Fragmented Markets and the Proliferation of Small Firms: Evidence from Mom-and-Pop Shops in Mexico

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MISMOS PRECIOS DEL DE ABASTOS

Motivation

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  - We explore one **demand-side factor** $\Rightarrow$ **consumer transport costs**

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- Why are developing countries characterized by a prevalence of **small firms** in retail sector?
  - We explore one **demand-side factor** $\Rightarrow$ **consumer transport costs**
- We ask: how do increases in transport costs affect the number, size and quality of small firms?

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- Market size matters for selection of entering firms
  - As market sizes $\uparrow \Rightarrow$ firms who enter have higher quality

What we do

1. Why are there many small firms in developing countries?
   - Spatial model: link between transport costs and market structure.
   - Empirical strategy: using data on universe of m&p shops in Mexico, exploit liberalization of gas prices as natural experiment for changes to consumer transport costs
     - Transport costs $\uparrow \Rightarrow$ num stores $\uparrow$ average size $\downarrow$ aggregate quality $\downarrow$
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2. Welfare implications of regularization program in Mexico City which increases costs of entry for m&p shops.
   - Increasing fixed costs leads to less firms but higher quality ones
   - Consumer and producer surplus decrease
   - In a world with high transport costs, larger negative impacts on welfare

Literature Review

- Constraints to firm growth:
  - Supply side: De Mel et al. (2008); Banerjee et al. (2019); Bassi and Nansamba (2022); Field et al. (2010); De Mel et al. (2014); McKenzie (2017); McKenzie and Sakho (2010); Campos et al. (2018).
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- Transport costs:
  - Market integration: Donaldson (2018); Banerjee et al. (2020)

  Contribution: high-frequency data to see micro shocks and short-term outcomes

Roadmap

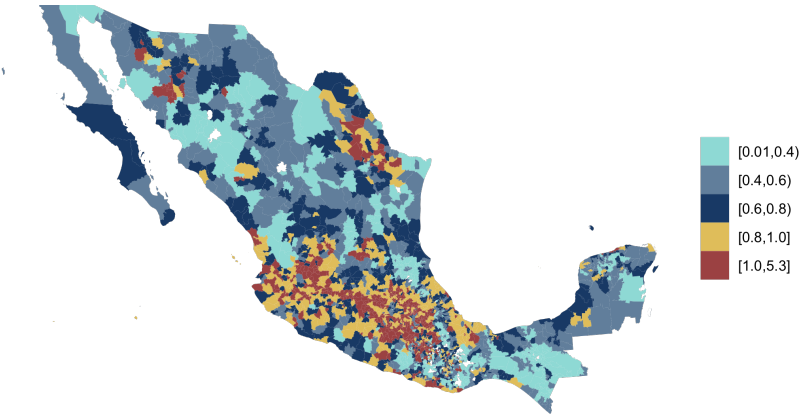
Mom and Pop Shops in Mexico

- 7% of GDP and 83% of employment in food and beverage sector

Typical M&P shop

Mom and Pop Shops in Mexico

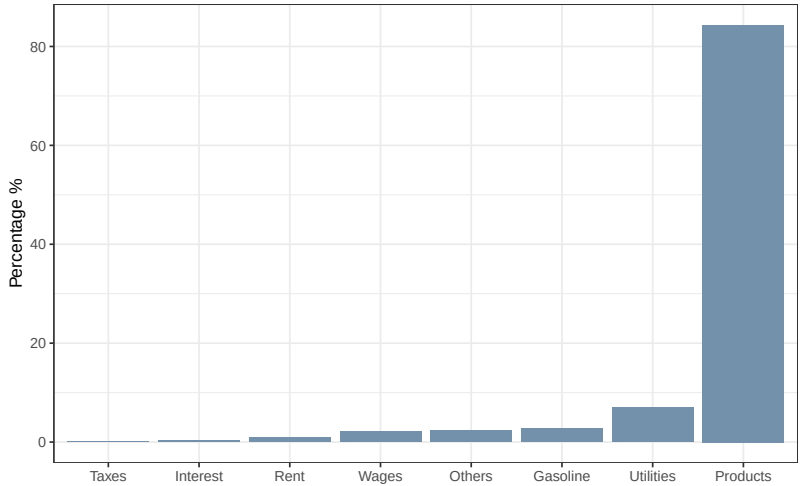
- 7% of GDP and 83% of employment in food and beverage sector
- 15% of all micro firms



Stores per 1000 people

Mom and Pop Shops in Mexico

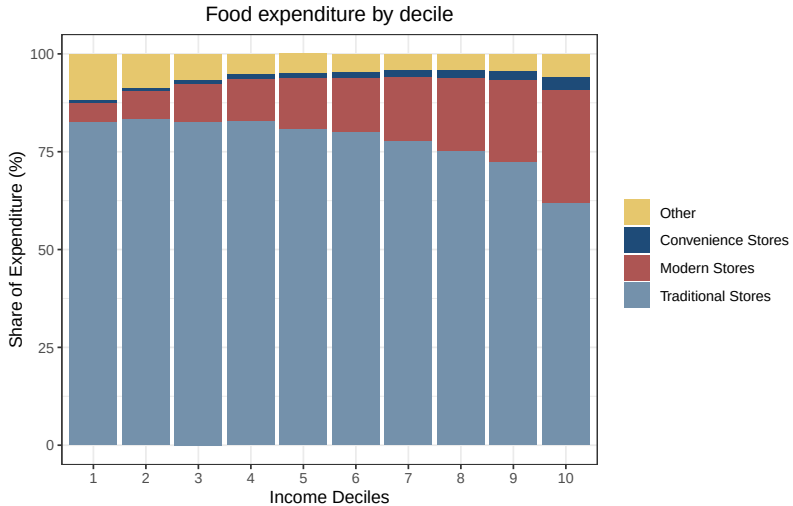
- 7% of GDP and 83% of employment in food and beverage sector
- 15% of all micro firms
- Highest operating cost is buying products



Expenses of mom-and-pop shops

Mom and Pop Shops in Mexico

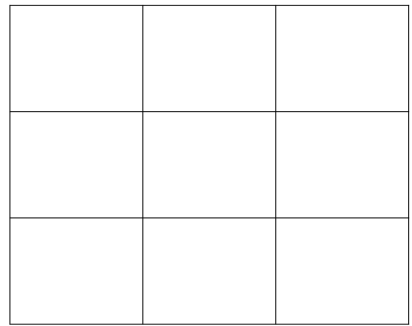
- 7% of GDP and 83% of employment in food and beverage sector
- 15% of all micro firms
- Highest operating cost is buying products
- Represent large share of expenditure for households



Roadmap

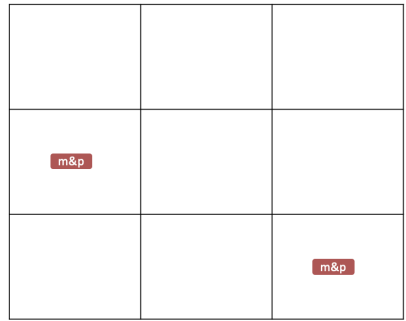
Conceptual framework

- City with N blocks $i, j \in \{1, ..., N\}$



Conceptual framework

- City with N blocks $i, j \in \{1, \ldots, N\}$, at most one m&p shop in every block.



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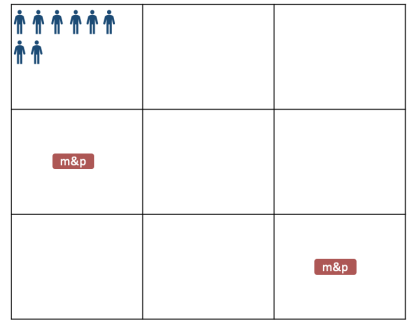

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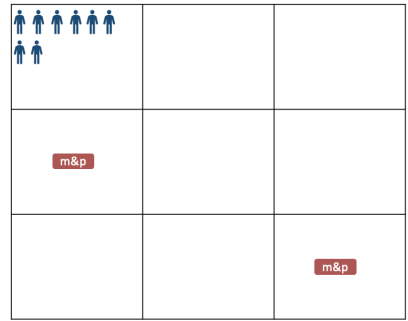

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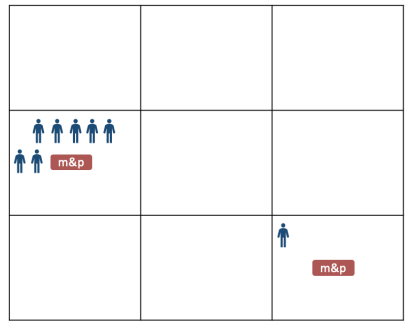
  - Observe potential demand and make entry decision



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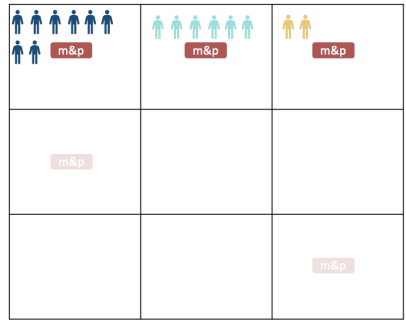
- $\Rightarrow$ As transport costs increase, markets become fragmented.



Roadmap

Data: firms

Partnered with the largest bread and snack company in Mexico that supplies products to the universe of mom and pop shops

- Catalog of firms contains:
  - $\sim$ 1.5 million m&p shops over whole sample. ▸ Representativeness
  - Latitude and longitude of firm.

- Sales data from upstream supplier to (or input purchases by) each m&p shop
  - 20 million observations
  - Monthly data from 2017-2020
  - Sales in Mexican pesos
  - Number of items sold

▸ Summary Stats

Data: other sources of data

- Gas price data
  - Daily price at pump from 2017-2020.
  - Location of gas stations.

- ENIGH
  - Household income and expenditure survey: 2016, 2018, 2020.
  - 100,000 households surveyed.

- Census data for 2010
  - Number of households and population at census tract level.
  - Years of schooling, access to health, household's characteristics at municipality level.

- Underlying CPI data
  - Data at the store-by-barcode level

- Social Security data
  - Wages and employment for the universe of formal workers

Roadmap

Consumer Transport Cost Shock

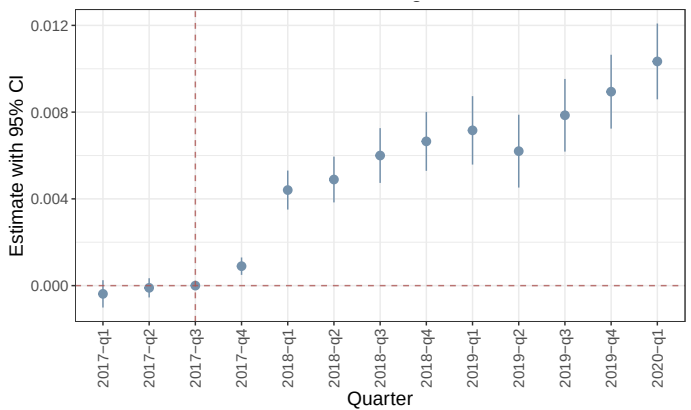
- Shock to consumer transport costs: Exploit deregulation of gas prices in Q4 of 2017
  - Mexico opened the gasoline market for the first time and allowed prices to fluctuate
- Instrument: use ex-ante distance to closest gasoline distribution center
  - Places further away experienced larger increase in gas prices due to additional logistics cost
- We estimate event studies:

$$Y_{mt} = \alpha_m + \delta_t + \sum_k \beta_k (\widehat{distNearDC}_m \times \mathbb{1}[t = k]) + \gamma_0 \boldsymbol{X}_{m0} + \epsilon_{mt}$$

- m municipality fixed effects, t quarter fixed effects
- cluster standard errors at municipality level

First stage

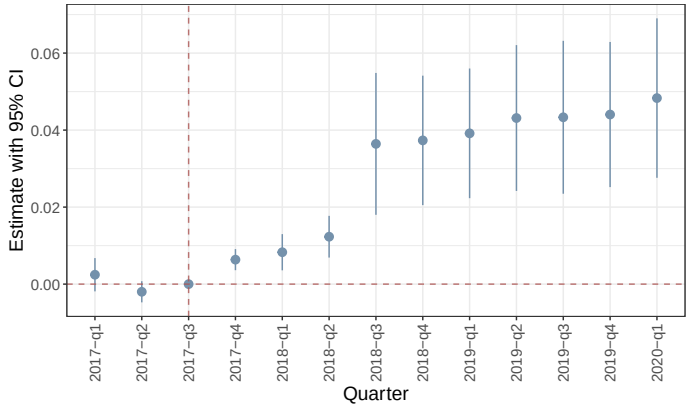
$$log(gasPrice_{mt}) = \alpha_m + \delta_t + \sum_k \beta_k (\log(distDistrCntr_m) \times \mathbb{1}[t = k]) + \gamma_0 \boldsymbol{X}_{m0} + \epsilon_{mt}$$



▸ Interpretation

Market Structure: number of stores increase

$$log(numShops_{mt}) = \alpha_m + \delta_t + \sum_k \beta_k (\log(distDistrCntr_m) \times \mathbb{1}[t = k]) + \gamma_0 \boldsymbol{X}_{m0} + \epsilon_{mt}$$



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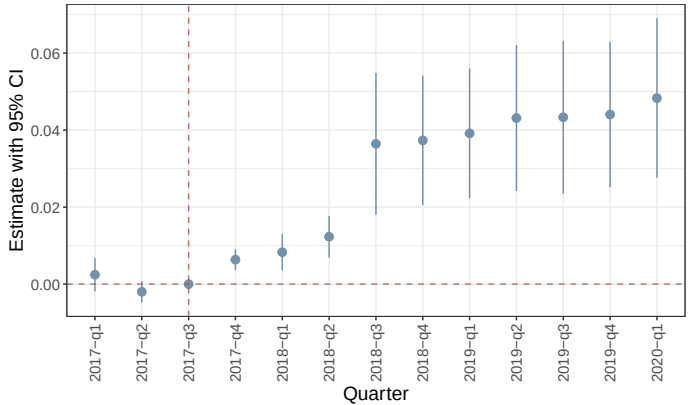
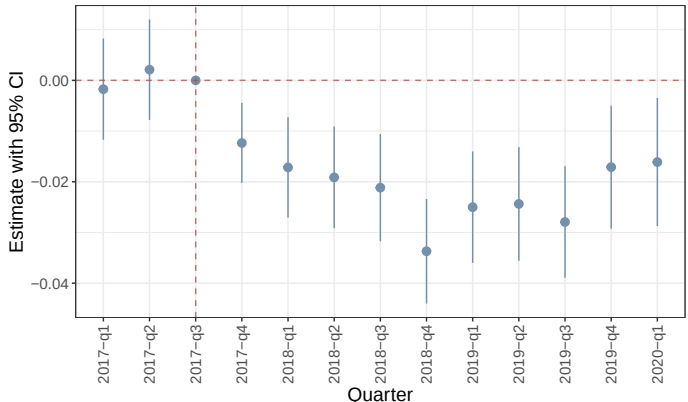
- Explained by entry of stores ▸ Details



Market Structure: average sales decrease

$$log(avgSales_{mt}) = \alpha_m + \delta_t + \sum_k \beta_k (\log(distDistrCntr_m) \times \mathbb{1}[t = k]) + \gamma_0 \boldsymbol{X}_{m0} + \epsilon_{mt}$$



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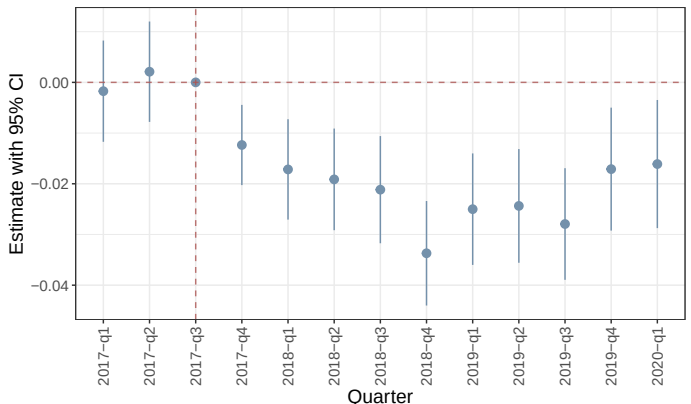
- What explains the decrease?



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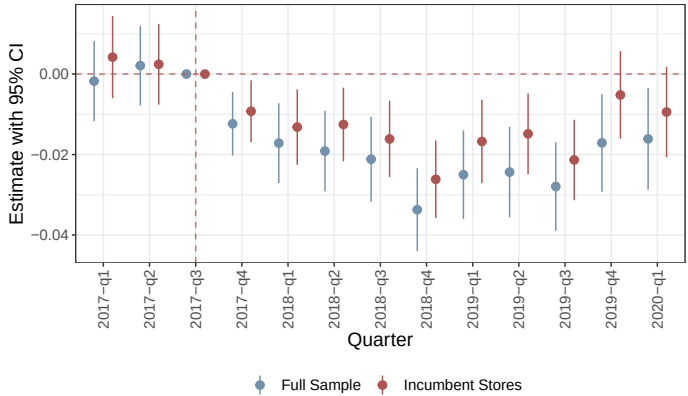
- What explains the decrease? 75% of decrease explained by business stealing
  - ▸ More: aggregate sales



Selection: quality

- Exploit panel-nature of our data to estimate firm-specific quality γ_j.

$$log(sales_{tj_{(l)}}) = \phi_{AgeBin_j} + \alpha_{tl} + \gamma_j + \epsilon$$

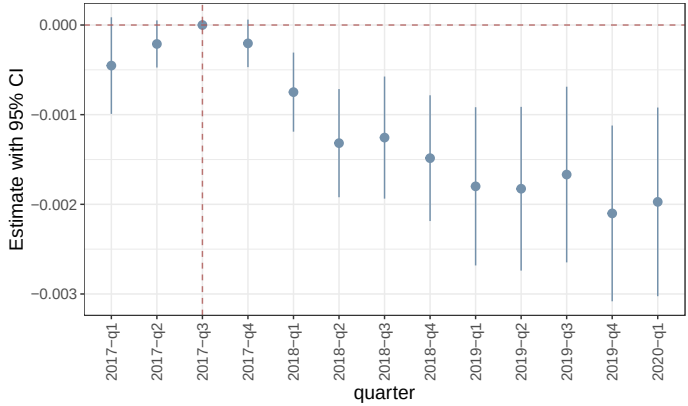
- Construct municipality-quarter level quality

$$quality_{mt} = \frac{\sum_{j \in \Omega} \gamma_{jt}}{\#\Omega}$$

  - Variation coming from change in composition of operating firms

Selection: quality decreases

$$quality_{mt} = \alpha_m + \delta_t + \sum_k \beta_k (\log(distDistrCntr_m) \times \mathbb{1}[t = k]) + \gamma_0 \boldsymbol{X}_{m0} + \epsilon_{mt}$$



▸ Age and quality ▸ Fixed cost of entry

Market fragmentation: gasoline expenditure drops

Dependent Variables:	Extensive Margin		Intensive Margin	
	Gasoline (1)	Public Transport (2)	Log Gasoline Lts (3)	Log Public Transport (4)
Variables				
Log Gasoline Price	-0.323*	0.395**	-0.965**	0.367
	(0.176)	(0.186)	(0.415)	(0.979)
Log Gasoline Price × Income	0.032***	-0.017***	0.068***	0.042***
	(0.010)	(0.005)	(0.020)	(0.007)
Controls	Yes	Yes	Yes	Yes
Fixed-effects				
State-Year	Yes	Yes	Yes	Yes
Municipality	Yes	Yes	Yes	Yes
Fit statistics				
N Observations	190,974	190,974	87,344	97,207
Dep. Var. Mean	39	64	89.5	78.6

Clustered (Municipality) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Market fragmentation: substitution across and within store format

	Extensive Margin		Intensive Margin		Within M&P
Dependent Variables:	M&P Shops	Supermarkets	Log M&P Shops	Log Supermarkets	Distance Traveled
	(1)	(2)	(3)	(4)	(5)
Variables					
Log Gasoline Price	0.052	-0.109	-1.14	-1.05**	-1.87***
	(0.119)	(0.192)	(0.694)	(0.504)	(0.543)
Log Gasoline Price × Income	-0.014***	0.010***	-0.031***	0.066***	
	(0.004)	(0.003)	(0.006)	(0.020)	
Controls	Yes	Yes	Yes	Yes	Yes
Fixed-effects					
State-Year	Yes	Yes	Yes	Yes	
Municipality	Yes	Yes	Yes	Yes	Yes
Quarter-Year					Yes
Fit statistics					
N Observations	190,974	190,974	175,653	130,520	27,371
Dep. Var. Mean	0.910	0.680	145.7	113.5	4,676.85

Clustered (Municipality) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

▸ Details

Ruling out other potential mechanisms

- Real wages falling ▸ Details
- Employment falling ▸ Details
- Prices changing at supermarkets relative to m&p shops ▸ Details
- Upstream supplier modifying supply chain: would bias against our results

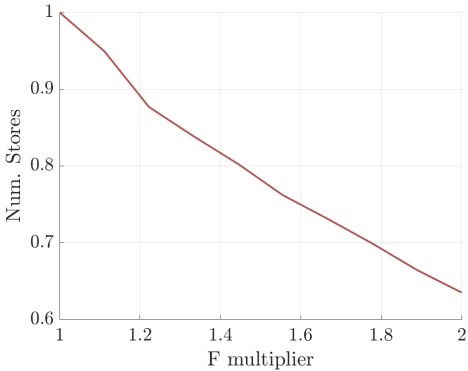
Roadmap

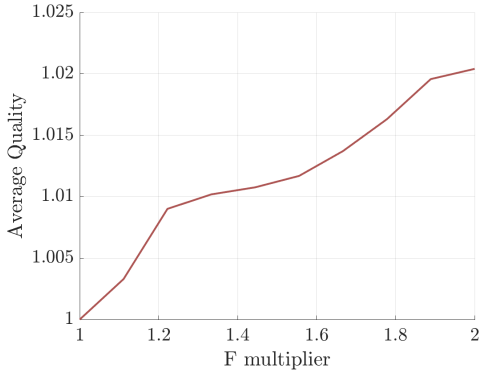
Regularization of mom-and-pop shops

- 2021 Mexico City: program to “regularize” mom-and-pop shops
- Stores had to obtain certificate for operation
- Bureaucratic process involving: payment for certificate ($\sim$ 100 dollars) and proof of documentation (pictures, ID, property tax payments, ownership of sotre’s location, etc.)
- $\Rightarrow$ effectively increasing fixed costs for store owners.

Trade-off between quantity and quality

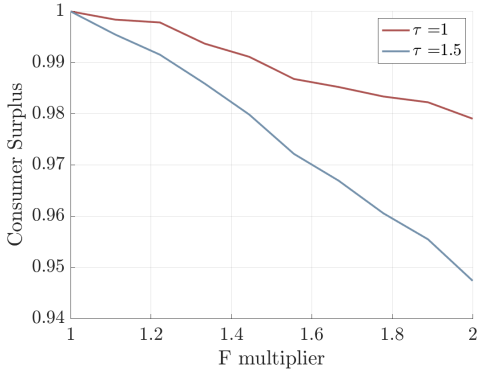
- As fixed costs of entry increase $\Rightarrow$ less stores enter the market and the average quality increases.

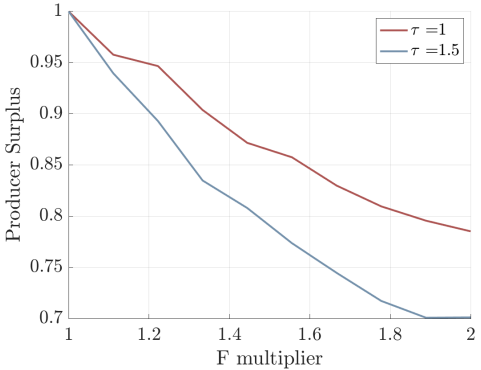




Consumer and Producer Welfare

- Consumers: hurt by less stores (predominant effect)
- Producers: hurt by higher fixed costs
- Welfare decrease larger in a world with high transport costs





Roadmap

Conclusion

- Increases in transport costs lead to:
  - $\uparrow$ number of stores (explained by entry)
  - $\downarrow$ average firm size (large business stealing effect)
  - $\downarrow$ agreggate quality (positive correlation with fixed costs of entry)
- As transport costs increase $\Rightarrow$ firms are able to enter because of their low fixed cost of entry.
- Evaluated Mexico City policy that increases fixed costs of entry
  - Trade-off between quantity and quality
  - Consumer and producer surplus decreases under higher F
  - Welfare decrease larger in a world with high transport costs

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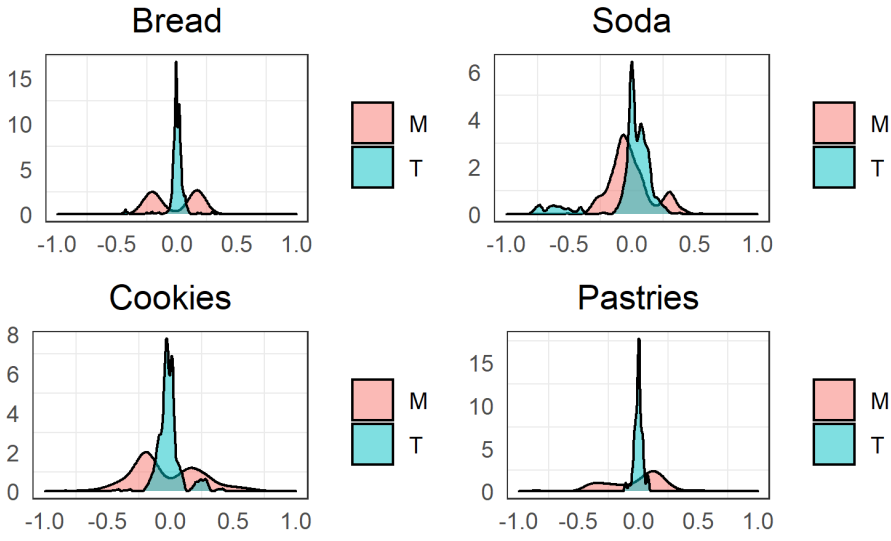
APPENDIX

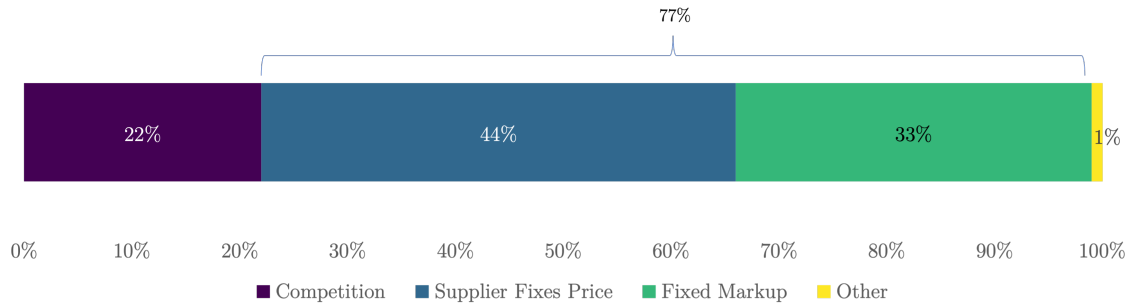
Price Dispersion in traditional and modern retailers



Return

Pricing in small stores

Almost 80% of firms report fixed markups

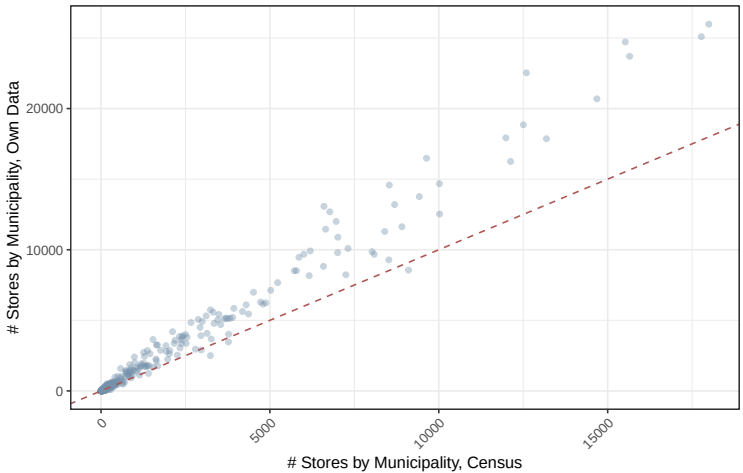


Source: ENAMIN, 2010. n = 3,488

Return

Representativeness of Data

Our data contains more stores than those in the 2019 economic census.

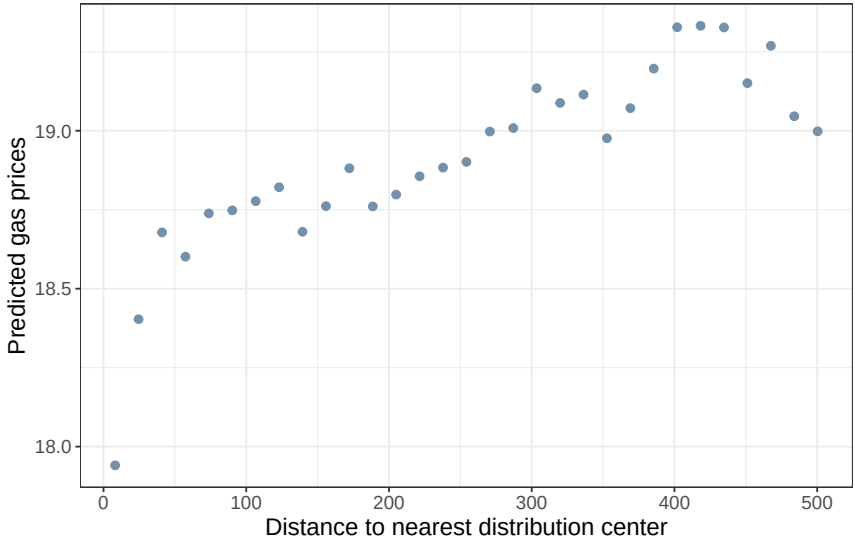


Summary Stats

Statistic	Mean	St. Dev.	Pctl(25)	Pctl(50)	Pctl(75)	Max
# of stores/Month	783,335	26,796	754,139	795,673	799,376	831,255
# Stores/Mun	527.7	1,067	88	206	435	12,854
# Stores/1KPop	8.95	5.78	6.38	8.95	11.3	188.5
Market Share	0.003	0.015	0.0002	0.0005	0.002	1
Month Value USD	223	249	63	136	285	1,790
Month Q	416	432	128	274	551	41,580
Average Price USD	0.54	0.5	0.42	0.51	0.59	27
Informal	83%					
Woman owner	63%					
Owns 1 store	82%					

Conversion rate used 1 USD = 18 MXN ▸ Return

Gas prices increased 8.3% in places furthest away



Return

IV estimates

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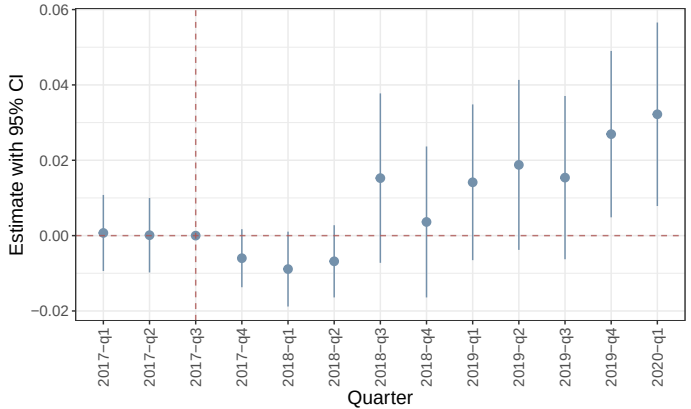
	First Stage	IV				
Dependent Variables:	Log Gasoline Price	Log #Stores	Log Average Sales	Log Sales	Entry	Exit
	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Log Distance Distr. Center × Post	0.006***					
	(0.0006)					
Log Gasoline Price		4.88***	-3.31***	1.57	13.4***	-0.732
		(1.12)	(0.631)	(1.16)	(2.49)	(2.29)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed-effects						
Quarter-Year	Yes	Yes	Yes	Yes	Yes	Yes
Municipality	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics						
N Observations	27,767	27,767	27,767	27,767	27,767	27,767
N Stores	1,114,665	1,114,665	1,114,665	1,114,665	1,114,665	1,114,665
F-Stat	112.014					
Dep. Var. Mean	0.791	438.2	441.0	253,237.6	17.2	12

Clustered (Municipality) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

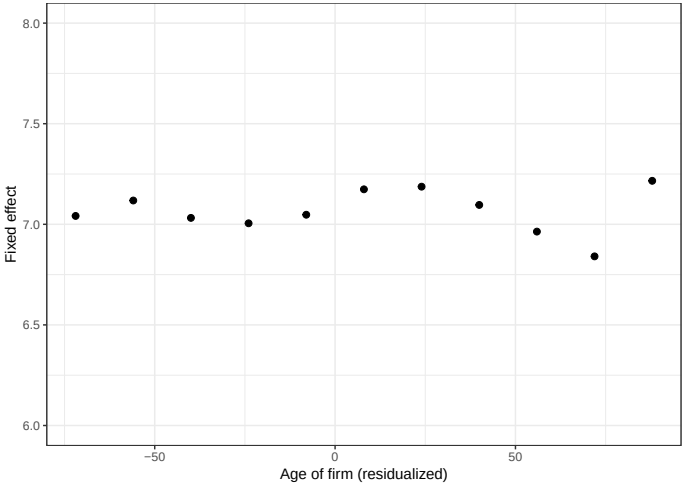
Market Structure: no change in aggregate sales

$$log(numShops_{mt}) = \alpha_m + \delta_t + \sum_k \beta_k (\log(distDistrCntr_m) \times \mathbb{1}[t = k]) + \gamma_0 \boldsymbol{X}_{m0} + \epsilon_{mt}$$



▸ Return

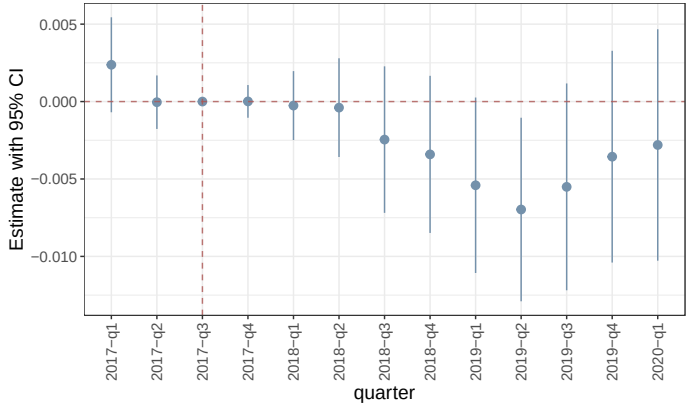
Correlation between age and FE



Return

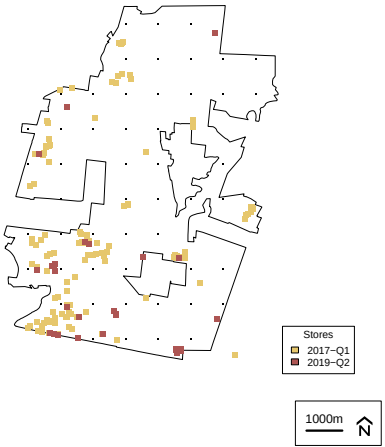
Selection: stores entering have lower fixed costs

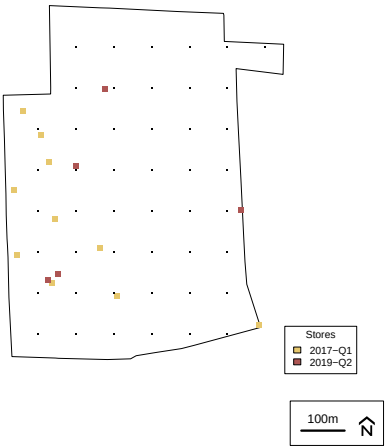
$$rentIndex_{mt} = \alpha_m + \delta_t + \sum_k \beta_k (\log(distDistrCntr_m) \times \mathbb{1}[t = k]) + \gamma_0 \boldsymbol{X}_{m0} + \epsilon_{mt}$$



▸ Return

Average distance strategy





▸ Return

Stores per ring

	0-200m	200-400m	400-600m	600-800m	800m-1km
Mean	7.6	16.88	24.21	30.23	35.46
Median	6	13	18	22	24

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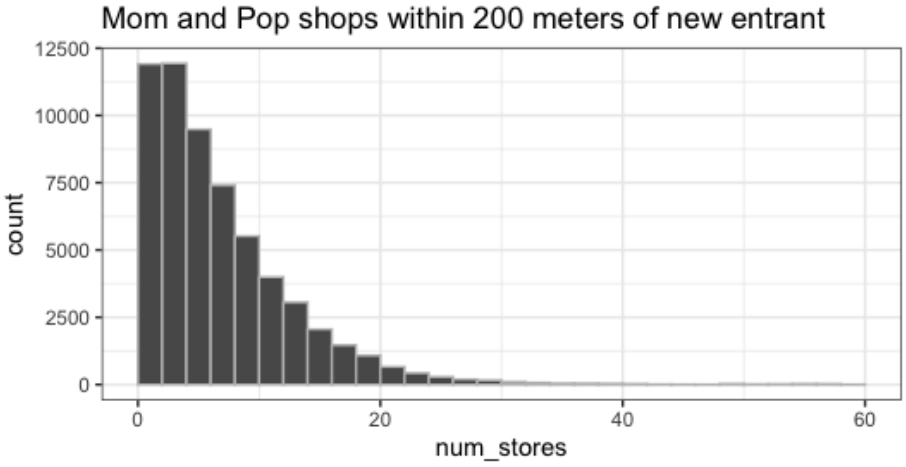
Zoom into 200 meter ring



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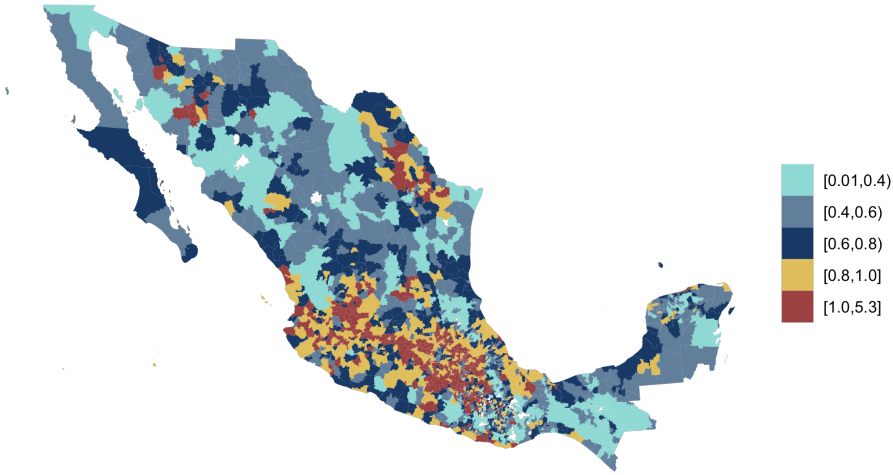
Type of Payment Across Store Formats

- Mom and Pop stores do not seem to give credit to their customers

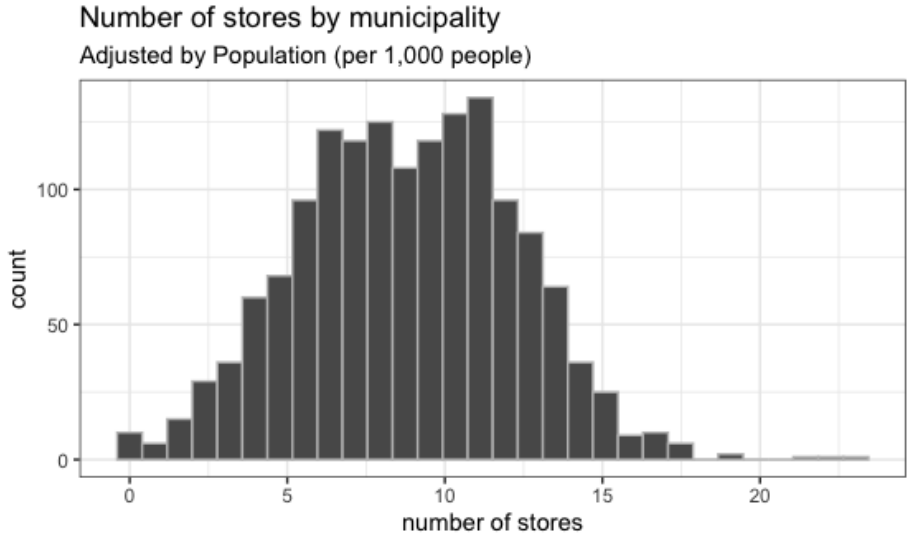
	Mom and Pop	Street market	Specialty shops	Convenience stores	Supermarkets
Cash	98.05	99.67	99.69	99.23	95.9
Card	0.02	0.05	0.08	0.68	4.01
Loan	1.93	0.29	0.22	0.09	0.08

Number of stores per 1K people

▸ Return

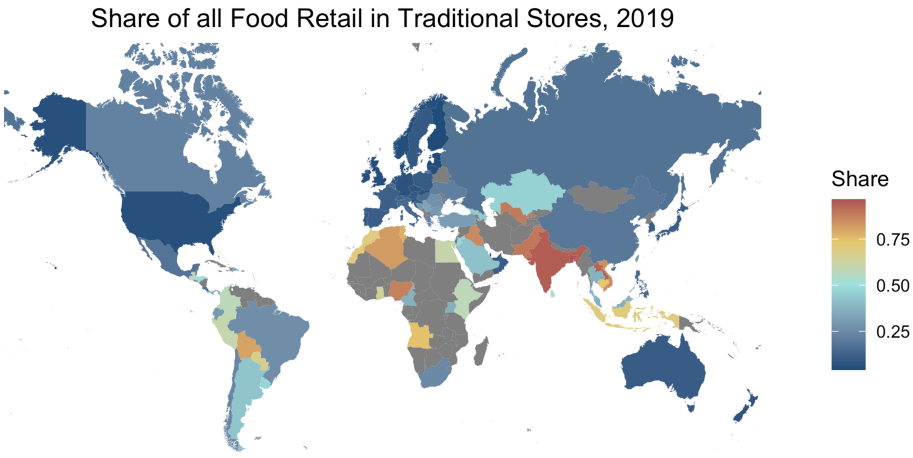


On average, there is $\sim$ 1 store per 100 people



Share of Total Food Retail in Traditional Stores by Country

Traditional mom-and-pop stores represent an important share of total food retail in many countries



Model with Realistic Geography

- City with N blocks indexed by $i, j \in \{1, ..., N\}$
- Each block i has mass M_i consumers. Consume 1 unit of homogeneous good with fixed price p
- Assume that at most one store can operate per block j
- Utility of consumer ω living in i consuming in block j: $u_{ij}(\omega) = p^{-1}\tau_{ij}^{-1}\epsilon_{ij}(\omega)$
  - τ_{ij}: transport cost of going from $i \to j$
  - $\epsilon_{ij}(\omega) \sim Frechet(\theta)$: idiosyncratic factors that push a consumer from i to consume in j
- Consumer chooses which block to consume j to maximize:

$$\max_j \quad u_{ij}(\omega) = \max_j \quad p^{-1}\tau_{ij}^{-1}\epsilon_{ij}(\omega)$$

Demand for Firms, Supply, and Equilibrium

- Frechet distribution implies share of consumers from i that consume in j is:

$$s_{ij} = \frac{\left(\tau_{ij}\right)^{-\theta}}{\sum_{j'}\left(\tau_{ij'}\right)^{-\theta}}$$

- θ is the elasticity of consumption to transport costs

- Total demand for a store in j is:

$$D_j = \sum_i D_{ij} = \sum_i M_i s_{ij}$$

- Assume firms earn fixed markups μ exogenously set by upstream supplier, but has to pay fixed cost of $F_j \geq 0$. Given set of operating firms $\varphi \equiv \{1, ..., J\}$

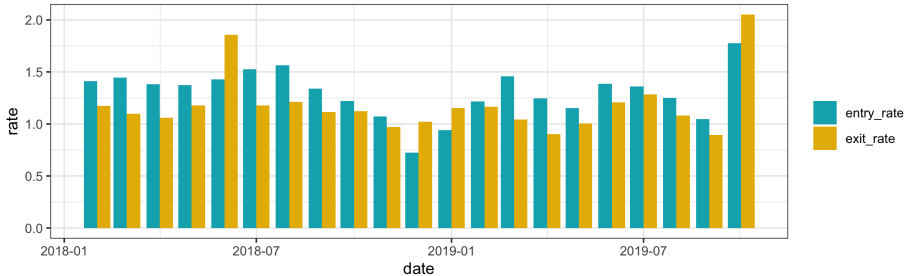
$$\pi_j(\varphi) = \mu D_j(\varphi) - F_j$$

- Equilibrium is market structure of active firms φ such that:

$$\pi_j(\varphi) \geq 0 \quad \forall j$$

Low cost of entry

- In any given month, there are on average $\sim 790,000$ mom and pop shops, $\sim 10,300$ firms enter and $\sim 9,400$ firms exit.



- The annual entry rate is $\sim 16\%$ and the annual exit rate is $\sim 14.7\%$.
  - Our estimates are in line with other papers that report entry and exit rates for informal and micro enterprises in developing countries: Vietnam (McCaig and Pavcnik 2021), India (Field et al. 2013).
  - Higher than formal firms in developing countries ($\sim 7\%$), manufacturing firms in developing countries (~ 7.4), firms in developed countries.

Business Stealing: Details

- Start from an equilibrium with J firms operating $\varphi = \{1, ..., J\}$
- Suppose a firm $J+1$ enters $\Rightarrow \varphi' = \{1, ..., J, J+1\}$. What is the effect on the incumbents? For a given incumbent $j \in \varphi$:

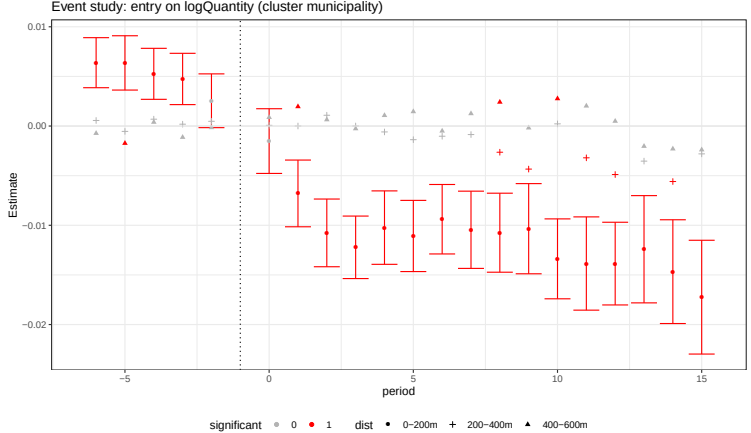
$$\pi_j(\varphi') - \pi_j(\varphi) = -\mu \sum_i \underbrace{s_{ij}(\varphi)}_{\text{initial share } i \to j} \times \underbrace{s_{iJ+1}(\varphi')}_{\text{new share } i \to J+1} < 0$$

- Entry by $J+1$ affects all firms but disproportionately affects firms from which it steals "more" business, i.e, firms that are closer
  - Model predicts decreasing effect of entry with respect to distance

▸ Return

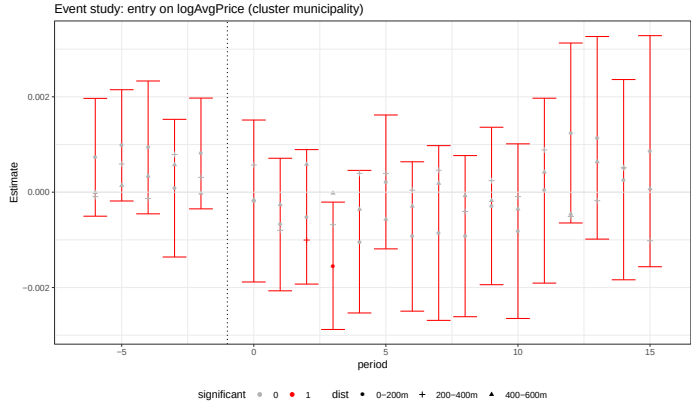
the effect is driven by quantity...

$$log(quantity)_{imtr} = \alpha_i + \alpha_{mt} + \sum_{\tau=-6}^{15} \sum_{\rho} \beta_{\tau r} \mathbb{1}\{t = \tau\} \times \mathbb{1}\{r = \rho\} + \epsilon_{imtr}$$



and not by price

$$log(avgPrice)_{imtr} = \alpha_i + \alpha_{mt} + \sum_{\tau=-6}^{15} \sum_{\rho} \beta_{\tau r} \mathbb{1}\{t = \tau\} \times \mathbb{1}\{r = \rho\} + \epsilon_{imtr}$$



▸ Return

Welfare

- Defining Consumer Market Access for individuals in block i as:

$$CMA_i(\varphi) \equiv \sum_{j' \in \varphi} \left(\tau_{ij'}\right)^{-\theta}$$

- Consumer welfare given an equilibrium market structure φ is given by:

$$CS_i(\varphi) = \mathbb{E}\left[\max_j u_{ij}(\omega)|\varphi\right] = \Gamma\left[CMA_i(\varphi)\right]^{1/\theta}$$

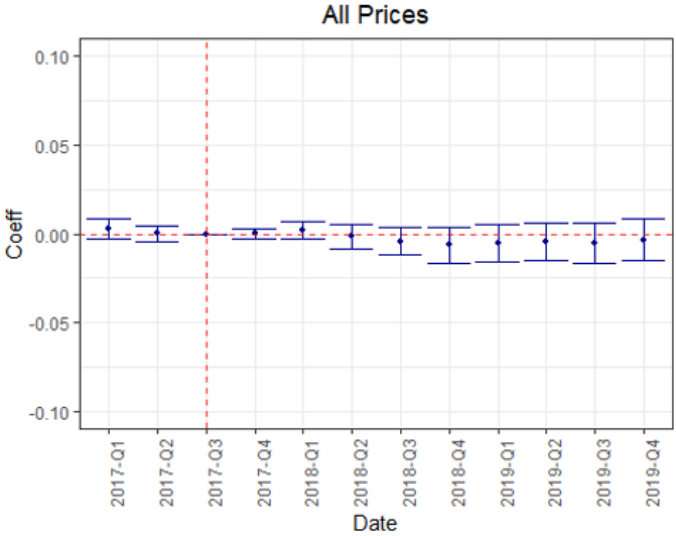
- where Γ is a constant

- Consumers like convenience! The closer operating firms are, the happier they are

- Aggregate consumer welfare is a weighted average of consumer surplus:

$$CS(\varphi) = \Gamma \sum_i \frac{M_i}{\sum_j M_j} \left[CMA_i(\varphi)\right]^{1/\theta}$$

Prices are not changing



Return

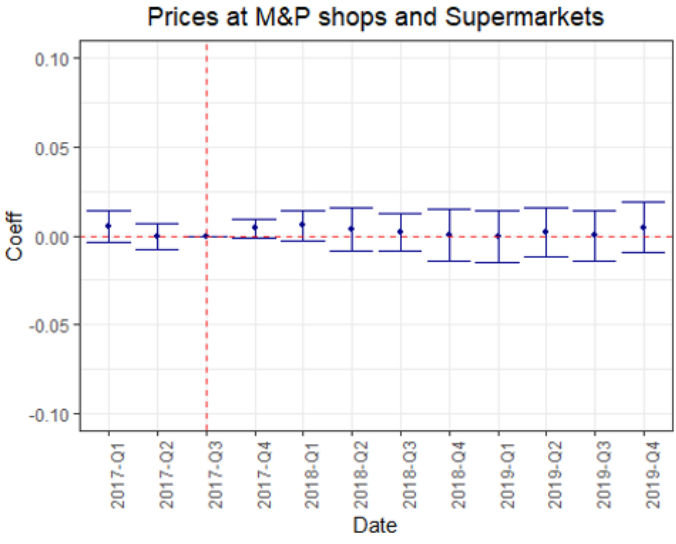
Income and employment not changing

Dependent Variables: Model:	log(meanIncome) (1)	log(employment) (2)	log(meanIncome) (3)	log(employment) (4)
log(priceGas)	0.0626	0.0124	-0.0382	-1.026
	(1.204)	(1.529)	(1.092)	(1.128)
Controls			Yes	Yes
Fixed-effects				
municipality	Yes	Yes	Yes	Yes
quarter:year	Yes	Yes	Yes	Yes
Fit statistics				
Observations	14,961	17,339	13,733	13,733
Dependent variable mean	306.59	11,356.6	303.80	14,321.8
F-test (1st stage), log(priceGas)	192.90	311.82	234.79	234.79

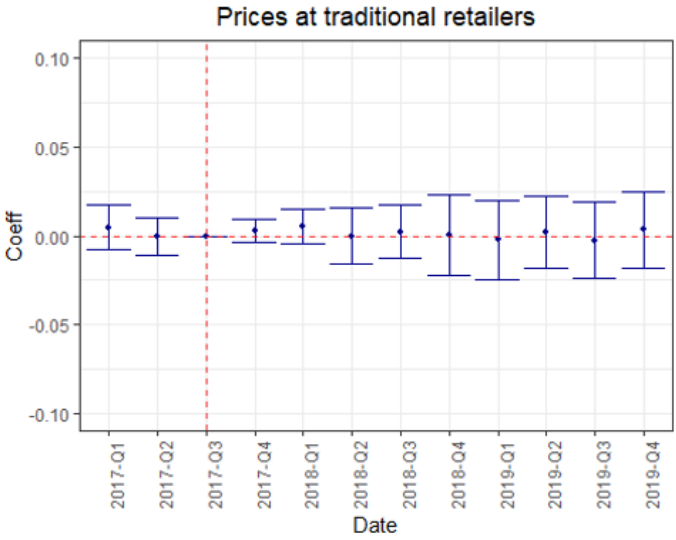
Clustered (municipality) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

▸ Return

Prices of food retail goods not changing



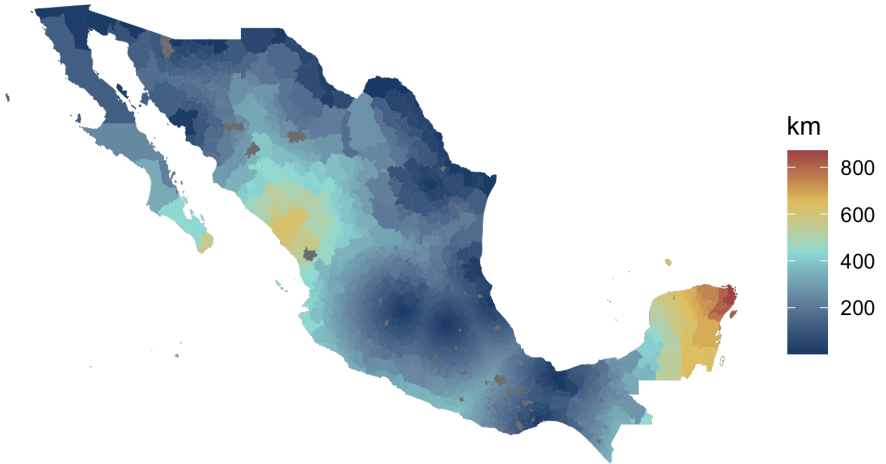
Prices at traditional shops not changing



Prices at modern supermarkets not changing

Return

Distance to distribution center



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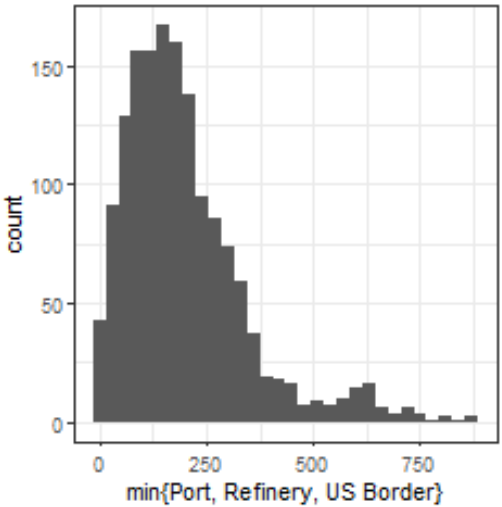
Histogram instrument



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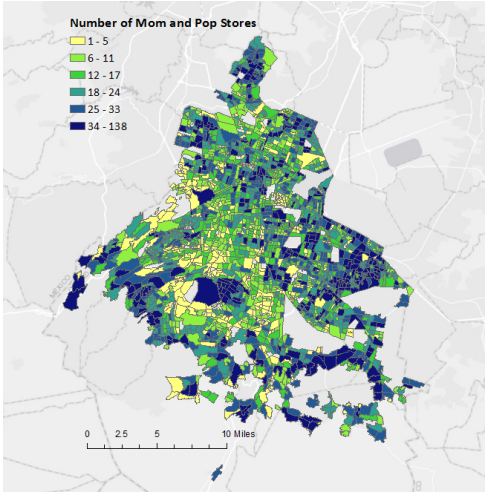
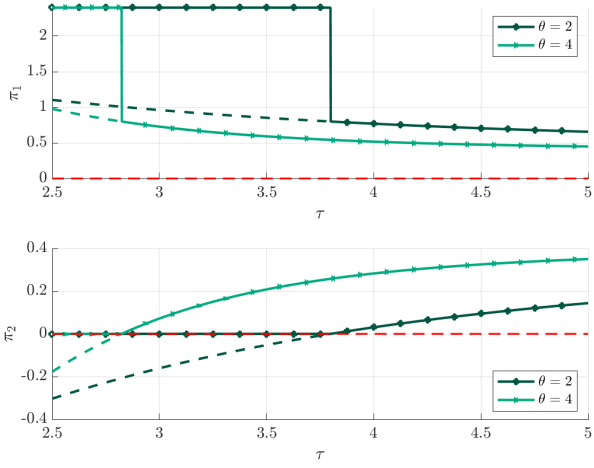
Number of Mom and Pop Stores per Block in Mexico City



Return

What exacerbates τ's effect? Simulation: varying τ for $\neq \theta$

- Two blocks. Everything is symmetric, except $\gamma_1 > \gamma_2$.



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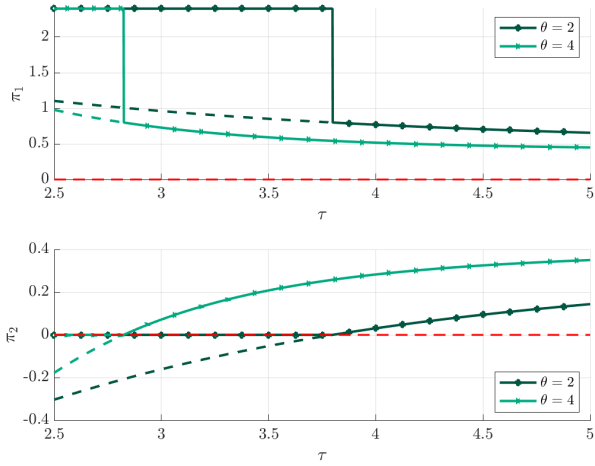
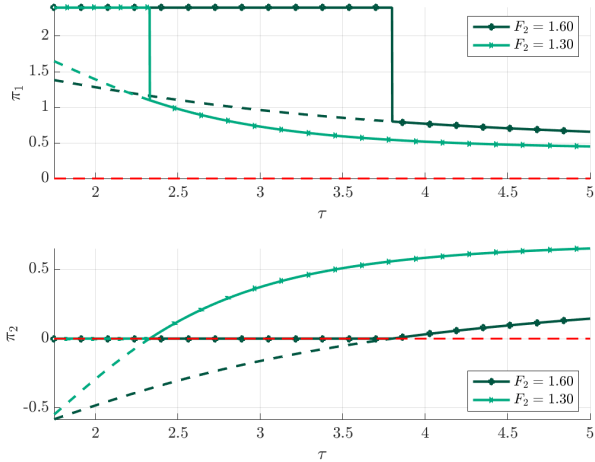


- Higher $\theta \Rightarrow$ store in block 2 enters the market at lower values of τ.

Return

What exacerbates τ's effect? Simulation: varying τ for $\neq F$

- Two blocks. Everything is symmetric, except $\gamma_1 > \gamma_2$.



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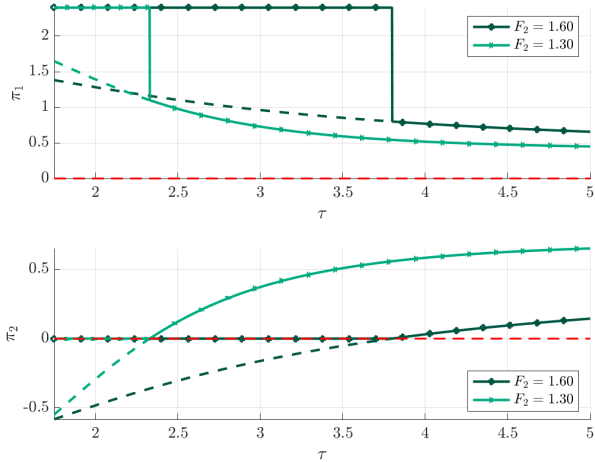

- Lower $F \Rightarrow$ store in block 2 enters the market at lower values of τ.

Return