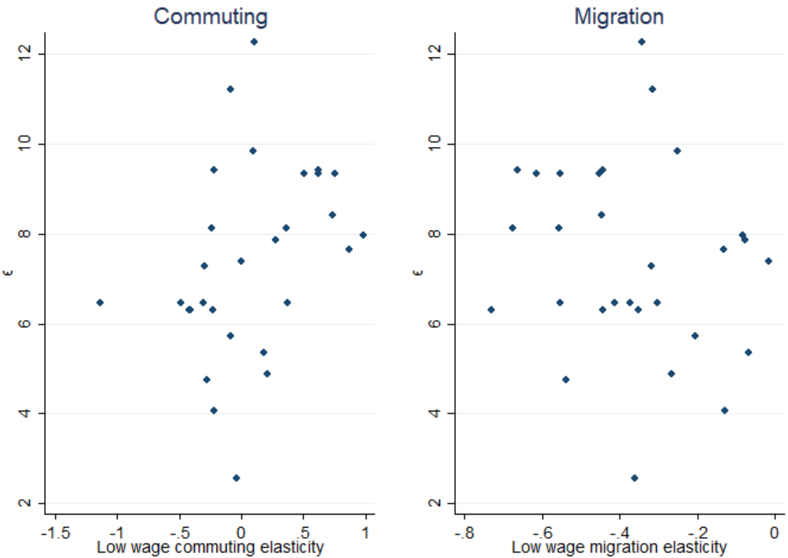
Estimates of ϵ: Gravity Equation, All Cities



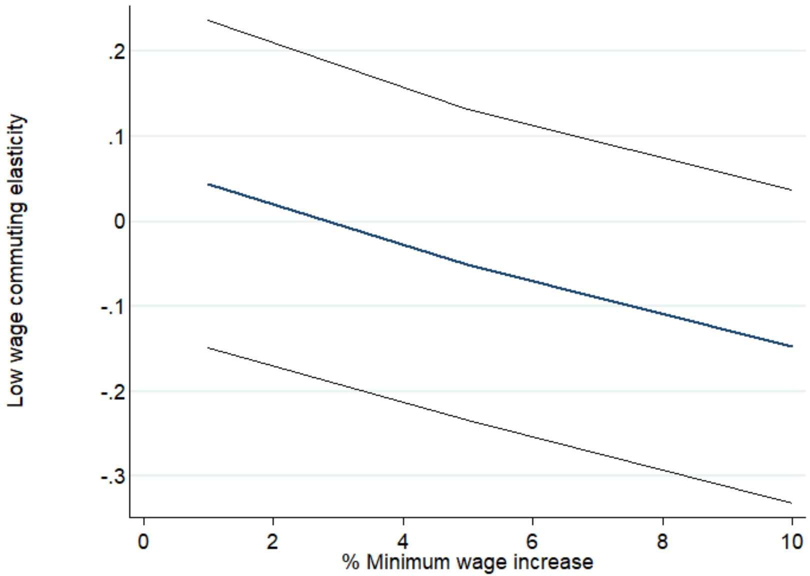
Low wage commuting elasticities in counterfactuals



Commuting, migration elasticities and ϵ



Commuting elasticity and size of the wage increase



Summary of Responses

- Average commuting elasticity in model ranges from 0.05 to -0.15 in 2015.
- Through general equilibrium effects, some cities may experience commuting increases
- Non linear effect of minimum wages: Larger negative elasticities of commuting with larger minimum wage increases

Concluding Remarks

Concluding Remarks

- This paper
  - Reduced form analysis of effects of minimum wages on local labor markets
  - Structural model of minimum wages and location choice allowing for unemployment
  - Counterfactuals for cities considering minimum wage increases
- Future research
  - Labor supply responses through labor market participation
  - Other dimensions of worker sorting
  - Validation with changes of minimum wage in sample
  - Housing price responses with new data

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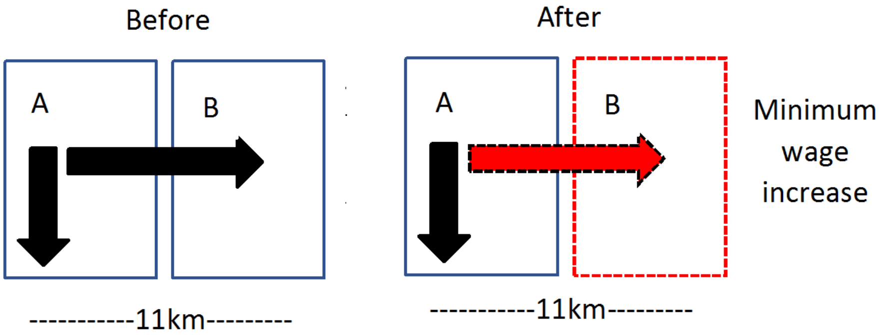
Extras

Empirical Research Design - Within



Back to Panel Design

Low Wage Commuting - Within Design

Log Low Wage Commuters - 11 Km to Border

	Same Residence		
	(1)	(2)	(3)
Log MW - Workplace - Log MW Residence	-0.19	-0.35***	-0.36***
	(1.01)	(0.13)	(0.11)
Adj R sq.	-0.000	0.291	0.290
N	11,038	10,846	10,846
Work counties	368	351	351
Res counties	319	296	296
Res effects x Year effects		Yes	Yes
Work effects x Year effects			
Res Effects			
Work effects		Yes	Yes
Controls			Yes
Mean dep. var.	2306.9	2273.8	2273.8
Within R sq.			0.000

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

Excludes pairs with average commuting below 150 a year. Excludes AZ, AR, DC, KS, MA, NH. Standard errors calculated with multidimensional clustering at border segment, county of work, county of residence and county pair level. Controls include: Population by age groups, lagged state employment, gas prices, state EITCs, establishment counts, corporate taxes.

Back to results

High Wage Commuting - Panel Design

Log High Wage Commuters - 11 Km to Border

	(1)	(2)	(3)	(4)	(5)	(6)
Log MW - Residence	0.58	-0.18	-0.07	-0.20*	-0.23*	-0.20
	(0.71)	(0.16)	(0.14)	(0.11)	(0.14)	(0.14)
Log MW Workplace	-0.00	-0.36**	-0.27**	-0.27**	-0.13	-0.13
	(0.73)	(0.14)	(0.13)	(0.11)	(0.11)	(0.12)
R sq.	0.003	0.976	0.978	0.979	0.980	0.999
N	6,657	6,650	6,096	6,096	6,096	6,096
Work counties	273	269	269	269	269	269
Res counties	306	303	303	303	303	303
Work, res effects		Yes	Yes	Yes	Yes	Yes
Year effects		Yes	Yes	Yes	Yes	Yes
Controls			Yes	Yes	Yes	Yes
State trends				Yes	Yes	Yes
Census div x year effects					Yes	Yes
Work, res trends						Yes
Mean dep. var.	794.9	795.7	779.3	779.3	779.3	779.3

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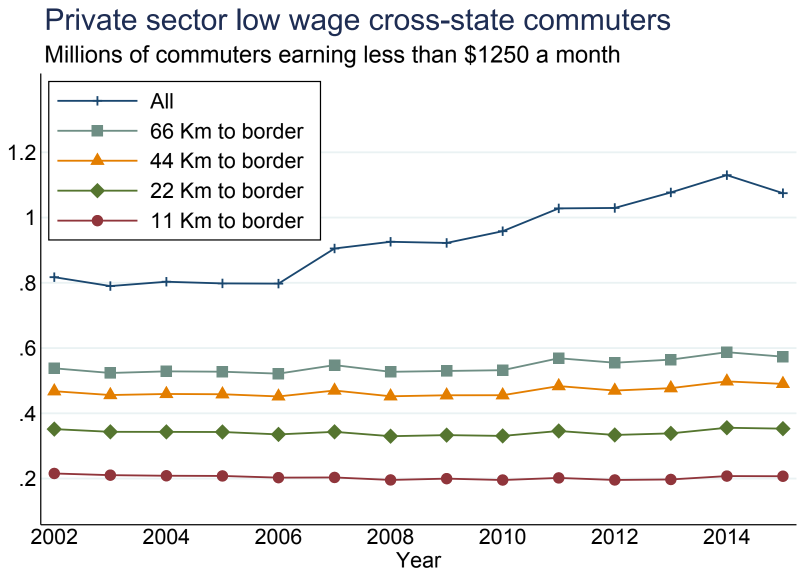
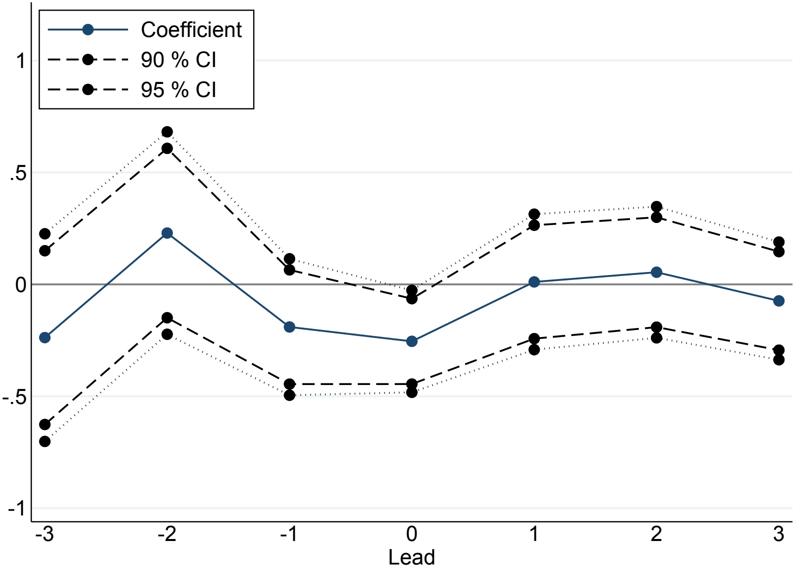
Back to results

Intuition for Identification

- Conditional on residence and wages, places that receive more commuters must have higher workplace amenities X_i^s. Can identify X_i^s
- Given X_i^s, and residential probabilities, places with more residents must have higher residence amenities or lower housing prices. Can identify $T_n^s Q_n^{-\epsilon(1-\beta)}$
- Given wages, employment, labor market tightness and σ, productivities A_i^s can be computed from the firm's first order conditions


Private sector low wage cross-state commuters
Millions of commuters earning less than $1250 a month
All
66 Km to border
44 Km to border
22 Km to border
11 Km to border
1.2
1
.8
.6
.4
.2
2002
2004
2006
2008
2010
2012
2014
Year

Coefficients on leads of the minimum wage variable



Employment Sorting

Difference in mid wage employment shares

	(1)	(2)	(3)
	11 Km	11 Km	11 Km
Log MW Residence	-0.04***	-0.03**	-0.01
	(0.01)	(0.01)	(0.02)
Log MW Workplace	0.02	0.02	0.03
	(0.01)	(0.02)	(0.02)
Adj R sq.	0.772	0.792	0.806
N	3,909	3,591	3,591
Work counties	189	188	188
Res counties	213	211	211
Work, res effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Controls		Yes	Yes
Census div x year effects			Yes
Mean dep. var.	-0.01	-0.01	-0.01

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

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Gross flows vs net flows

Commuting **from A to B** depends on the difference in minimum wages between A and B:

$$C_{abt} = \alpha_{ab} + \beta(mw_{bt} - mw_{at}) + \varepsilon_{abt}$$

Same in the opposite direction:

$$C_{bat} = \alpha_{ba} + \beta(mw_{at} - mw_{bt}) + \varepsilon_{bat}$$

Then a regression of net flows identifies the coefficient:

$$NetC_{abt} = C_{abt} - C_{bat} = (\alpha_{ab} - \alpha_{ba}) + 2\beta(mw_{bt} - mw_{at}) + \varepsilon_{abt} - \varepsilon_{bat}$$

Gross flows vs net flows

Commuting from A to B depends on both minimum wages at workplace *w* and residence *r* :

$$C_{abt} = \alpha_{ab} + \beta_w mw_{bt} + \beta_r mw_{at} + \varepsilon_{abt}$$

Same in the opposite direction :

$$C_{bat} = \alpha_{ba} + \beta_w mw_{at} + \beta_r mw_{bt} + \varepsilon_{bat}$$

Then a regression of net flows does not identify the coefficients, only their differences :

$$\begin{aligned} NetC_{abt} &= C_{abt} - C_{bat} \\ &= (\alpha_{ab} - \alpha_{ba}) + (\beta_w - \beta_r) mw_{bt} + (\beta_r - \beta_w) mw_{at} + \varepsilon_{abt} - \varepsilon_{bat} \end{aligned}$$

Also occurs if the coefficients are different in each direction (example: towards/away from central business district) Back to results