The Demand Side of Firm Growth: Evidence from Mexico

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Introduction

- Firms in developing countries face many constraints to upgrading Verhoogen 2020
- There must exist demand for the additional and/or improved products Atkin Khandelwal and Osman 2017, Hjort Iyer and de Rochambeau 2021
- In the long run, firms cannot rely exclusively on exporting Goldberg and Reed 2020
- This paper: studies informational frictions as a potential demand-side barrier to the growth of firms in the domestic market

Motivation

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  - Efforts to raise national standards

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- Hypothesis: there is domestic demand for higher-quality products, but quality uncertainty prevents domestic firms from fully capturing it
  - Many instances of product safety issues
  - Efforts to raise national standards
- How does quality uncertainty impact the growth of domestic firms?
  - What can be done to support the domestic sector?

Research Design & Preview of Results

1. Use rare consumption data to establish new stylized facts
    1. Domestic firms grow relatively more through surviving goods
    2. Domestic products have a slower life-cycle
    3. Customer acquisition is key to domestic firm growth
    4. Domestic firms acquire customers relatively more within products
    5. The new customers of domestic products are poorer
2. Propose a model of consumer learning in a context of uncertainty
    - Consumers may learn about quality by experimenting themselves
    - Or by waiting until others experiment.
    - Uncertainty makes waiting valuable for poorer customer, hurting firms
3. Test for this uncertainty mechanism

Contribution 1: trade and consumption

How does trade affect consumption in developing countries?

- Using expenditure shares: Fajgelbaum and Khandelwal (2016)
- Using broadly-defined good categories: Atkin (2013)
- Using barcode-level data but without the origin: Atkin, Faber and Gonzalez-Navarro (2018)
- Using barcode-level data with the origin a handful of imported products: Atkin and Donaldson (2015)

This paper: analyzes the impact of MNCs on consumption thanks to the identification of the origin of the universe of CPG consumed in a market.

Contribution 2: marketing

How does marketing affect firms' sales?

- Marketing efforts increase markups: Atkin, Chaudhry, Chaudry, Khandelwal and Verhoogen (2015)
- Marketing costs limit firms' expansion in export markets: Arkolakis (2016)
- Teachable marketing skills can increase firms' market access: Hjort, Iyer and de Rochambeau (2021)
- Marketing expenses may come at the expense of firms' investment in R&D: Einav, Klenow, Levin and Murciano-Goroff (2021)

This paper: suggests how marketing could overcome quality uncertainty issues

Contribution 3: quality uncertainty

- Bai (2021), Bai Gazze and Wang (2017)

Overview

Outline

Mexico: A large and highly-integrated emerging market

- 15th economy in the world, GDP: $1.2 TR USD in 2015
- 15.6% growth in constant terms between 2010 and 2015
- Upper middle-income country: GDP/capita $\sim$ $10,000 GDP/capita
- High inequality and high poverty
- High volatility
- Highly exposed to trade:
  - Imports + exports total over 60% of GDP in goods and services
  - The U.S. is by far the main importer & exporter [USCMA]
  - Up to 50% of the goods consumed are manufactured by MNCs

An extremely detailed consumption panel

Kantar World Panel: similar to Nielsen Homescan

- 8,000 households per year, each followed 3.5 years on average
- Household information: number of people, age, gender, some socio-economic information, some appliances, city summary stats

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- Households are surveyed **weekly** about their purchases of at-home consumption packaged goods
- Purchase information: date, price, category, quantity, brand, flavor, color, packaging material, size, etc. **at the barcode level** data structure

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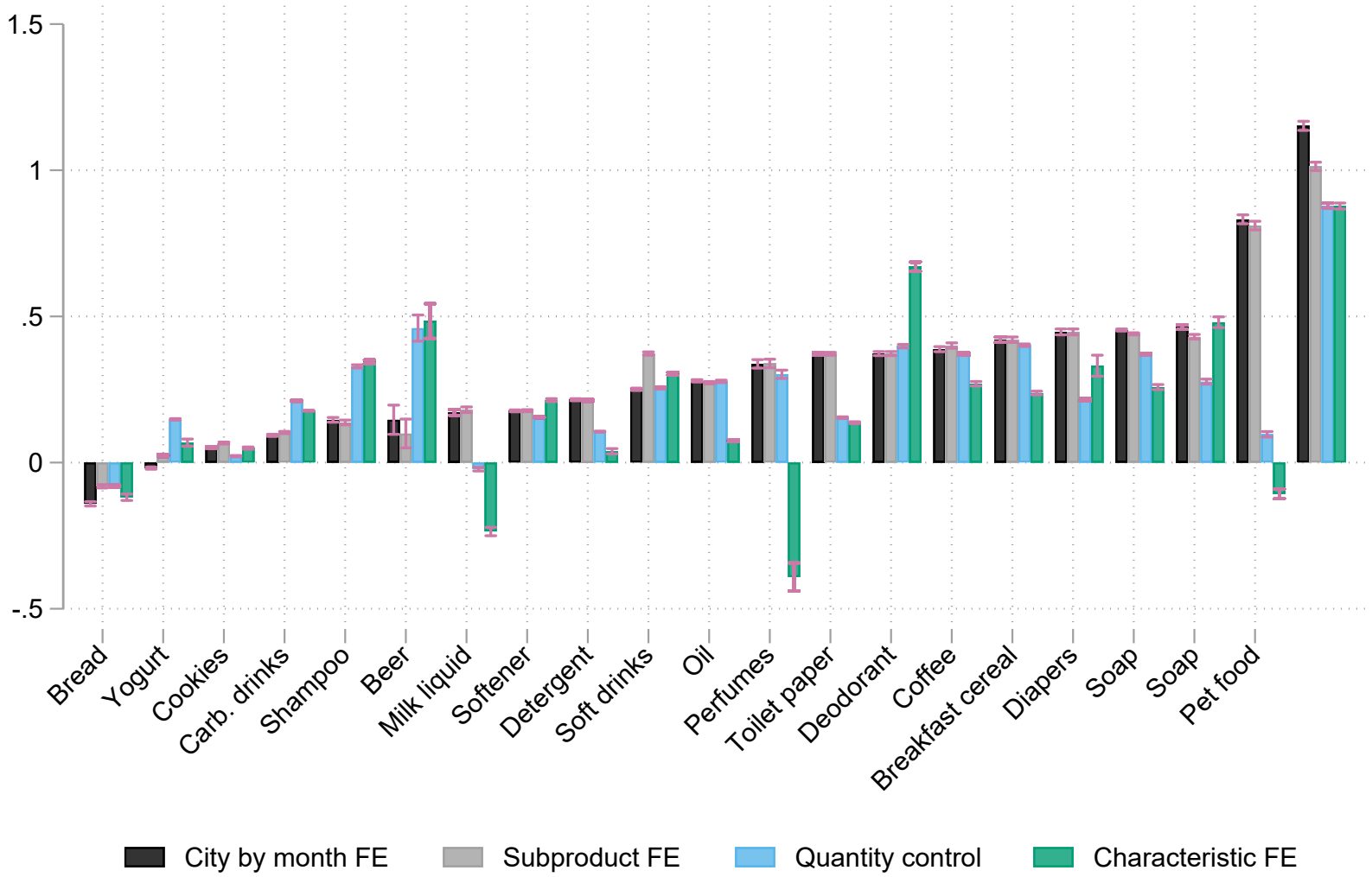
- Purchase information: date, price, category, quantity, brand, flavor, color, packaging material, size, etc. **at the barcode level** data structure
- The firms are the "manufacturer" of the products purchased.
  - Directorio Estadistico Nacional de las Unidades Economicas (DENUE)
  - Registro Nacional de Inversiones Extranjeras (RNIE) firms

A panel that's representative of urban Mexican consumers

	ENIGH			KWP			Difference	
	mean	sd	N	mean	sd	N	diff	p
Number of household members	3.94	1.98	26942	4.37	1.83	8414	0.430	0.00
Number of women in household	2.03	1.27	26942	2.29	1.22	8414	0.267	0.00
Age head of household	48.32	15.62	26942	45.61	14.02	8412	-2.707	0.00
Finished primary	0.84	0.37	26942	0.96	0.20	8414	0.120	0.00
Finished secondary	0.35	0.48	26942	0.65	0.48	8414	0.307	0.00
Finished Post-secondary	0.26	0.44	26942	0.13	0.34	8414	-0.130	0.00
Works full time	0.75	0.44	26942	0.75	0.43	8414	0.006	0.24
Number of cars	0.53	0.80	26942	0.56	0.66	8414	0.030	0.00
Number of PCs	0.31	0.61	26942	0.33	0.47	8414	0.019	0.01
Access to Internet (0/1)	0.19	0.39	26942	0.24	0.42	8414	0.043	0.00
Number of color TVs	1.44	0.92	26942	1.87	0.98	8413	0.426	0.00
Number of fridges	0.83	0.43	26942	0.96	0.19	8412	0.135	0.00
Number of microwaves	0.42	0.51	26942	0.70	0.46	8414	0.287	0.00
Number of bedrooms	2.01	0.97	26385	2.20	0.97	8412	0.188	0.00
Debit or credit card (0/1)	0.21	0.41	26942	0.28	0.45	8414	0.070	0.00
Monthly expenditure (MXN)	1107.30	758.20	26942	1320.09	736.49	8414	212.796	0.00

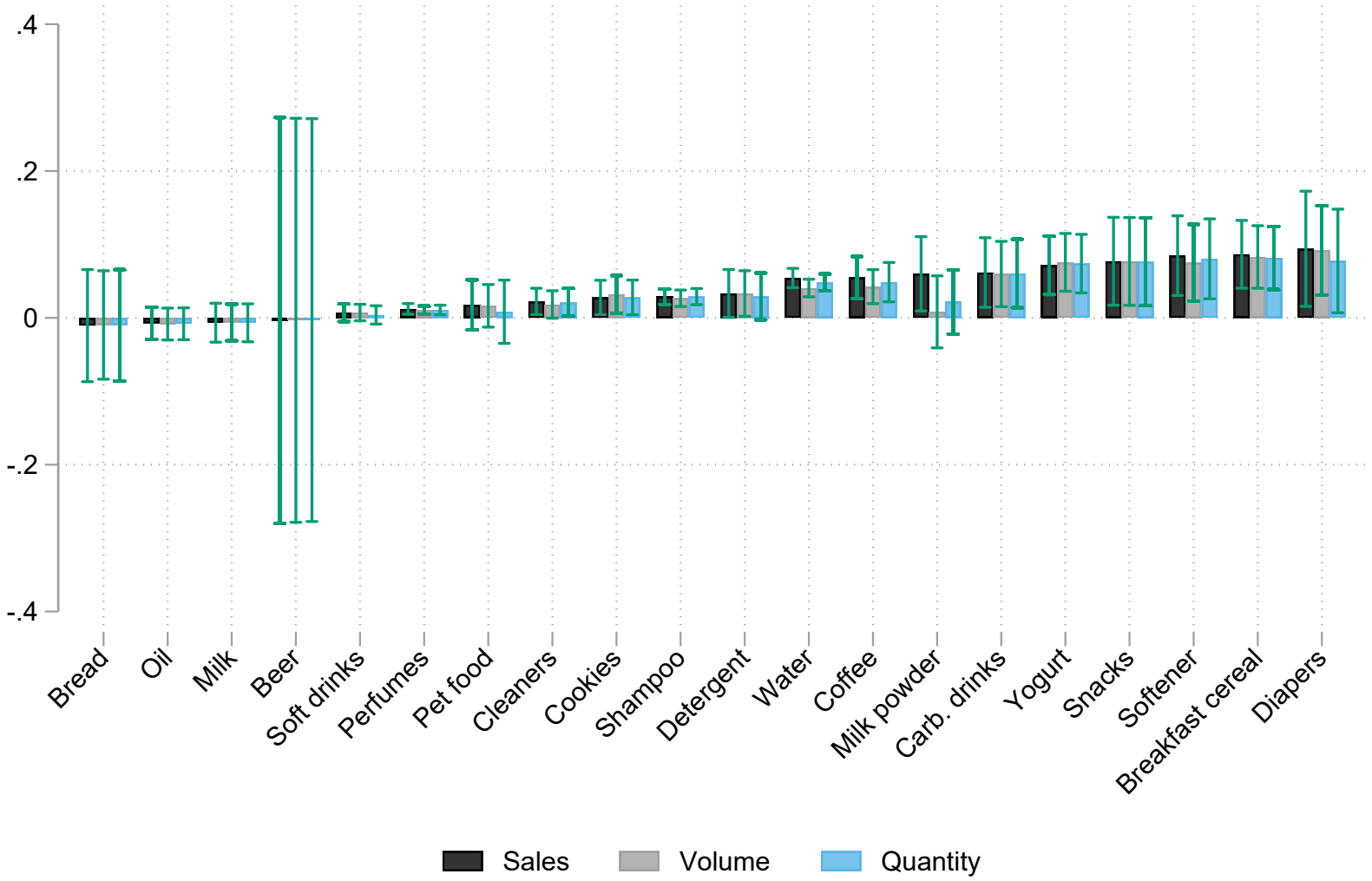
back

The Foreign price premium in Mexican consumer goods



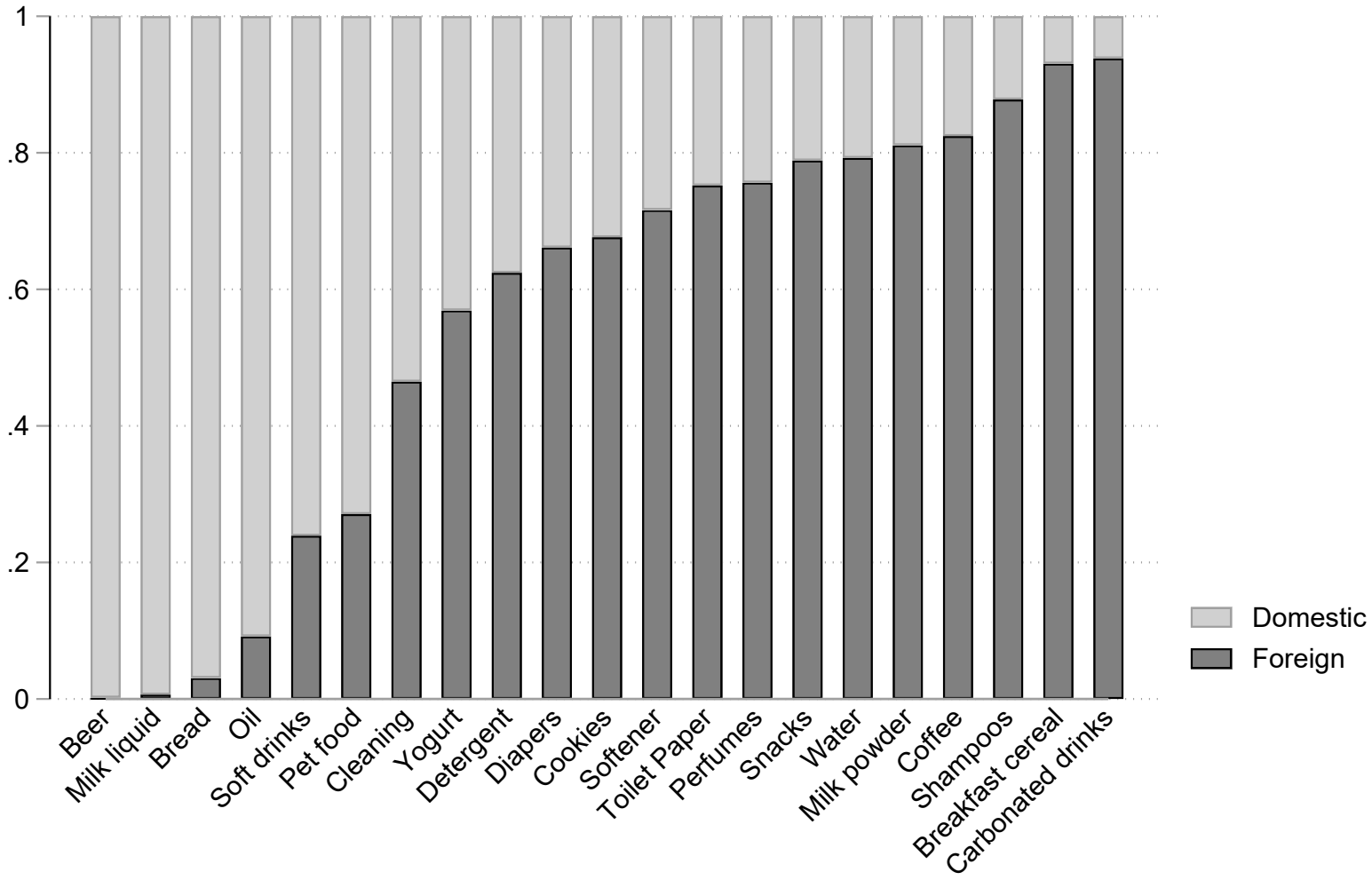
back more controls

The Foreign share premium in Mexican consumer goods



back all products

The Foreign share in Mexican consumer goods



back all products volume quantity

A large sample of firms manufacturing consumer goods

Over 4,000 manufacturers, $>$ 90% of them are domestic.

	Top Foreign Firm			Top Domestic Firm		
	Rank	Share	Name	Rank	Share	Name
Milk	20	0.00	WAL-MART	1	0.50	LALA
Detergent	1	0.43	PROCTER & GAMBLE	2	0.27	LA CORONA
Water	1	0.31	COCA COLA FEMSA	5	0.05	JOSE RAMOS CHIAPAS
Oil	5	0.07	ACH FOODS	1	0.23	EMBOTELLADORA MEXICANA
Toilet paper	1	0.53	KIMBERLY CLARK	3	0.09	FABRICA DE PAPEL SAN FRANCISCO
Bread	3	0.01	GRUPO GAMESA	1	0.93	BIMBO
Cookies	1	0.58	GRUPO GAMESA	2	0.23	BIMBO
Beer	5	0.00	HEINEKEN	1	0.51	CERVECERIA MODELO
Yogurt	1	0.37	DANONE	2	0.19	LALA
Milk powder	1	0.71	NESTLE	3	0.07	LICONSA

back

Outline

Stylized Facts

1. Domestic firms grow relatively more through surviving goods

What share of growth is due to product innovation?

Following Argente, Lee and Moreira (2020), the growth of sales S of firm i at time t are made of:

- the growth of sales of older products,
- *minus* the t-1 share of sales of products that exited between t and t-1
- *plus* the sales of new products, which are made of
  - the rate of entry of new products between t-1 and t
  - multiplied by the relative average sale of a new product at time t compared to an old, surviving product at time t

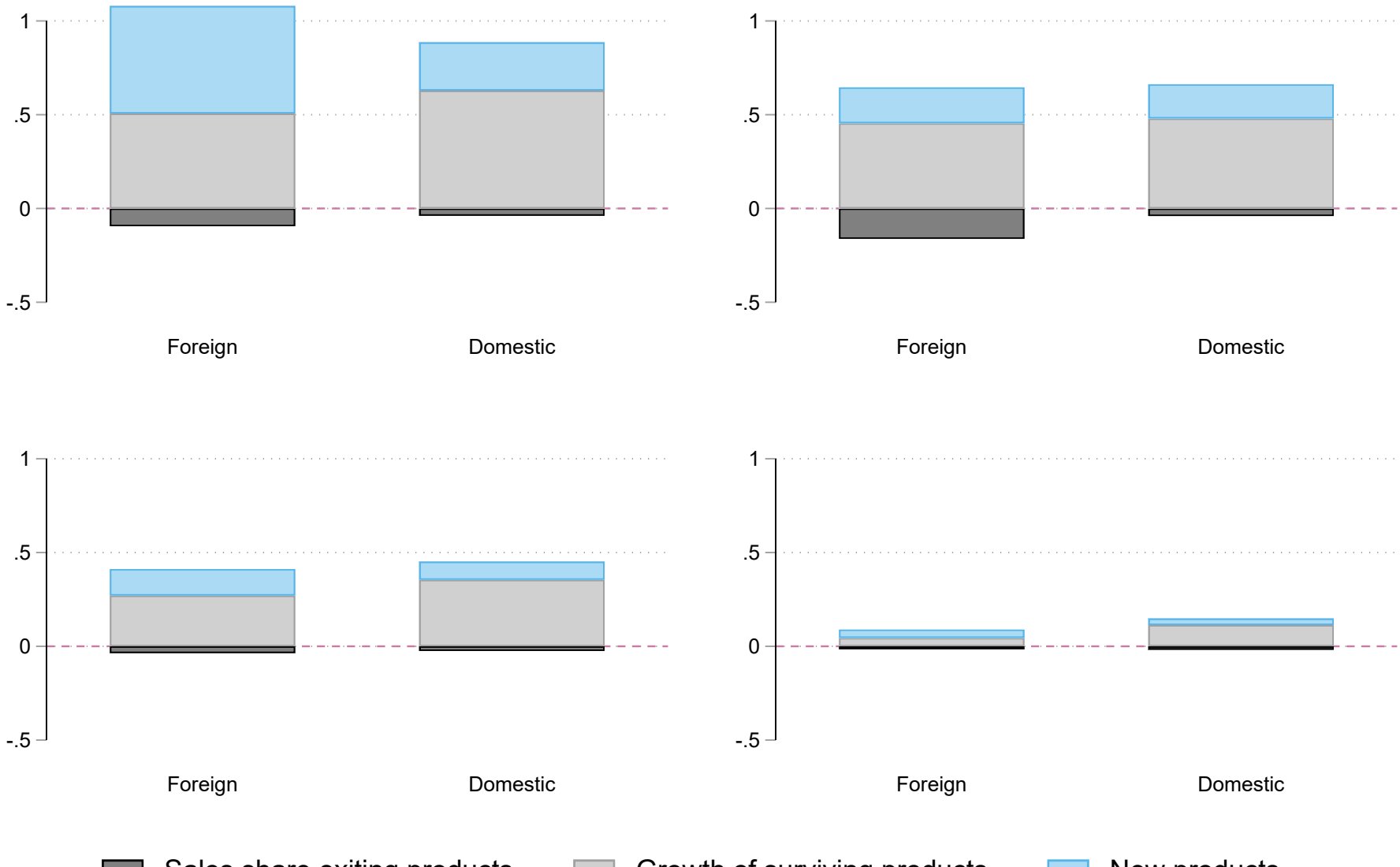
$$\Delta S_{i,t} = \underbrace{\Delta S_{i,t}^{old,survive} - \overline{S}_{i,t-1}^{old,exit}}_{product\ \ life-cycle} + \underbrace{n_{i,t}^{new} \times \overline{s}_{i,t}^{new}}_{new\ \ products}$$

Data-driven definition of new goods

- Data-driven definition
- Product that appears at least one year into the dataset
- Introduced by households who have been **active** in the dataset for at least one year
- Verification: Based on marketing releases, for example Coca-Cola Life or Ocean Spray Pomegranate and Blueberry, released in 2013

rate

Domestic firms grow more through surviving goods



Stylized Facts

1. Domestic firms grow relatively more through surviving goods
2. Domestic products have a slower life-cycle

Product life-cycle

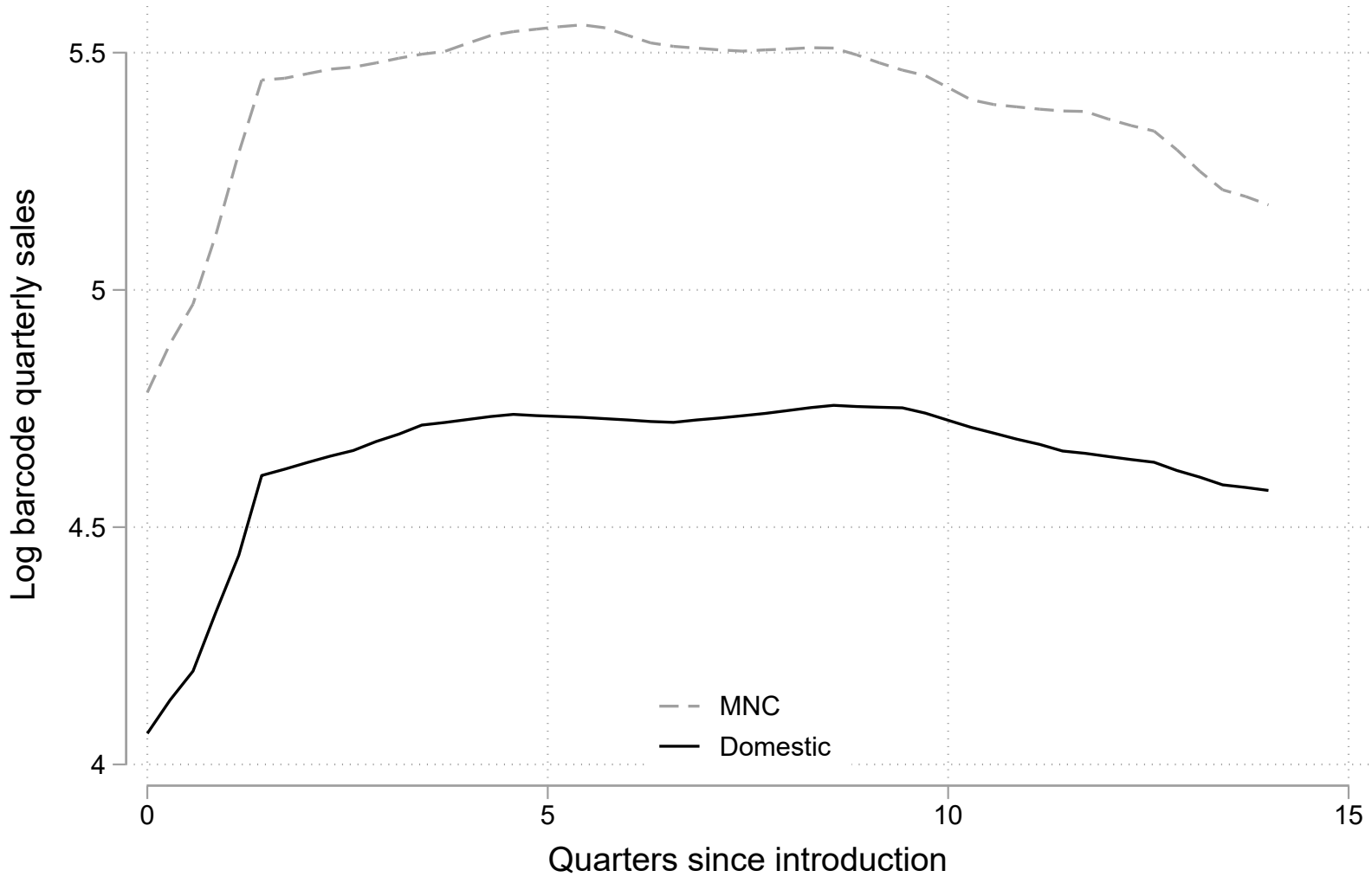
We estimate the effect of age on product sales following Argente, Lee and Moreira (2020):

$$logY_{u,t} = \alpha + \sum_{a=2} \beta_a D_a + \lambda_{jt} + \theta_c + u_{u,t}$$

- u product
- a age in quarters - D_a are fixed effects for each age
- j product category
- t quarter - we control for time and product category fixed effects
- c cohort - we control for cohort effects Deaton 1997

Balanced panel comprised of products introduced starting in 2011 Q1 and that survived at least 14 quarters, observed for 14 quarters.

Domestic products have a slower life-cycle



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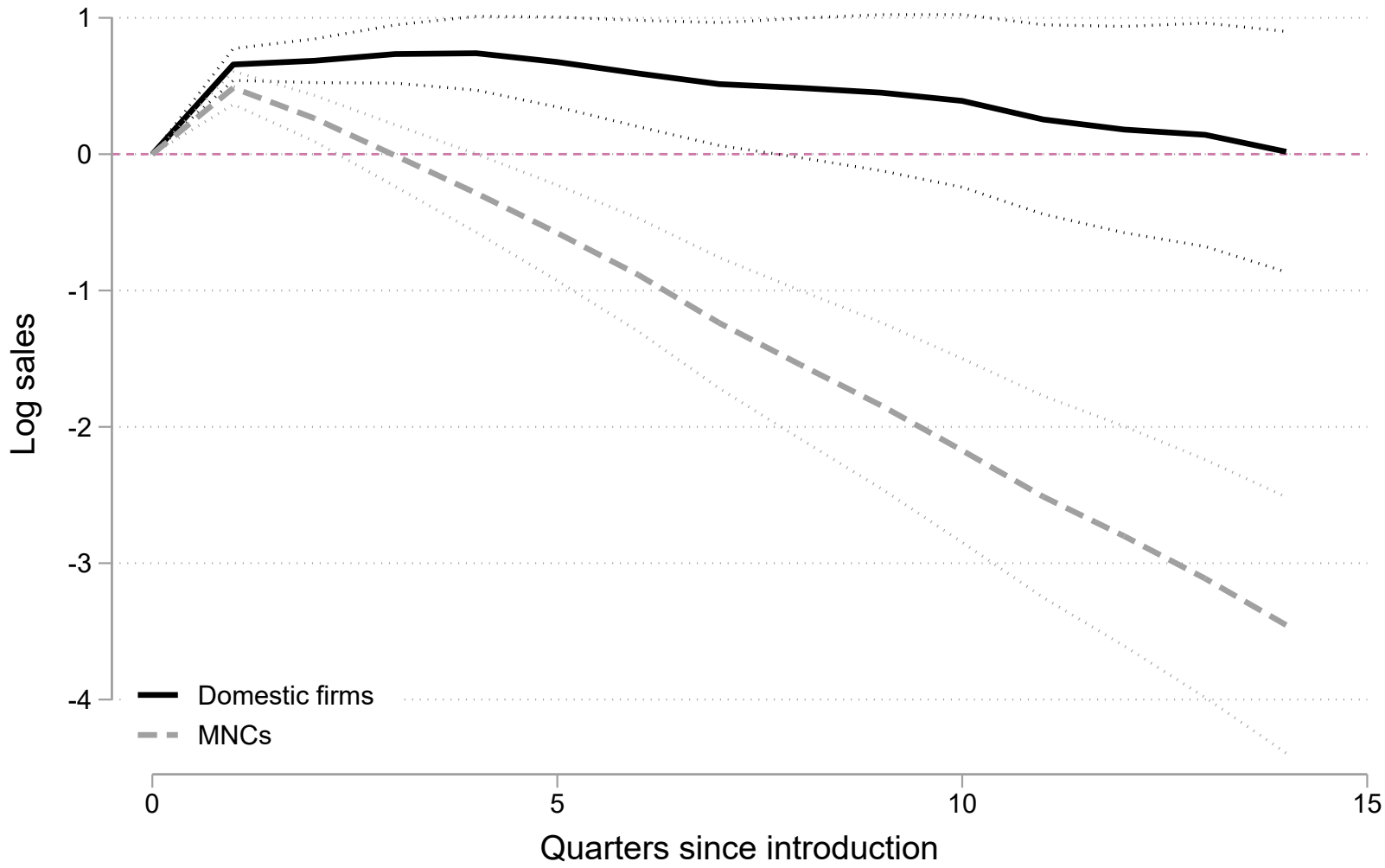

larger definition of product | narrower fixed effects | 12 quarters | 16 quarters | quantity | price | exit

Stylized Facts

1. Domestic firms grow relatively more through surviving goods
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3. Customer growth is key to firm growth, especially for domestic firms

How can firms grow sales?

Following Einav, Klenow, Levin and Murcinao-Goroff (2021):

$$\text{Sales} \equiv \text{Customers} \frac{\text{Quantity}}{\text{Customers}} \underbrace{\frac{\text{Sales}}{\text{Quantity}}}_{\text{Unit value}}$$

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$$\log(\text{Sales}) = \log(\text{Customers}) + \log(\text{Quantity per Customer}) + \log(\text{Unit value})$$

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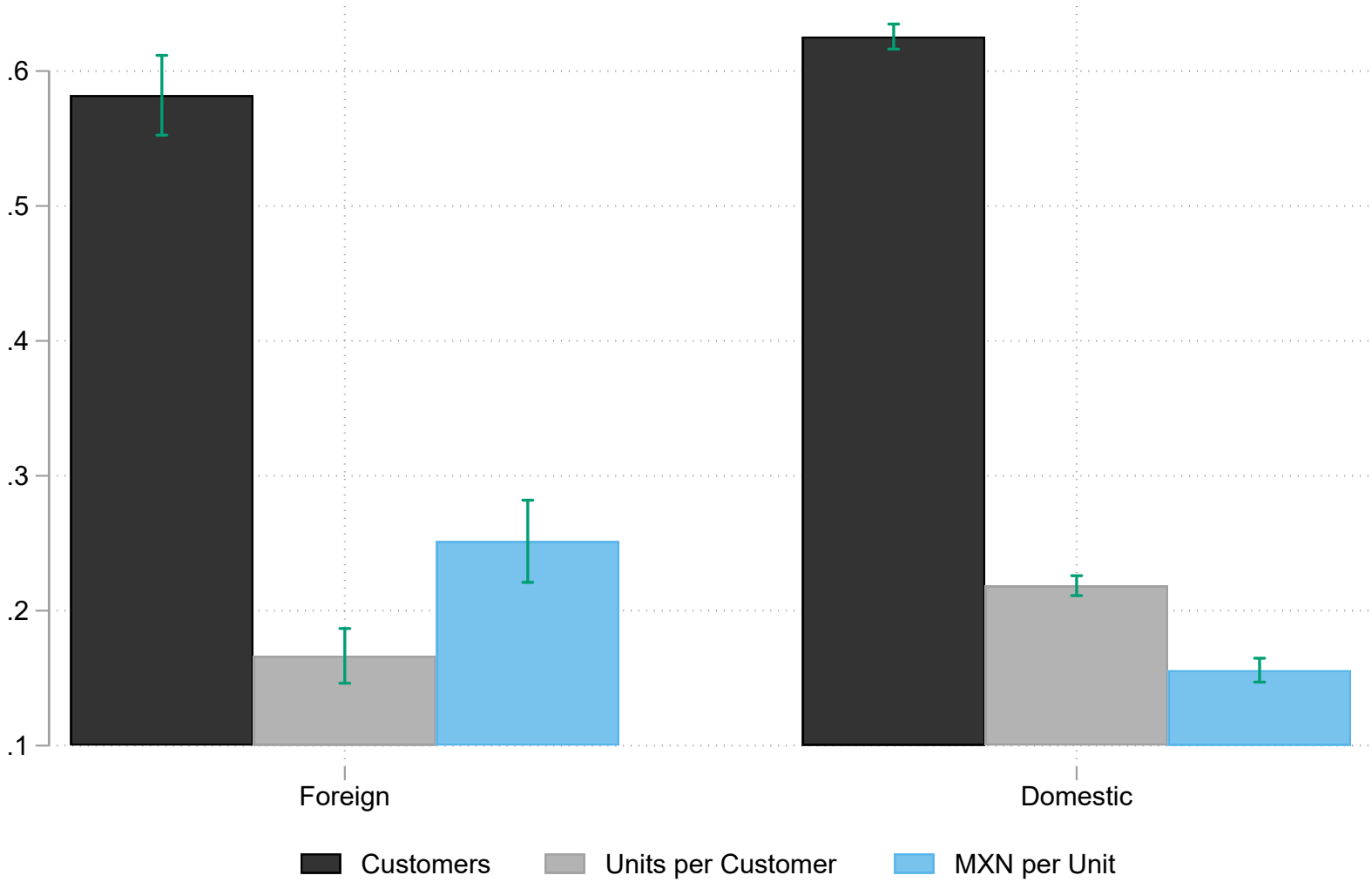
$$\begin{aligned}
\log(\text{Customers}_{it}) &= \alpha + \beta_C \log(\text{Sales})_{it} + \gamma_i + \delta_t + \epsilon_{it} \\
\log(\text{Quantity per Customer}_{it}) &= \alpha + \beta_Q \log(\text{Sales})_{it} + \gamma_i + \delta_t + \epsilon_{it} \\
\log(\text{Unit value}_{it}) &= \alpha + \beta_U \log(\text{Sales})_{it} + \gamma_i + \delta_t + \epsilon_{it}
\end{aligned}$$

$$\beta_C + \beta_Q + \beta_U \equiv 1$$

γ_i are firm fixed effects and δ_t are year fixed effects

The fastest-growing firms also acquire customers the fastest



purchases sector

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4. Domestic firms acquire customers relatively more within product markets

How can firms acquire more customers?

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$$\text{Customers} \equiv \text{Markets} \frac{\text{Customers}}{\text{Markets}}$$

$$\log(\text{Customers}) = \log(\text{Markets}) + \log(\text{Customers per markets})$$

$$\log(\text{Markets})_{it} = \alpha + \beta_M \log(\text{Customers})_{it} + \gamma_i + \delta_t + \epsilon_{it}$$
$$\log(\text{Customers per markets})_{it} = \alpha + \beta_C \log(\text{Customers})_{it} + \gamma_i + \delta_t + \epsilon_{it}$$

$$\beta_M + \beta_C \equiv 1$$

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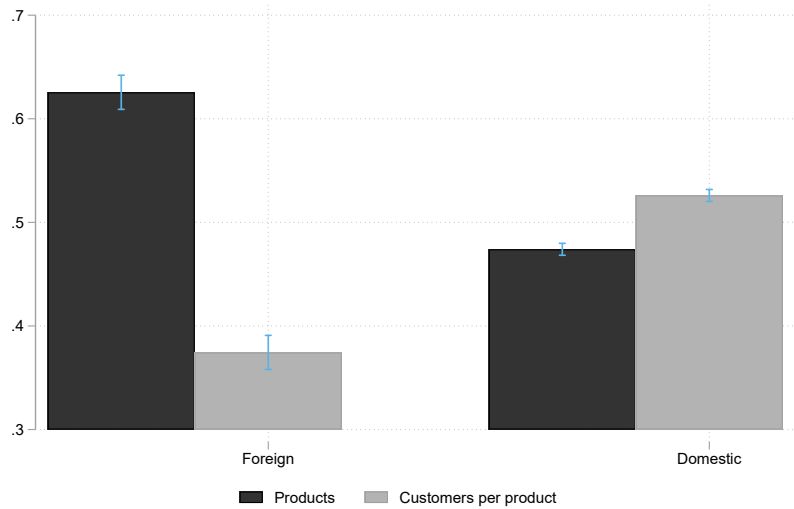
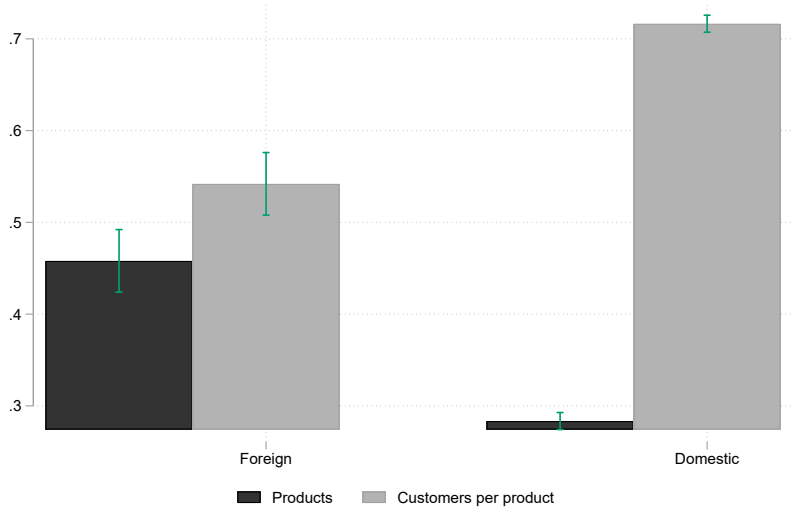
Domestic firms acquire customers relatively more within product markets

Across firms / Within firms over time





table

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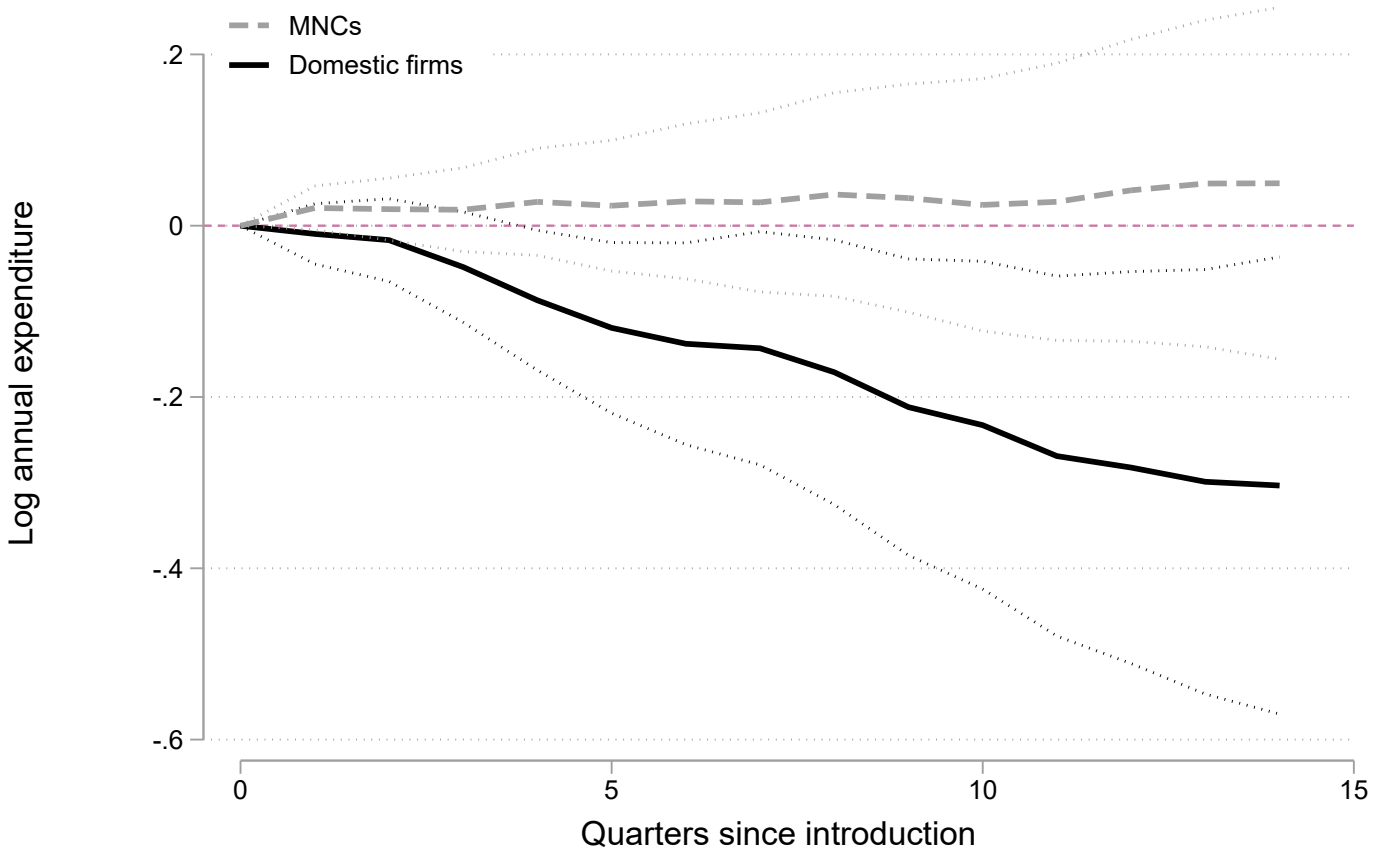
4. Domestic firms acquire customers relatively more within products
5. The new customers of older domestic products are poorer

Who are the new customers of older goods?

$$log Y_{u,t} = \alpha + \sum_{a=1} \beta_a D_a + \lambda_{jt} + \theta_c + u_{u,t}$$

Where $Y_{u,t}$ is the sales-weighted average of the annual expenditure of the new customers of product u at quarter t

The new customers of older domestic goods are poorer



City FE | subproduct | city | SES

Outline

Setup

- New good of unknown quality x R. V. with prior μ_0
- Agents maximize utility

$$u(x) = \max\{\mu - \beta_i p,\ 0\}$$

- There are two agents i, where price-sensitivity $\beta_i \in \{\beta_L, \beta_H\},\ \beta_H > \beta_L$.
- They each represent a share γ_i of the market, where $\gamma_i \in \{\gamma_L,\ \gamma_H\},\ \gamma_H > \gamma_L$.

Sequence of events

- In each period, agents decide whether to buy the new good or not.
- Once they have tried the good, they immediately learn the true quality.
- If they like the good, they continue buying for 3 periods and exit.
- If they don't, they immediately exit.
- Everybody observes whether the good has been purchased or not.

Experimentation

Period t

- Suppose no agent has purchased the good yet.
- Everyone has the same prior μ_t.

$$\mu_t - \beta_i p > 0?$$

Experimentation

Period t

- Suppose no agent has purchased the good yet.
- Everyone has the same prior μ_t.

$$\mu_t - \beta_i p > 0?$$

- Suppose one agent purchases the good.
- It must be the agent with the lowest β: the "leader".
- Immediately after, she learns the true quality x.

Period t+1

- The "follower" has not purchased and not learned. For him,

$$\mu_{t+1} = \mu_t$$

- The "leader" has learned and faces a new problem:

$$x - \beta_L p > 0?$$

She decides whether to buy the good again or not.

Period t+2

- If the "leader" has not bought in $t+1$:
  - The "follower" agent learns that that $x < \beta_L p$
  - Updates his belief $\mu_{t+2}(x < \beta_L p) < \mu_{t+1} = \mu_t$
  - If he didn't experiment with μ_t, he won't with μ_{t+2}.
- If the the "leader" has bought in $t+1$:
  - The "follower" agent learns that $x > \beta_L p$
  - He updates his belief $\mu_{t+2}(x > \beta_L p) > \mu_{t+1}$
  - He might decide to start buying the good.

Life-cycle of a successful product

With unknown quality:

Quarter	0	1	2	3	4	5
β_L	γ_L	γ_L	γ_L	0	0	0
β_H	0	0	γ_H	γ_H	γ_H	0
Total	γ_L	γ_L	$\gamma_L + \gamma_H$	γ_H	γ_H	0
Quarter FE	.	0	$+\gamma_H$	$+\gamma_H - \gamma_L$	$+\gamma_H - \gamma_L$	$-\gamma_L$

Life-cycle of a successful product

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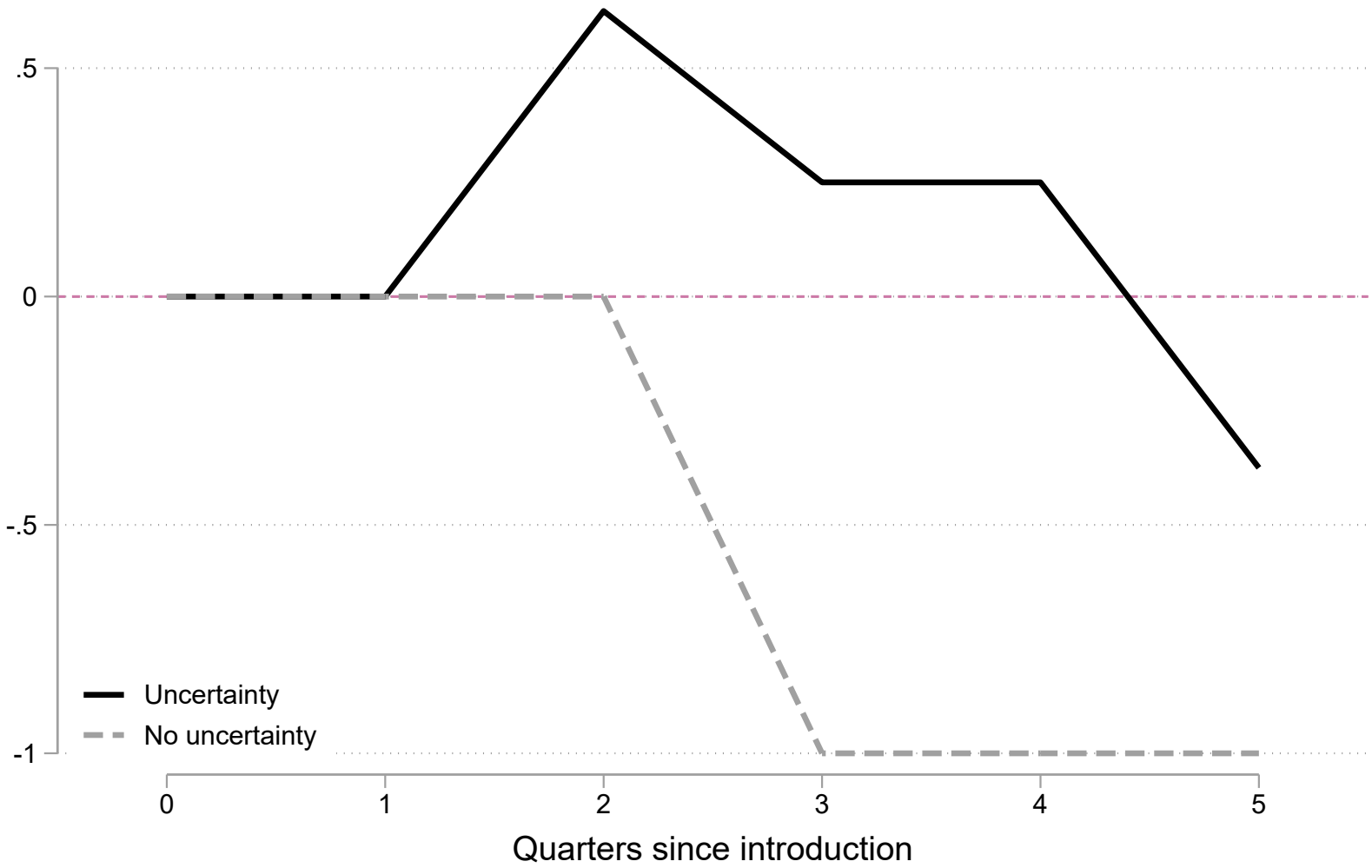
Total	γ_L	γ_L	$\gamma_L + \gamma_H$	γ_H	γ_H	0
Quarter FE	.	0	$+\gamma_H$	$+\gamma_H - \gamma_L$	$+\gamma_H - \gamma_L$	$-\gamma_L$

With known quality:

Quarter	0	1	2	3	4	5
β_L	γ_L	γ_L	γ_L	0	0	0
β_H	γ_H	γ_H	γ_H	0	0	0
Total	$\gamma_L + \gamma_H$	$\gamma_L + \gamma_H$	$\gamma_L + \gamma_H$	0	0	0
Quarter FE	.	0	0	$-\gamma_H - \gamma_L$	.	.

Trajectory


.5
0
-.5
-1
Uncertainty
No uncertainty
0
1
2
3
4
5
Quarters since introduction

Implications

What can be done to accelerate adoption?

1. Provoke experimentation: subsidize first purchase
2. Reduce uncertainty: raise and enforce quality regulation
3. Substitute for social learning: leverage brand power

Outline

Measuring individual learning

I study the effect of consumption of a brand on the probability of consuming a (new) good from the same brand a year later

$$y_{i,jk,t} = \alpha + \beta y_{j,t-1} + \gamma D_j + \delta D_j \times y_{j,t-1} + d_i + \epsilon_{i,t}$$

- i is the consumer
- j is the brand, k the product
- t is the year
- D_j is a dummy that turns on if the brand is domestic

Domestic brand effects are larger

	Current consumption			
	Barcode	Brand	Firm	Country
	(1)	(2)	(3)	(4)
Previous consumption	0.326	0.018	0.012	0.007
	(0.001)	(0.000)	(0.000)	(0.000)
Domestic	-0.004	-0.002	-0.002	-0.004
	(0.000)	(0.000)	(0.000)	(0.000)
Previous consumption X	0.070	0.007	0.008	0.000
Domestic	(0.001)	(0.000)	(0.000)	(.)
Hhd FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Control mean	0.013	0.007	0.005	0.008
N	6259248	6141346	6141346	6141346
R2	0.12	0.01	0.01	0.00

Poorer households rely more on brand effects

	Current consumption			
	Barcode	Brand	Firm	Country
	(1)	(2)	(3)	(4)
Previous consumption	0.290	0.020	0.017	0.011
	(0.000)	(0.000)	(0.000)	(0.000)
Low expenditure	-0.005	-0.004	-0.004	-0.007
	(0.001)	(0.001)	(0.001)	(0.003)
Previous consumption X Low expenditure	0.107	0.005	0.002	0.005
	(0.003)	(0.001)	(0.001)	(0.003)
Barcode FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Control mean	0.013	0.007	0.005	0.008
N	6259248	6141346	6141346	6141346
R2	0.17	0.05	0.05	0.05

Products for which uncertainty matters more

	Current consumption			
	Barcode	Brand	Firm	Country
	(1)	(2)	(3)	(4)
Previous consumption	0.325	0.017	0.012	0.005
	(0.001)	(0.000)	(0.000)	(0.001)
Food	0.003	0.000	0.000	0.002
	(0.000)	(0.000)	(0.000)	(0.001)
Previous consumption X Food	0.043	0.005	0.006	0.001
	(0.001)	(0.000)	(0.000)	(0.001)
Hhd FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Control mean	0.013	0.007	0.005	0.008
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Conclusion

- In the Mexican consumer goods sector, domestic firms have quite different growth patterns compared to MNCs.
- Part of these differences can be attributed to hesitant demand for new domestic goods.
- Uncertainty about product quality may be one contributor.
- Marketing strategies may help address this problem.
- Policy intervention raising quality and transparency could also help support the domestic sector.

Thank you

Thank you!

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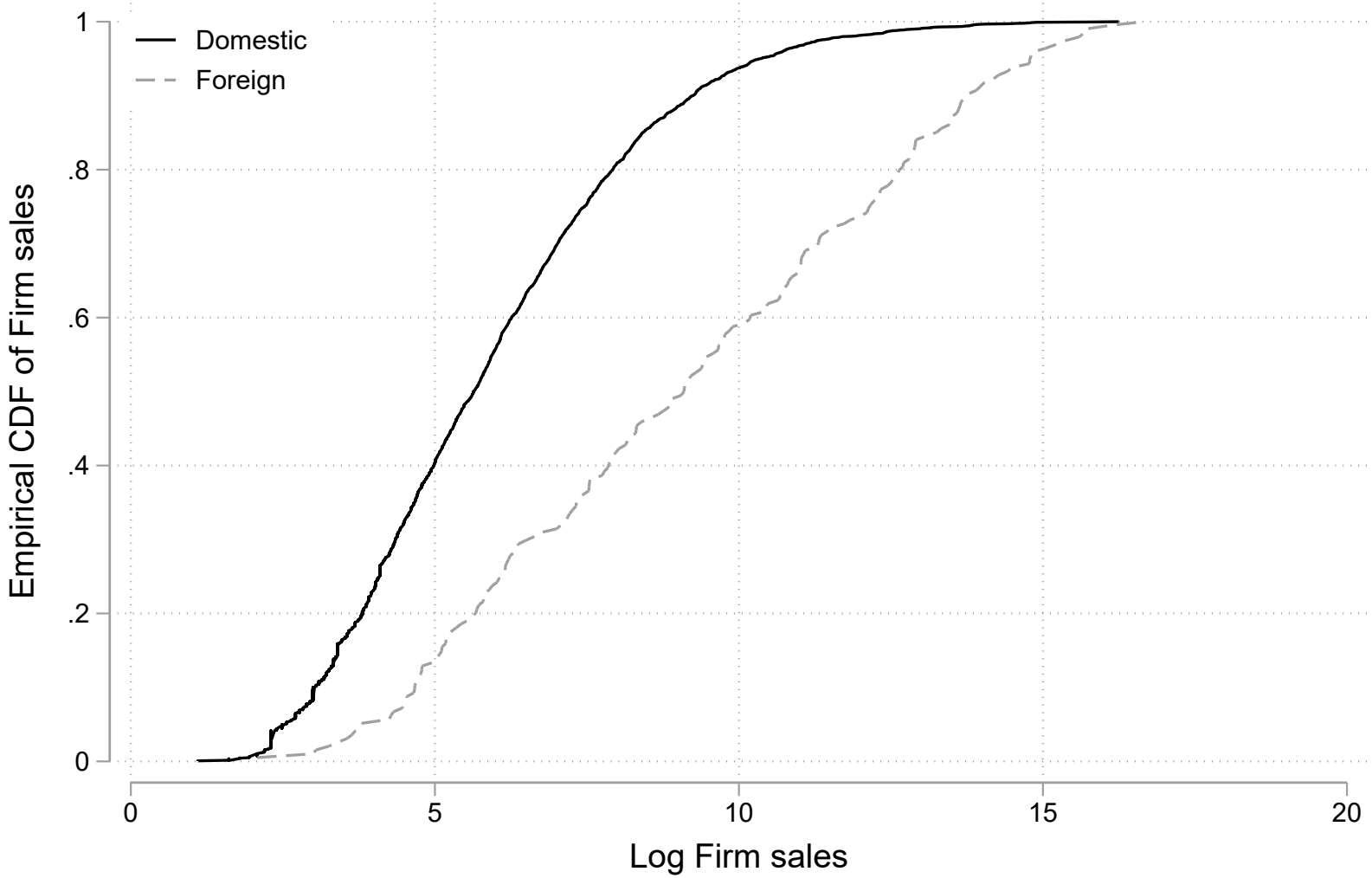
Appendix slides

The distribution of firm size in the Mexican Consumer goods sector



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Date	id	product	subproduct	brand	producer	charac1	charac2	[...]	content	hhid
2013/02/17	1	Energy drinks	regular	Burn	Coca-Cola	.	can	[...]	310 ML	a
2013/09/05	2	Snacks	.	Doritos	Sabritas	Pizzerolas	bag	[...]	52gr	b
2013/12/26	2	Oil	Oil	1-2-3	La Corona	Vegetal	plastic	[...]	500 ML	b

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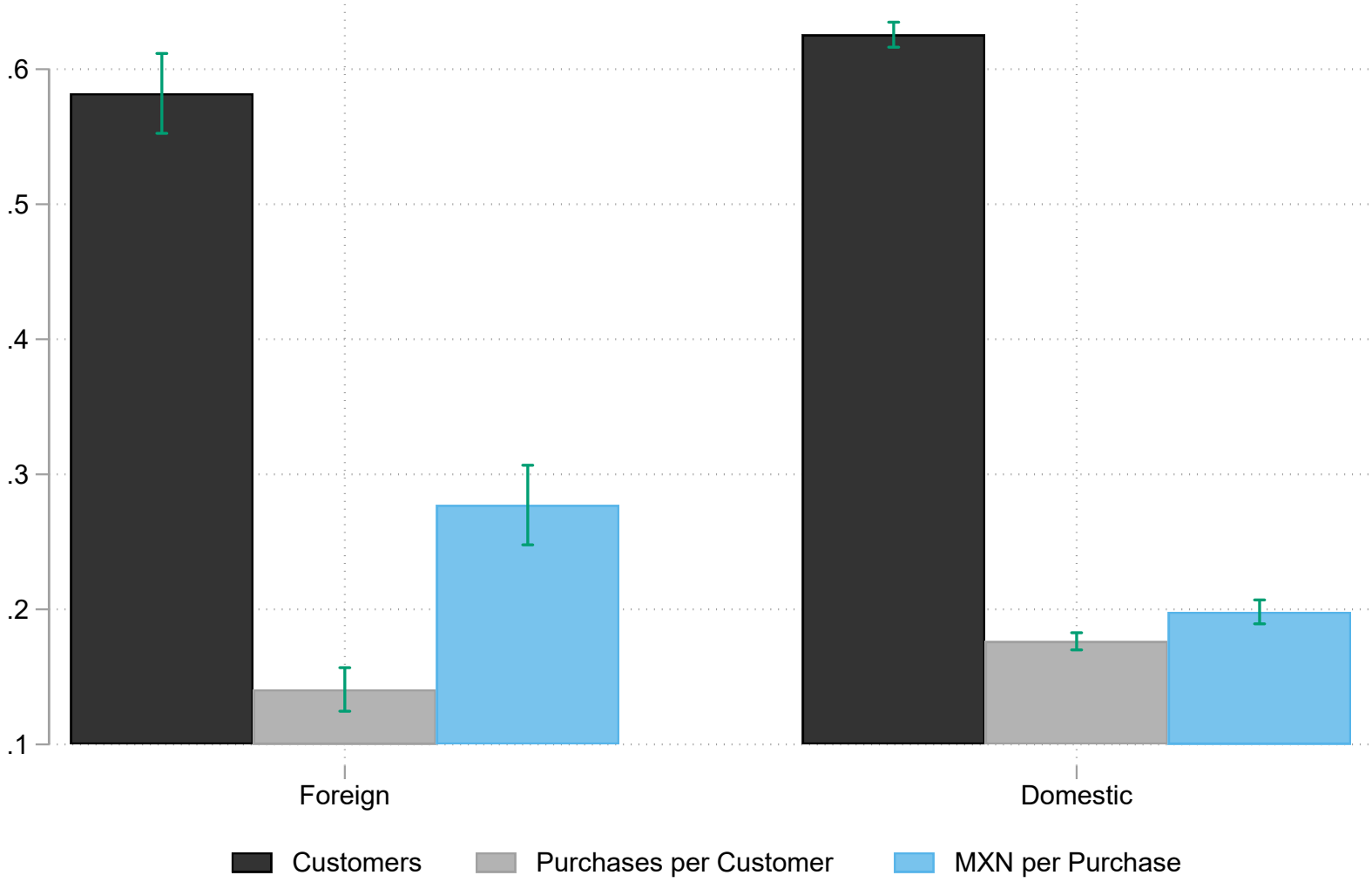
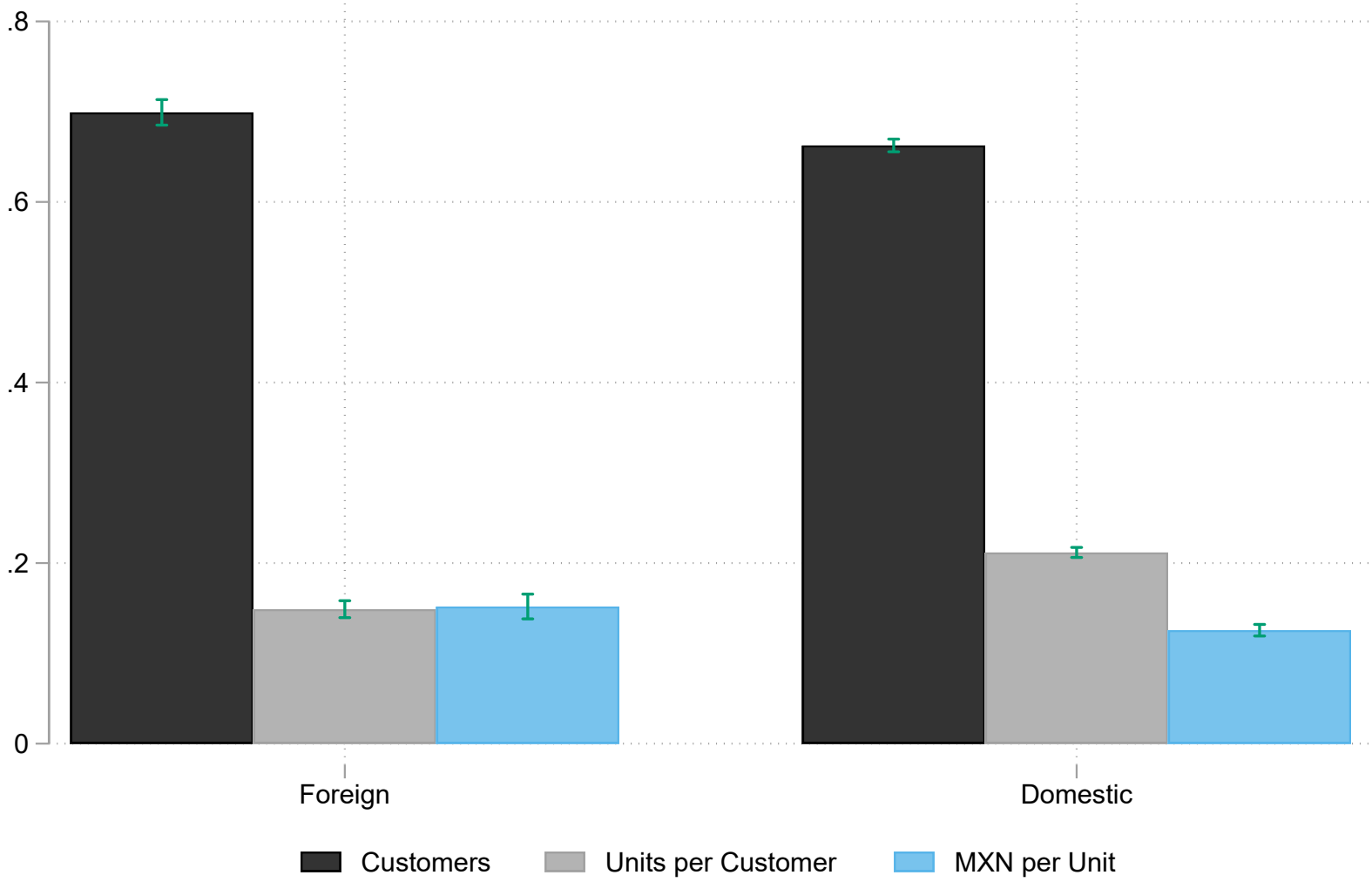
The fastest-growing firms also acquire customers the fastest

Number of purchases instead of Volume



The fastest-growing firm-industry pairs also acquire customers the fastest



The customer margin is the key one to increase sales

Panel A: All firms

Dep. var:	Customers	Items per C	MXN per item
All	0.622***	0.215***	0.162***
	(0.005)	(0.004)	(0.004)
N	12064	12064	12064
R2	0.97	0.91	0.89

Panel B: Mexican firms

Dep. var:	Customers	Items per C	MXN per item
All	0.625***	0.218***	0.157***
	(0.005)	(0.004)	(0.005)
N	10943	10943	10943
R2	0.97	0.91	0.88

Panel C: Foreign Firms

Dep. var:	Customers	Items per C	MXN per item
All	0.586***	0.171***	0.243***
	(0.015)	(0.010)	(0.016)
N	1121	1121	1121
R2	0.99	0.96	0.91

How to get more customers

Panel A: All firms

Dep. var:	Cities	per city	Chains	per chain	Products	per product
All	0.630***	0.370***	0.595***	0.405***	0.294***	0.706***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
N	12257	12257	12428	12428	12428	12428
R2	0.97	0.95	0.96	0.94	0.96	0.95

Panel B: Mexican firms

Dep. var:	Cities	per city	Chains	per chain	Products	per product
Mexican firms	0.629***	0.371***	0.596***	0.404***	0.283***	0.717***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)
N	11165	11165	11283	11283	11283	11283
R2	0.96	0.94	0.96	0.93	0.95	0.95

Panel C: Foreign Firms

Dep. var:	Cities	per city	Chains	per chain	Products	per product
Foreign firms	0.649***	0.351***	0.565***	0.435***	0.451***	0.549***
	(0.012)	(0.012)	(0.014)	(0.014)	(0.017)	(0.017)
N	1092	1092	1145	1145	1145	1145
R2	0.99	0.98	0.98	0.98	0.98	0.96

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Mexican firms introduce relatively more new goods

	Share new products					
	(1)	(2)	(3)	(4)	(5)	(6)
Mexican	0.053	0.042	0.053	0.046	0.035	0.045
	(0.013)	(0.013)	(0.014)	(0.012)	(0.013)	(0.013)
Firm sales		-0.026	0.008		-0.025	0.007
		(0.007)	(0.009)		(0.006)	(0.009)
Number of varieties			-0.199			-0.196
			(0.061)			(0.060)
Firm leader in category			-0.071			-0.067
			(0.034)			(0.034)
Firm controls	No	No	No	Yes	Yes	Yes
Year FEs	No	No	No	Yes	Yes	Yes
Baseline share (foreign)	0.22	0.22	0.22	0.22	0.22	0.22
N	12128	12128	12128	12127	12127	12127
R2	0.00	0.00	0.08	0.06	0.06	0.12

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