Retail Globalization and Household Welfare: Evidence from Mexico

Ben Faber (UC Berkeley)

with David Atkin (UCLA) and Marco Gonzalez-Navarro (U Toronto)

IGC/SCID Conference at Stanford, 14 November 2014
Motivation

- The arrival of global retail chains in developing countries is causing a radical transformation in the way that households source their consumption.

- This process has led to heated debates, and stark differences in policy choices across countries.
  - e.g. Latin America/E Europe vs India moving back to outright ban.

- The existing literature on trade and development has so far paid relatively little attention to this channel of international integration.
  - The goal of this paper is to try to fill this gap.
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Retail Globalization in Developing Countries

- Retail is a large and important sector in developing countries.
  - Retail on average accounts for 20% of employment, 10-15% of GDP, and >50% of household expenditures.

- Retail globalization is pervasive and fast growing.
  - Stock of retail FDI in developing countries rose from 24 billion USD in 1990 to 522 billion in 2012 (going from 10% to 25% of world retail FDI).
  - This process has been dubbed “The Supermarket Revolution” in the developing world (Neven and Reardon, 2004).

- We focus on Mexico during the main wave of foreign retail expansion.
  - Number of foreign-owned supermarkets increased from 365 at the end of 2001 to 1335 stores by 2014.
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This Paper

- Contributes to our understanding of the following three questions:

  1. What is the effect of foreign retail entry on average household welfare in the municipality of entry?

  2. What are the channels underlying this effect?

  3. To what extent does the effect differ across the income distribution?
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Methodology

1. Bring to bear newly available collection of microdata that allows us to estimate a general expression for the local welfare gains.
   - Decompose total gains into six components including gains from variety, pro-competitive effects on domestic stores, business profits and nominal income effects.

2. Use an event study design to ensure that the moments we feed in are causal effects.
   - We exploit data on the universe of foreign store opening dates and locations (1999-2014) in combination with high frequency data on local consumer prices and incomes.
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Data

- Household cost of living:
  - Barcode-by-store level confidential microdata of Mexican CPI (monthly, 2002-14, ≈11m obs).

- Incomes, profits and employment:
  - Worker level data on incomes and income sources (quarterly, 2002-12, ≈13m obs) (ENEU/ENOE).
  - Store-level revenues and costs from Mexican Retail Census (2004 and 2009, ≈3.5m obs)

- Quantifying the gains:
  - Household survey data on budget shares at product-group-by-store-type level, income shares by occupation/business income source (ENIGH) (2006-12, ≈5m obs).
Data

- Household cost of living:
  - Barcode-by-store level confidential microdata of Mexican CPI (monthly, 2002-14, \( \approx 11m \) obs).
  - Household-by-barcode-by-store level microdata from AC Nielsen Mexico (daily, 2011-14, \( \approx 25m \) obs).

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Summary of Findings

1. Retail FDI causes large and significant welfare gains for the average household.
   - We estimate a 7% increase in household real income.

2. The majority of this effect is driven by a reduction in cost of living.
   - About 20% of the cost of living effect is due to pro-competitive effects on prices in domestic stores.
   - The remaining 80% is due to direct price index effect of being able to shop at new foreign store (combination of lower prices, greater variety and different amenities).

3. No evidence of an effect on average nominal incomes, wages, or employment.
   - However, we do find adverse effects on domestic store profits and retail wage incomes.

4. The gains from retail FDI are positive for all income groups, but regressive.
   - Due to interplay of opposing forces that we quantify.
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Outline of Talk

- Related Literature
- Background and motivating evidence on retail globalization in Mexico
- Theoretical framework
- Data
- Empirical estimation
  - Part 1: Causal effects on prices, quantities and incomes.
  - Part 2: Demand estimation.
  - Part 3: Proceed to quantification.
- Conclusion
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Related Literature

- **Gains from trade liberalization in developing countries**
  - We focus on retail globalization, and newly available data allow us to carefully estimate causal effects on price indexes.
  - Small literature on foreign retail focuses on suppliers rather than consumers/workers (Iacovone et al., 2012; Javorcik & Li, 2013).

- **Quantifying gains from trade and FDI**
  - Estimate general welfare expression that nests ACR statistic, use causal effects.
  - Trace foreign production shares into household consumption baskets.

- **WalMart in the US**
  - We exploit rich Mexican microdata to provide comprehensive assessment of all major components of household welfare.
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Retail Globalization in Mexico:
Number of Foreign Stores over Time

- The estimation period coincides with the major wave of foreign store expansion in Mexico.
  - Number of stores December 1995: 204
  - December 2001: 365
  - March 2014: 1335

- Who are the foreign supermarket players?
  - Walmart (Walmart, Sam's Club, Superama, Aurrera, Bodega Aurrera)
  - Costco
  - Safeway (Casa Ley)
  - HEB
  - S-Mart
  - Smart and Final
  - Carrefour
  - Auchan
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Retail Globalization in Mexico: 1995 (204 stores)
Retail Globalization in Mexico: 2001 (365 stores)
Retail Globalization in Mexico: 2014 (1335 stores)
## Motivating Evidence: How Do Foreign Supermarkets Differ Ex Post?

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Log Price</td>
<td>Log Price</td>
<td>Log Number of Barcodes</td>
<td>Log Floor Space</td>
</tr>
<tr>
<td>Foreign Store Dummy</td>
<td>-0.118***</td>
<td>0.249***</td>
<td>1.612***</td>
<td>1.911***</td>
</tr>
<tr>
<td></td>
<td>(0.00913)</td>
<td>(0.0160)</td>
<td>(0.0671)</td>
<td>(0.0416)</td>
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<tr>
<td>Municipality-By-Year FX</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Municipality-By-Product-By-Month FX</td>
<td>✓</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Municipality-By-Barcode-By-Month FX</td>
<td>✓</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Observations</td>
<td>18,659,777</td>
<td>18,659,777</td>
<td>10,393</td>
<td>11,113</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.923</td>
<td>0.368</td>
<td>0.139</td>
<td>0.302</td>
</tr>
<tr>
<td>Number of Municipalities</td>
<td>151</td>
<td>151</td>
<td>151</td>
<td>499</td>
</tr>
</tbody>
</table>

- Foreign stores charge on average 12 percent less for identical barcodes.
- They appear to offer higher quality varieties.
- On average offer several times more barcode variety and floor space.
- Stores typically fancier and cleaner ([picture](#)).
- At same time, stores often located further away from town center ([map](#)).
Theoretical Framework: A General Expression for the Welfare Effect

- \( CV = e(P_1^1, u_h^0) - y_h^1 \)

\[
= \underbrace{\left[ e(P_1^1, u_h^0) - e(P_0^0, u_h^0) \right]}_{\text{Cost of living effect (CLE)}} \quad - \quad \underbrace{\left[ y_h^1 - y_h^0 \right]}_{\text{Income effect (IE)}}
\]

- While effects on incomes can in principle be estimated without imposing additional structure, this is not the case for cost of living.

- Can observe price changes of products in continuing domestic stores \((P_{dc}^1 - P_{dc}^0)\).
- Cannot observe price changes for consumption at entering foreign retailers \((P_f^1 - P_f^{0*})\) or exiting domestic retailers \((P_{dx}^{1*} - P_{dx}^0)\).
Theoretical Framework: A General Expression for the Welfare Effect

- \( CV = e(P^1, u^0_h) - y^1_h \)

- \( = \left[ e(P^1, u^0_h) - e(P^0, u^0_h) \right] - \left[ y^1_h - y^0_h \right] \)

  Cost of living effect (CLE)  Income effect (IE)

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Theoretical Framework: A General Expression for the Welfare Effect

- \( CV = e(P^1, u^0_h) - y^1_h \)
  
  \[ = \left[ e(P^1, u^0_h) - e(P^0, u^0_h) \right] - \left[ y^1_h - y^0_h \right] \]
  
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Theoretical Framework: Decomposition

\[ CLE = \left[ e(P_{dc}^1, P_{dx}^1, P_f^1, u_h^0) - e(P_{dc}^1, P_{dx}^1, P_f^1, u_h^0) \right] + \left[ e(P_{dc}^1, P_{dx}^1, P_f^1, u_h^0) - e(P_{dc}^0, P_{dx}^0, P_f^0, u_h^0) \right] \]

1: Direct effect (DE)

\[ IE = \left[ \sum_i w_i^1 l_{ih}^1 - \sum_i w_i^0 l_{ih}^0 \right] + \left[ \sum_i \pi_{ih}^1 (P_{ih}^1; w^1) - \sum_i \pi_{ih}^0 (P_{ih}^0; w^0) \right] \]

4: Retail wage effect (WE)

5: Retail business effect (BE)

\[ + \left[ x_h^1 - x_h^0 \right] \]

6: Other income effects (OE)

- Where *’s denote unobserved prices for products in entering/exiting retailers.
Two Approaches to Estimating the Cost of Living Effect

- Follow two approaches to empirically estimate the cost of living effect:

  1. Exact estimation under multi-tier asymmetric CES:
     - Use tools from literature on gains from variety to quantify the complete set of "virtual" price changes due to foreign entry.

  2. First order approximation exploiting rich price microdata:
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Estimation Using Exact Approach (1)

- Use a multi-tier asymmetric CES utility function:

\[
U = \prod_{g \in G} [Q_g]^{\alpha_{gh}} : \text{Cobb-Douglas over product groups } g
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\[
Q_g = \left( \sum_{s \in S_g} \beta_{gsh} q_{gs}^{\frac{\eta-1}{\eta}} \right)^{\frac{\eta}{\eta-1}} : \text{CES over stores } s
\]

\[
q_{gs} : \text{preferences within store-good unspecified for now}
\]

- This choice of preferences has three main virtues:
  - Thanks to Feenstra (1994) estimation is convenient.
  - CES identical to aggregating discrete choices (multinomial logit) of many consumers (Anderson et al. 1992).
  - The direct effect collapses to sufficient statistic in ACR/RR:

\[
\frac{CLE}{e(P_{0g}^{\beta_{gsh}^{1}} \cdot \beta_{gsh}^{u_{0}})} = \prod_{g \in G} \left\{ \left( \sum_{s \in S_g^{dc}} \phi_{gsh}^{1} \right)^{\frac{1}{\eta-1}} \right\}^{\alpha_{gh}} - 1 \quad (More)
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\[ \frac{C}{e(p_d^{0*}, p_f^{0*}, u_h^{0})} = \prod_{g \in G} \left\{ \left( \sum_{s \in S_g} \phi_{gsh} \right)^{\frac{1}{n-1}} \right\}^{\alpha_{gh}} - 1 \]  

- Market share of foreign retail and elasticity of substitution give us consumer gains, bundling lower prices, more variety, different amenities.
Estimation Using Exact Approach (2)

- We can write out the full welfare expression in terms of observable moments in our microdata:
  - Causal effects of foreign retail entry on consumer prices, quantities and household incomes using our collection of microdata.
  - Demand parameters, which we estimate from the Nielsen Consumer Panel.
  - Initial raw moments from microdata.

\[
\frac{CV}{e(p_0^{d}, p_0^{f}, u_0^h)} = \left[ \prod_{g \in G} \left\{ \frac{1}{\sum_{s \in S_{dcg}^{g}} \phi_{gsh}^{1}} \prod_{s \in S_{dcg}^{g}} \left( \frac{r_{gs}^{1}}{r_{gs}^{0}} \right)^{\omega_{gsh}} \right\}^{\alpha_{gh}} - \prod_{g \in G} \left\{ \frac{1}{\sum_{s \in S_{dcg}^{g}} \phi_{gsh}^{0}} \prod_{s \in S_{dcg}^{g}} \left( \frac{r_{gs}^{1}}{r_{gs}^{0}} \right)^{\omega_{gsh}} \right\}^{\alpha_{gh}} \right]
\]

(1) Direct effect (DE)

\[
+ \left[ \prod_{g \in G} \left\{ \frac{1}{\sum_{s \in S_{dcg}^{g}} \phi_{gsh}^{0}} \prod_{s \in S_{dcg}^{g}} \left( \frac{r_{gs}^{1}}{r_{gs}^{0}} \right)^{\omega_{gsh}} \right\}^{\alpha_{gh}} - \prod_{g \in G} \left\{ \prod_{s \in S_{dcg}^{g}} \left( \frac{r_{gs}^{1}}{r_{gs}^{0}} \right)^{\omega_{gsh}} \right\}^{\alpha_{gh}} \right]
\]

(3) Pro-competitive exit (PEX)

\[
- \sum_{i} \left[ \theta_{wih} \left( \frac{w_{i}^{1} - w_{i}^{0}}{w_{i}^{0}} \right) + \frac{l_{ih}^{1} - l_{ih}^{0}}{l_{ih}^{0}} + \frac{w_{i}^{1} - w_{i}^{0}}{w_{i}^{0}} \right] \left( \frac{w_{i}^{1} - w_{i}^{0}}{w_{i}^{0}} \right) \right] - \sum_{i} \left[ \theta_{\pi ih} \left( \frac{\pi_{ih}(p_{ih}^{1}; w) - \pi_{ih}(p_{ih}^{0}; w)}{\pi_{ih}(p_{ih}^{0}; w)} \right) \right] \left( \frac{\pi_{ih}(p_{ih}^{1}; w) - \pi_{ih}(p_{ih}^{0}; w)}{\pi_{ih}(p_{ih}^{0}; w)} \right) \right] - \left[ \theta_{o ih} \left( \frac{x_{i}^{1} - x_{i}^{0}}{x_{i}^{0}} \right) \right]
\]

(4) Wage effects

(5) Household business effects

(6) Other income effects
Estimation Using First-Order Approach

- The first-order approach:
  - Causal effects of foreign retail entry on consumer prices, quantities and household incomes using our collection of microdata.
  - Initial raw moments from microdata.

\[
\frac{CV}{e(P^0_d, P^0_f, u^0_h)} \approx \sum_b \sum_{s \in S_b^f} \phi^1_{bsh} \left( \frac{p^1_{bf} - p^0_{bd}}{p^1_{bf}} \right) \\
\sum_b \sum_{s \in S_b^{dc}} \phi^1_{bsh} \left( \frac{p^1_{bs} - p^0_{bs}}{p^1_{bs}} \right)
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(1) Direct effect (DE)

\[
- \sum_i \left[ \theta^0_{ih} \left( \frac{w^1_i - w^0_i}{w^0_i} + \frac{l^1_{ih} - l^0_{ih}}{l^0_{ih}} \right) + \frac{w^1_i - w^0_i}{w^0_i} + \frac{l^1_{ih} - l^0_{ih}}{l^0_{ih}} \right] - \sum_i \left[ \theta^0_{ih} \left( \frac{\pi^0_{ih}(P^1_{ih}; w) - \pi^0_{ih}(P^0_{ih}; w)}{\pi^0_{ih}(P^0_{ih}; w)} \right) \right] - \left[ \theta^0_{h} \frac{x^1_{h} - x^0_{h}}{x^0_{h}} \right]
\]

(2) Pro-competitive effect (PE)

(4) Wage effects

(5) Household business effects

(6) Other income effects
Data

- We assemble six main datasets:

  2. Confidential Mexican CPI microdata: Monthly barcode price quotes 2002-2014 with retailer identities (\(\sim 85,000\) each month) (INEGI CPI).
  5. Retail census microdata on sales and costs by store for 2004 and 2009 (\(\sim 3.4\) million obs) (INEGI Censos Economicos).
  6. Household microdata combining income sources and expenditures 2006-2012 (\(\sim 25,000\) households in each round) (ENIGH).
Data

We assemble six main datasets:


2. Confidential Mexican CPI microdata: Monthly barcode price quotes 2002-2014 with retailer identities (∼85,000 each month) (INEGI CPI).


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Estimation

- Part 1:
  - Effects on prices.
  - Effects on quantities.
  - Effects on incomes.

- Part 2: Demand estimation.

- Part 3: Quantification.
Estimation

• Part 1:
  • Effects on prices.
  • Effects on quantities.
  • Effects on incomes.

• Part 2: Demand estimation.

• Part 3: Quantification.
Prices (1): Domestic Retail Prices

• Want to compare prices at domestic stores pre and post foreign store entry.

• But timing of foreign store entry may be endogenous to domestic price changes:
  1. May seek places with higher price growth.
  2. May seek fast-growing places with rising competitiveness and falling prices.
  3. May try to open in every major town as quickly as possible.

• Event study specification:

\[
\ln p_{gsbmt} = \sum_{\tau=-12}^{36} \beta_\tau I(MonthsSinceEntry_{mt} = \tau) + \delta_{gsbm} + \eta_t + \epsilon_{gsbmt}
\]

• where \( g = \) product-group, \( s = \) store, \( b = \) barcode, \( m = \) municipality, \( t = \) month.

• Estimate price changes in domestic stores in every month 1 year before and 3 years after foreign retail entry.

• Allows us to verify exogeneity of timing of store entry.
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  3. May try to open in every major town as quickly as possible.

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\[
\ln p_{gsbm} = \sum_{\tau=-12}^{36} \beta_{\tau} I(MonthsSinceEntry_{mt} = \tau) + \delta_{gsbm} + \eta_t + \epsilon_{gsbm}
\]

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\[ \ln p_{gsbmt} = \sum_{\tau=-12}^{36} \beta_{\tau} I(MonthsSinceEntry_{mt} = \tau) + \delta_{gsbm} + \eta_t + \varepsilon_{gsbmt} \]

• where \( g \) = product-group, \( s \) = store, \( b \) = barcode, \( m \) = municipality, \( t \) = month.

• Estimate price changes in domestic stores in every month 1 year before and 3 years after foreign retail entry.

• Allows us to verify exogeneity of timing of store entry.
Prices (2): Domestic Retail Prices

Notes: Point estimates are based on 149,273 monthly price series of unique barcode-by-store combinations over the period 2002-2014. The graph depicts 95% confidence intervals based on standard errors that are clustered at the municipality level.
### Prices (3): Domestic Retail Prices

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>(1) Log Price</th>
<th>(2) Log Price</th>
<th>(3) Log Price</th>
<th>(4) Log Price</th>
<th>(5) Log Price</th>
<th>(6) Log Price (Non-Retail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Entry - Four Quarters Before</td>
<td>-0.00257</td>
<td>-0.00348</td>
<td>-0.00389</td>
<td>-0.00366</td>
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<td>(0.00594)</td>
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<td>(0.00457)</td>
<td>(0.00441)</td>
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<td>(0.00528)</td>
</tr>
<tr>
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<td>-0.00521</td>
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<td>(0.00642)</td>
<td>(0.00500)</td>
<td>(0.00558)</td>
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<td>(0.00783)</td>
<td>(0.00599)</td>
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<td>Foreign Entry - Two Quarters Before</td>
<td>-0.00354</td>
<td>-0.00374</td>
<td>-0.00333</td>
<td>-0.00300</td>
<td>-0.00334</td>
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<td>(0.00751)</td>
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<td>(0.00614)</td>
<td>(0.00649)</td>
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</tr>
<tr>
<td>Foreign Entry - One Quarter Before</td>
<td>-0.00523</td>
<td>-0.00401</td>
<td>-0.00275</td>
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<td>(0.00753)</td>
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<td>(0.00664)</td>
</tr>
<tr>
<td>Foreign Entry - One Quarter After</td>
<td>-0.00088</td>
<td>-0.00770</td>
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<td>-0.00819</td>
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<td>(0.00940)</td>
<td>(0.00765)</td>
<td>(0.00684)</td>
<td>(0.00688)</td>
<td>(0.00858)</td>
<td>(0.00792)</td>
</tr>
<tr>
<td>Foreign Entry - Two Quarters After</td>
<td>-0.00924</td>
<td>-0.0106</td>
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<td>(0.00916)</td>
<td>(0.00807)</td>
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<td>Foreign Entry - Three Quarters After</td>
<td>-0.0136</td>
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<td>-0.0121</td>
<td>-0.0153*</td>
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<tr>
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<td>(0.00914)</td>
<td>(0.00849)</td>
<td>(0.00802)</td>
<td>(0.00767)</td>
<td>(0.00861)</td>
<td>(0.00733)</td>
</tr>
<tr>
<td>Foreign Entry - Four Quarters After</td>
<td>-0.0156*</td>
<td>-0.0147*</td>
<td>-0.0106</td>
<td>-0.0126</td>
<td>-0.0167*</td>
<td>-0.00302</td>
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<tr>
<td></td>
<td>(0.00909)</td>
<td>(0.00876)</td>
<td>(0.00835)</td>
<td>(0.00815)</td>
<td>(0.00854)</td>
<td>(0.00850)</td>
</tr>
<tr>
<td>Foreign Entry - Five Quarters After</td>
<td>-0.0184*</td>
<td>-0.0183*</td>
<td>-0.0136</td>
<td>-0.0163*</td>
<td>-0.0206*</td>
<td>0.00464</td>
</tr>
<tr>
<td></td>
<td>(0.0103)</td>
<td>(0.00958)</td>
<td>(0.00913)</td>
<td>(0.00930)</td>
<td>(0.0111)</td>
<td>(0.00872)</td>
</tr>
<tr>
<td>Foreign Entry - Six Quarters After</td>
<td>-0.0279**</td>
<td>-0.0271**</td>
<td>-0.0218**</td>
<td>-0.0251*</td>
<td>-0.0288**</td>
<td>0.00365</td>
</tr>
<tr>
<td></td>
<td>(0.0114)</td>
<td>(0.0104)</td>
<td>(0.0101)</td>
<td>(0.0104)</td>
<td>(0.0129)</td>
<td>(0.00960)</td>
</tr>
<tr>
<td>Foreign Entry - Seven Quarters After</td>
<td>-0.0344***</td>
<td>-0.0316***</td>
<td>-0.0256*</td>
<td>-0.0291***</td>
<td>-0.0330**</td>
<td>-0.00447</td>
</tr>
<tr>
<td></td>
<td>(0.0116)</td>
<td>(0.0105)</td>
<td>(0.0101)</td>
<td>(0.0107)</td>
<td>(0.0134)</td>
<td>(0.0101)</td>
</tr>
<tr>
<td>Foreign Entry - Eight Quarters After</td>
<td>-0.0340***</td>
<td>-0.0320***</td>
<td>-0.0250***</td>
<td>-0.0294***</td>
<td>-0.0373**</td>
<td>-0.00411</td>
</tr>
<tr>
<td></td>
<td>(0.0109)</td>
<td>(0.0103)</td>
<td>(0.0102)</td>
<td>(0.0112)</td>
<td>(0.0139)</td>
<td>(0.0117)</td>
</tr>
</tbody>
</table>

- P-Value (Eight Quarters=Post Eight Quarters): 0.4262
- Month FX
- Barcode-By-Municipality FX
- Barcode-By-Store FX
- Municipality Time Trends
- Product-By-Month FX
- Quarterly Municipality Controls
- Observations: 3,228,544
- R-squared: 0.990
- Number of Barcode-By-Store Cells: 149,273
- Number of Product-By-Month Cells: 16,818
- Number of Municipality Clusters: 76

- Point estimates robust to variety of alternative specifications.
- No effects on non-retail prices (both placebo check and quantification input).
### Prices (4): Domestic Retail Prices — Heterogeneity

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>(1) Log Price</th>
<th>(2) Log Price</th>
<th>(3) Log Price</th>
<th>(4) Log Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Entry</td>
<td>-0.00574</td>
<td>-0.0256**</td>
<td>-0.0103</td>
<td>-0.00852</td>
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<tr>
<td></td>
<td>(0.0164)</td>
<td>(0.0121)</td>
<td>(0.0178)</td>
<td>(0.0191)</td>
</tr>
<tr>
<td>Foreign Entry X Modern Store</td>
<td>-0.0475**</td>
<td>-0.0567***</td>
<td>-0.0630**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0213)</td>
<td>(0.0190)</td>
<td>(0.0253)</td>
<td></td>
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<tr>
<td>Foreign Entry X Food Products</td>
<td>0.000863</td>
<td>0.0240*</td>
<td>0.0148</td>
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</tr>
<tr>
<td></td>
<td>(0.0186)</td>
<td>(0.0136)</td>
<td>(0.0215)</td>
<td></td>
</tr>
<tr>
<td>Foreign Entry X Modern X Food</td>
<td>0.0173</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.0315)</td>
<td></td>
</tr>
</tbody>
</table>

- Month FX: ✓ ✓ ✓ ✓ ✓
- Barcode-By-Store FX: ✓ ✓ ✓ ✓ ✓
- Product-By-Store Type-By-Month FX: ✓ ✓ ✓ ✓ ✓

Observations: 2,790,780 3,157,767 2,790,780 2,790,780
R-squared: 0.996 0.996 0.996 0.996
Number of Barcode-By-Store Cells: 123,937 148,479 123,937 123,937
Number of Product-By-Store Type-By-Month Cells: 33,516 33,516 33,516 33,516
Number of Municipality Clusters: 76 76 76 76

- For the quantification, estimate price effects across different product groups and stores.
  - Biggest price declines in modern domestic stores.
  - Slightly smaller declines for food compared to non-food.
Prices (5): Ex-Post Cross-Store Price Differences
(Used in First Order Approach)

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>(1) Log Price</th>
<th>(2) Log Price</th>
<th>(3) Log Price</th>
<th>(4) Log Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Store</td>
<td>0.118***</td>
<td></td>
<td>0.0744***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00913)</td>
<td></td>
<td>(0.00765)</td>
<td></td>
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<tr>
<td>Domestic Traditional</td>
<td>0.173***</td>
<td>0.170***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00874)</td>
<td>(0.0108)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic Modern</td>
<td>0.0397***</td>
<td>0.0189***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0113)</td>
<td>(0.00713)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic X Food</td>
<td>0.0492***</td>
<td></td>
<td>0.0492***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.00923)</td>
<td></td>
<td>(0.00923)</td>
<td></td>
</tr>
<tr>
<td>Domestic Traditional X Food</td>
<td></td>
<td></td>
<td></td>
<td>0.00401</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.0130)</td>
</tr>
<tr>
<td>Domestic Modern X Food</td>
<td></td>
<td></td>
<td></td>
<td>0.0242**</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.0100)</td>
</tr>
</tbody>
</table>

Municipality-By-Barcode-By-Month FX | ✓ | ✓ | ✓ | ✓ |
Observations                   | 18,659,777 | 18,659,777 | 18,659,777 | 18,659,777 |
R-squared                      | 0.923      | 0.923      | 0.923      | 0.923      |
Number of Municipalities       | 151        | 151        | 151        | 151        |

- Foreign stores charge on average 12% lower prices, and more than 17% lower prices compared to traditional domestic stores.
- These price gaps are larger for food and beverage products.
Quantities (1):
Ex-Post Foreign Retail Market Shares By Income Group

- Average expenditure share of foreign retailers is $>30\%$ (post entry).
- Share is strongly increasing in household income (40% difference), affects distribution of the direct price index effect.
Quantities (2):
Foreign Retail Market Shares By Product Group

- Foreign shares on average slightly larger for non-food product groups.
Incomes (1): Average Monthly Incomes and Employment

- Find no effects on average household incomes or employment.
Incomes (2): Heterogeneity

\[
\ln(\text{Income})_{jimt} = \sum_i \beta_i (\text{ForeignEntry}_{mt} \times \text{Occupation}_i) + \gamma X_{jimt} + \delta_{mt} + \eta_{im} + \theta_{it} + \varepsilon_{jimt}
\]

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Foreign Entry X Modern Retail Worker</td>
<td>-0.0798***</td>
<td>0.00528</td>
<td>-0.0238</td>
<td>-0.0234</td>
<td>0.0813***</td>
<td>0.0441***</td>
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<td>(0.00639)</td>
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<td>(0.00202)</td>
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<td>(0.00462)</td>
<td>(0.00385)</td>
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<tr>
<td>Foreign Entry X Traditional Retail Worker</td>
<td>-0.285***</td>
<td>-0.0280</td>
<td>-0.0451**</td>
<td>-0.0450**</td>
<td>0.0944***</td>
<td>0.0370***</td>
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<td>0.0181</td>
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<td>(0.0293)</td>
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<td>0.0866***</td>
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<td>(0.00428)</td>
<td>(0.00450)</td>
</tr>
</tbody>
</table>

- Person Controls
- Municipality-by-Quarter FX
- Municipality-by-Group Fixed Effects
- Group-by-Quarter FX
- State-by-Group Time Trends

Observations: 4,222,154 4,222,154 4,222,154 4,222,154 5,500,588 5,500,588 5,500,588 5,500,588
R-squared: 0.328 0.252 0.253 0.253 0.057 0.029 0.060 0.061
Number of Individuals: 1,568,257 1,568,257 1,568,257 1,568,257 1,787,095 1,787,095 1,787,095 1,787,095
Number of Municipality-by-Quarter Cells: 9,184 9,184 9,184 9,184 9,184 9,184 9,184 9,184
Number of State-by-Group Time Trends: 128 128 128 128 128 128 128 128
Number of Municipality Clusters: 298 298 298 298 298 298 298 298

Do find adverse effects on the incomes of traditional retail workers.
Incomes (3): Domestic Store Profits and Store Exit Using Mexican Retail Census Microdata

- Do find adverse effects on domestic store profits and store exit among traditional domestic stores.
With causal moments in hand, we turn to estimating the demand parameters.

\[
\frac{CV}{e(P^0_d, P^0_f, u^0_h)} = \left[ \prod_{g \in G} \left\{ \frac{\sum_{s \in d} \phi_{gsh} \frac{1}{\eta - 1}}{\sum_{s \in d} \phi_{gsh} \frac{1}{\eta - 1}} \right\} \prod_{s \in d} \left( \frac{r^1_{gs}}{r^0_{gs}} \right)^{\omega_{gsh}} \right]^{\alpha_{gh}}
\]

(1) Direct effect (DE)

\[
+ \left[ \prod_{g \in G} \left\{ \frac{\sum_{s \in d} \phi_{gsh} \frac{1}{\eta - 1}}{\sum_{s \in d} \phi_{gsh} \frac{1}{\eta - 1}} \right\} \prod_{s \in d} \left( \frac{r^1_{gs}}{r^0_{gs}} \right)^{\omega_{gsh}} \right]^{\alpha_{gh}}
\]

(2) Pro-competitive price (PEI)

\[-\sum_i \theta_{ih} x_{ih}^1 - x_{ih}^0] \]

(4) Wage effects

\[-\sum_i \theta_{ih} \left( \frac{\pi_{ih}(P^1_{ih}; w) - \pi_{ih}(P^0_{ih}; w)}{\pi_{ih}(P^0_{ih}; w)} \right) \]

(5) Household business effects

\[-\theta^\pi_{ih} x_{ih}^1 - x_{ih}^0] \]

(6) Other income effects
Estimating Demand Parameters (2)

- Mexican Nielsen Consumer Panel allows us to explore substitution patterns across retail stores.
  - Exploit cross-municipality differences in store price indexes.
  - This variation provides long-run elasticities.

- Under CES, can write store-product-group-level market shares as functions of price index and fixed effects:
  \[
  \ln \phi_{gshmt} = (1 - \eta) \ln r_{gshmt} - (1 - \eta) \ln c_{ghmt} + \eta \ln \beta_{gshmt}
  \]

- Where price-index \( r_{gshmt} \) is Stone price index for overlapping barcodes.
- Standard endogeneity issues: Instrument with neighboring municipality prices.
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  \]

  \[
  \implies \ln \phi_{gshmt} = b \ln r_{gshmt} + \delta_{ghmt} + \gamma_{st} + u_{gshmt}
  \]
  - Where price-index \( \ln r_{gshmt} \) is Stone price index for overlapping barcodes.

- Standard endogeneity issues: Instrument with neighboring municipality prices.
### Estimating Demand Parameters (3):

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log(Store Price Index)</td>
<td>0.535***</td>
<td>-2.819**</td>
</tr>
<tr>
<td>Log(Store Price Index)</td>
<td>-0.0153</td>
<td>(1.248)</td>
</tr>
<tr>
<td>Product-by-Income-by-Municipality-by-Quarter FX</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Store-by-Quarter FX</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Observations</td>
<td>115,224</td>
<td>104,979</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.735</td>
<td></td>
</tr>
<tr>
<td>First-Stage F-Statistic</td>
<td></td>
<td>18.940</td>
</tr>
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</table>

- As $b = 1 - \eta$, implies CES elasticity across stores of 3.82.
Quantification: Exact Approach

- With causal moments and elasticities in hand, we can proceed to welfare quantification and decomposition.

- Household surveys (ENIGH) provide remaining moments: household budget shares at product-group-by-store-type level, household income shares by occupation/business income source.

- Calculate gains for each urban household to generate distribution.

\[
CV_{\text{exact}} = \prod_{g \in G} \left\{ \left( \frac{\sum_{s \in S^g} \phi_{1gsh}}{\sum_{s \in S^g} \phi_{0gsh}} \right)^{1/\eta} \prod_{s \in S^g} \left( \frac{r_{gs}}{r_{g0s}} \right)^{\omega_{gsh}} \right\}^\alpha_{gh} - \prod_{g \in G} \left\{ \left( \frac{\sum_{s \in S^g} \phi_{0gsh}}{\sum_{s \in S^g} \phi_{1gsh}} \right)^{1/\eta} \prod_{s \in S^g} \left( \frac{r_{gs}}{r_{g0s}} \right)^{\omega_{gsh}} \right\}^\alpha_{gh}
\]

(1) Direct effect (DE)

\[
+ \prod_{g \in G} \left\{ \left( \frac{1}{\sum_{s \in S^g} \phi_{1gsh}} \right)^{1/\eta} \prod_{s \in S^g} \left( \frac{r_{gs}}{r_{g0s}} \right)^{\omega_{gsh}} \right\}^\alpha_{gh} - \prod_{g \in G} \left\{ \prod_{s \in S^g} \left( \frac{r_{gs}}{r_{g0s}} \right)^{\omega_{gsh}} \right\}^\alpha_{gh}
\]

(2) Pro-competitive price (PEI)

\[
- \sum_i \left[ \theta_{0i} \left( \frac{w_i^1 - w_i^0}{w_i^0} + \frac{l_{0i}^i - l_{0i}}{l_{0i}} \right) \right] - \sum_i \left[ \theta_{i} \frac{l_{i}^1 - l_{i}^0}{l_{i}^0} \right]
\]

(4) Wage effects

\[
+ \prod_{g \in G} \left\{ \prod_{s \in S^g} \left( \frac{r_{gs}}{r_{g0s}} \right)^{\omega_{gsh}} \right\}^\alpha_{gh}
\]

(3) Pro-competitive exit (PEX)

\[
- \sum_i \left[ \theta_{0i} \frac{\pi_{ih}(P_{1i}^i, w_i) - \pi_{ih}(P_{0i}^i, w_i)}{\pi_{ih}(P_{0i}^i, w_i)} \right] - \frac{1}{x_h} \left[ \frac{z_h^1 - x_h^0}{x_h^0} \right]
\]

(5) Household business effects

(6) Other income effects
Quantification (1): Decomposing Average Gains from Foreign Retail

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>(1) Total Effect</th>
<th>(2) Direct Price Index Effect</th>
<th>(3) Pro-Comp Price Index Effect</th>
<th>(4) Pro-Comp Exit</th>
<th>(5) Wage Effect</th>
<th>(6) Profit Effect</th>
<th>(7) Other Income Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Effect</td>
<td>0.0732***</td>
<td>0.0653***</td>
<td>0.0132***</td>
<td>-0.00158***</td>
<td>-0.00177***</td>
<td>-0.00197***</td>
<td>0</td>
</tr>
<tr>
<td>(0.00171)</td>
<td>(0.00102)</td>
<td>(0.000416)</td>
<td>(7.70e-05)</td>
<td>(0.000231)</td>
<td>(0.000432)</td>
<td></td>
<td>(0)</td>
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<tr>
<td>Observations (Households)</td>
<td>11,992</td>
<td>11,992</td>
<td>11,992</td>
<td>11,992</td>
<td>11,992</td>
<td>11,992</td>
<td>11,992</td>
</tr>
<tr>
<td>Number of Municipality Clusters</td>
<td>240</td>
<td>240</td>
<td>240</td>
<td>240</td>
<td>240</td>
<td>240</td>
<td>240</td>
</tr>
</tbody>
</table>

- Average gain \( \approx 7\% \) of initial household income (bootstrapped SE’s to come).
- Cost of living effect is the dominant channel.
  - 20\% of cost of living effect driven by pro-competitive effects on domestic stores.
  - 80\% direct effect (lower prices, more variety, amenities at foreign stores).
Quantification: First-Order Approach

- With causal moments in hand, we can proceed to welfare quantification and decomposition.
  - Household surveys (ENIGH) provide remaining moments: household budget shares at product-group-by-store-type level, household income shares by occupation/business income source.
  - Calculate gains for each urban household to generate distribution.

\[
\frac{CV}{e(p^0_d, p^0_f, u^0_h)} \approx \sum_b \sum_{s \in S^f_b} \left[ \phi^1_{bsh} \left( \frac{p^1_{bf} - p^0_{bd}}{p^1_{bf}} \right) \right] \\
\quad \text{(1) Direct effect (DE)}
\]

\[
+ \sum_b \sum_{s \in S^dc_b} \left[ \phi^1_{bsh} \left( \frac{p^1_{bs} - p^0_{bs}}{p^1_{bs}} \right) \right] \\
\quad \text{(2) Pro-competitive effect (PE)}
\]

\[
- \sum_i \left[ \theta_{pih} \left( \frac{w^1_i - w^0_i}{w^0_i} + \frac{l^1_{ih} - l^0_{ih}}{l^0_{ih}} + \frac{x^1_i - x^0_i}{x^0_i} \right) \right] \\
\quad \text{(4) Wage effects}
\]

\[
- \sum_i \left[ \theta_{wi} \left( \frac{\pi_{ih}(p^1_{ih}; w^0) - \pi_{ih}(p^0_{ih}; w^0)}{\pi_{ih}(p^0_{ih}; w^0)} \right) \right] - \theta^0 \frac{x^1_h - x^0_h}{x^0_h} \\
\quad \text{(5) Household business effects}
\]

\[
\quad \text{(6) Other income effects}
\]
### Quantification (2): Average Gains under First-Order Approach

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
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<tbody>
<tr>
<td><strong>Dependent Variable:</strong></td>
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<td>Direct Price Index Effect</td>
<td>Pro-Comp Price Index Effect</td>
<td>Pro-Comp Exit</td>
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<td>11,992</td>
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<tr>
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<td>240</td>
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</thead>
<tbody>
<tr>
<td><strong>First Order Approach</strong></td>
<td>Total Effect</td>
<td>Direct Price Index Effect</td>
<td>Pro-Comp Price Index Effect</td>
<td>Pro-Comp Exit</td>
<td>Wage Effect</td>
<td>Profit Effect</td>
<td>Other Income Effect</td>
</tr>
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<td><strong>Average Effect</strong></td>
<td>0.0262***</td>
<td>0.0211***</td>
<td>0.00881***</td>
<td>0</td>
<td>-0.00177***</td>
<td>-0.00197***</td>
<td>0</td>
</tr>
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- First-order direct effect accounts for 1/3rd of exact (under CES) direct effect.
- Remainder driven by documented differences in shopping variety and amenity.
Quantification (3): Distribution of the Gains from Retail FDI

- Gains are regressive (richest gain approximately twice as much).
Quantification (4): Why are Gains Regressive?  
Comparison to First Order Approach

- Consumption side: Direct Effect
  - First-order approach shows no such regressiveness.
  - Consistent with rich valuing foreign-store varieties/amenities more.
Quantification (5): Why are Gains Regressive?

Ex-Post Retail Expenditure at Foreign Stores

- Consumption side: Direct Effect
  - Rich spend more of their retail expenditure at foreign stores at identical prices.
  - Again consistent with rich valuing foreign-store varieties and amenities more.
Quantification (6): Why are Gains Regressive?
Retail as Share of Total Expenditure

- Consumption side: Direct and Pro-Competitive Effect
  - Rich spend less of expenditure on retail.
Quantification (7): Why are Gains Regressive? 

Food as Share of Retail Expenditure

- Consumption side: Direct and Pro-Competitive Effect
  - Rich spend more on product groups that experience slightly larger price reductions.
Quantification (8): Why are Gains Regressive?
Retail Income as Share of Total Income

- **Income side:**
  - Rich less likely to source significant part of their incomes from the traditional domestic retail sector.
Conclusion

• The arrival of foreign retailers in developing countries is causing a radical transformation in the way households source their consumption.

• Despite massive policy interest, we know almost nothing about the impacts of these changes.
  
  • This paper writes down a very general welfare expression made possible by assembling 6 newly-available micro-level datasets.
  
  • Feed in causal moments obtained through event study methodology.

• Several new findings.
  
  • 1) Retail FDI causes large positive welfare gains (∼7%) for the average household.
  
  • 2) Effect predominantly driven by cost of living (20% pro-competitive; 80% direct effect, 1/3 of which pure price effects, 2/3 variety/amenity gains).
  
  • 3) The gains from retail FDI appear to be regressive, but positive for all income groups.

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- Thank You!
Backup Slides
Amenity Value of Foreign versus Domestic Stores
Store Locations by Type
Store Locations by Type
Relationship to Recent Literature on the Gains from Trade and FDI

- Under our multi-tier CES, the CLE becomes:

$$\frac{CLE}{e(P_0^*, P_f^*, u_h)} = \prod_{g \in G} \left\{ \frac{\sum_{s \in S_{dcg}^d} \phi_{gsh}^1}{\sum_{s \in S_{dcg}^d} \phi_{gsh}^0} \right\}^{\frac{1}{\eta - 1}} \prod_{s \in S_{dcg}^d} \left( \frac{p_{gs}^1}{p_{gs}^0} \right)^{\omega_{gsh}} \right\}^{\alpha_{gh}} - 1$$

- Notice that in absence of additional welfare effects (no PE’s or IE’s), this collapses to a multi-sector-multi-tier equivalent of the ACR sufficient statistic:

$$\frac{CLE}{e(P_0^*, P_f^*, u_h)} = \prod_{g \in G} \left\{ \left( \frac{\sum_{s \in S_{dcg}^d} \phi_{gsh}^1}{\sum_{s \in S_{dcg}^d} \phi_{gsh}^0} \right)^{\frac{1}{\eta - 1}} \right\}^{\alpha_{gh}} - 1$$

- Introducing sectors and store formats allows us to focus on what we think of as the most appropriate “trade elasticity” in our setting:

  - How do households within a given product group substitute between stores as a function of across-store local price indexes?