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The Consumption Effects of Trade

Amit Khandelwal

Selected Paper prepared for presentation at the International Agricultural Trade Research Consortium's (IATRC's) 2017 Annual Meeting: Globalization Adrift, December 3-5, 2017, Washington, DC.

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The Consumption Effects of Trade

Amit Khandelwal
Columbia Business School
December 2017

Public Support for Trade Agreements is Waning

- Little disagreement among economists on the benefits of free trade
  - Chicago Booth IGM Forum polls 60 top academic economists on various public policy issues
  - 95% support free trade

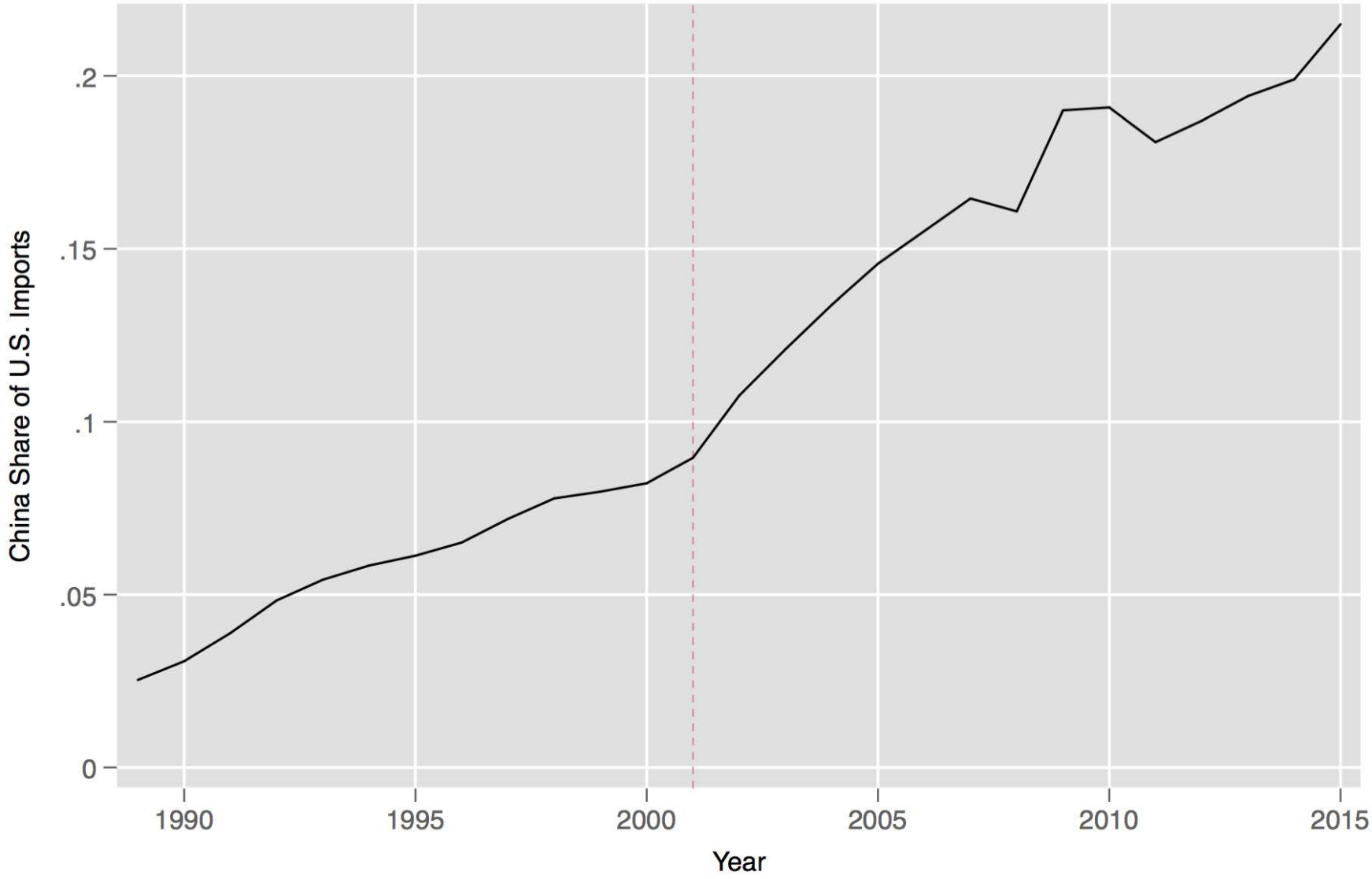
- But the public is much more skeptical about trade agreements
  - Only 52% say that free trade agreements have "been a good thing"
  - Conversations are centered around distributional gains from trade ("how the pie is divided"), not aggregate gains ("size of the pie")

- This is despite a large volume of evidence concluding that trade accounts for the minority of the rise in inequality in the U.S.

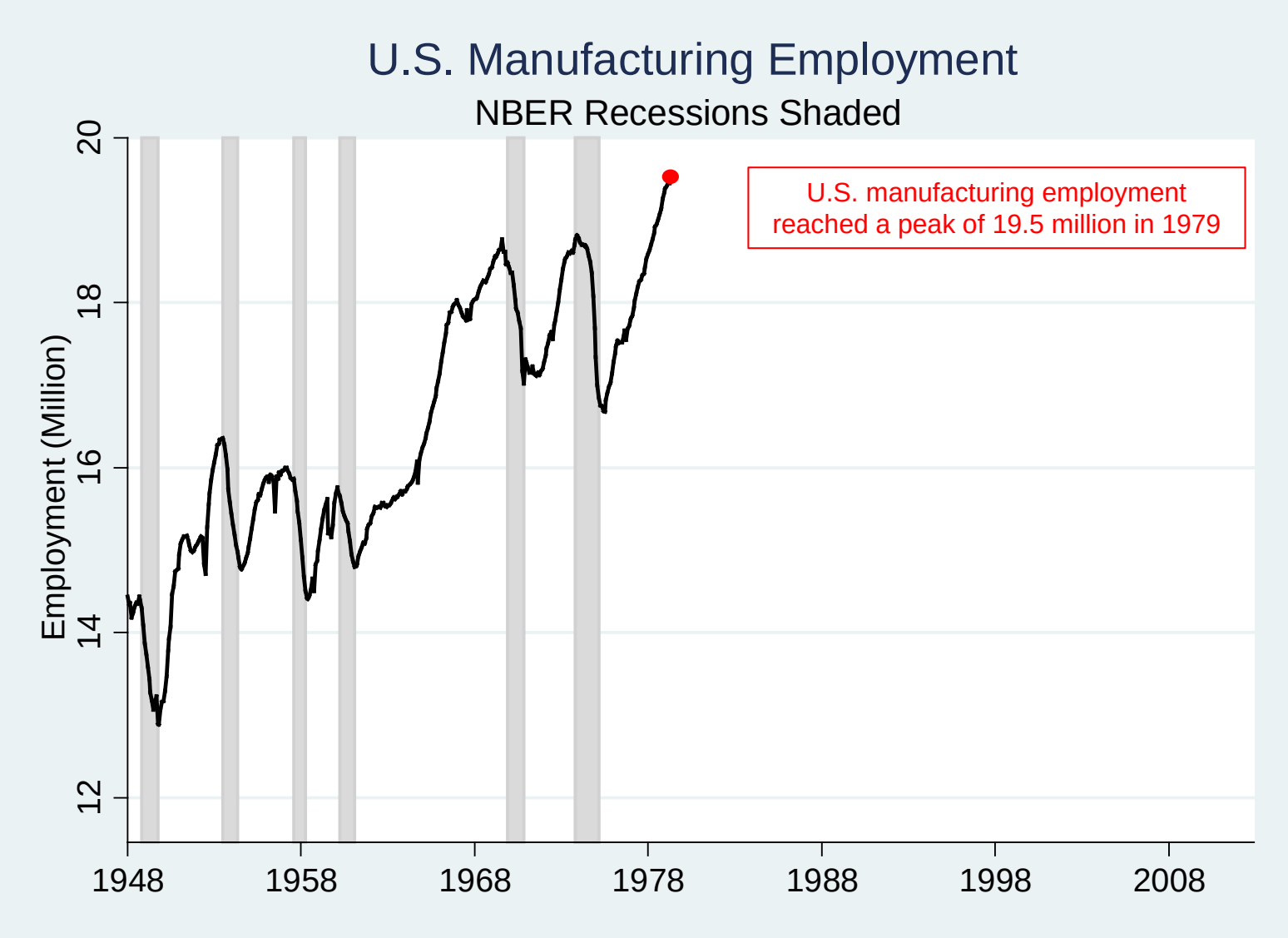
Predominant Focus is on Labor Markets

- Resurgence of research re-investigating the impact of trade on labor markets
- For developing countries, the focus has been on understanding the link between trade and wage inequality
  - Puzzling, since standard trade models predicted that wage inequality should fall in developing countries
- For developed countries, the focus has been on imports from China and the impact on U.S. manufacturing employment

China's Import Share into U.S.

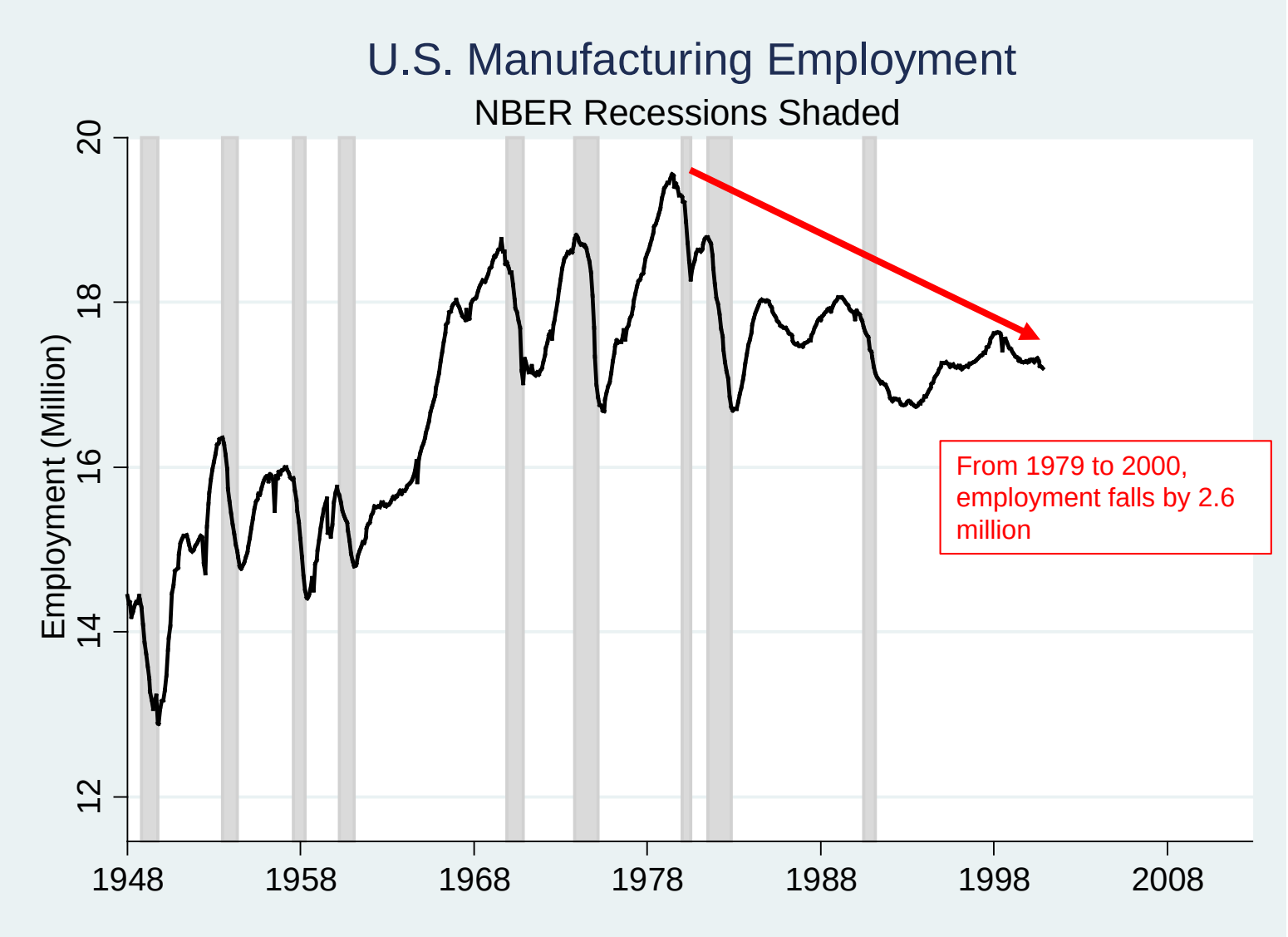


Post-War U.S. Manufacturing Employment



Source: Pierce and Schott (2016)

Post-War U.S. Manufacturing Employment



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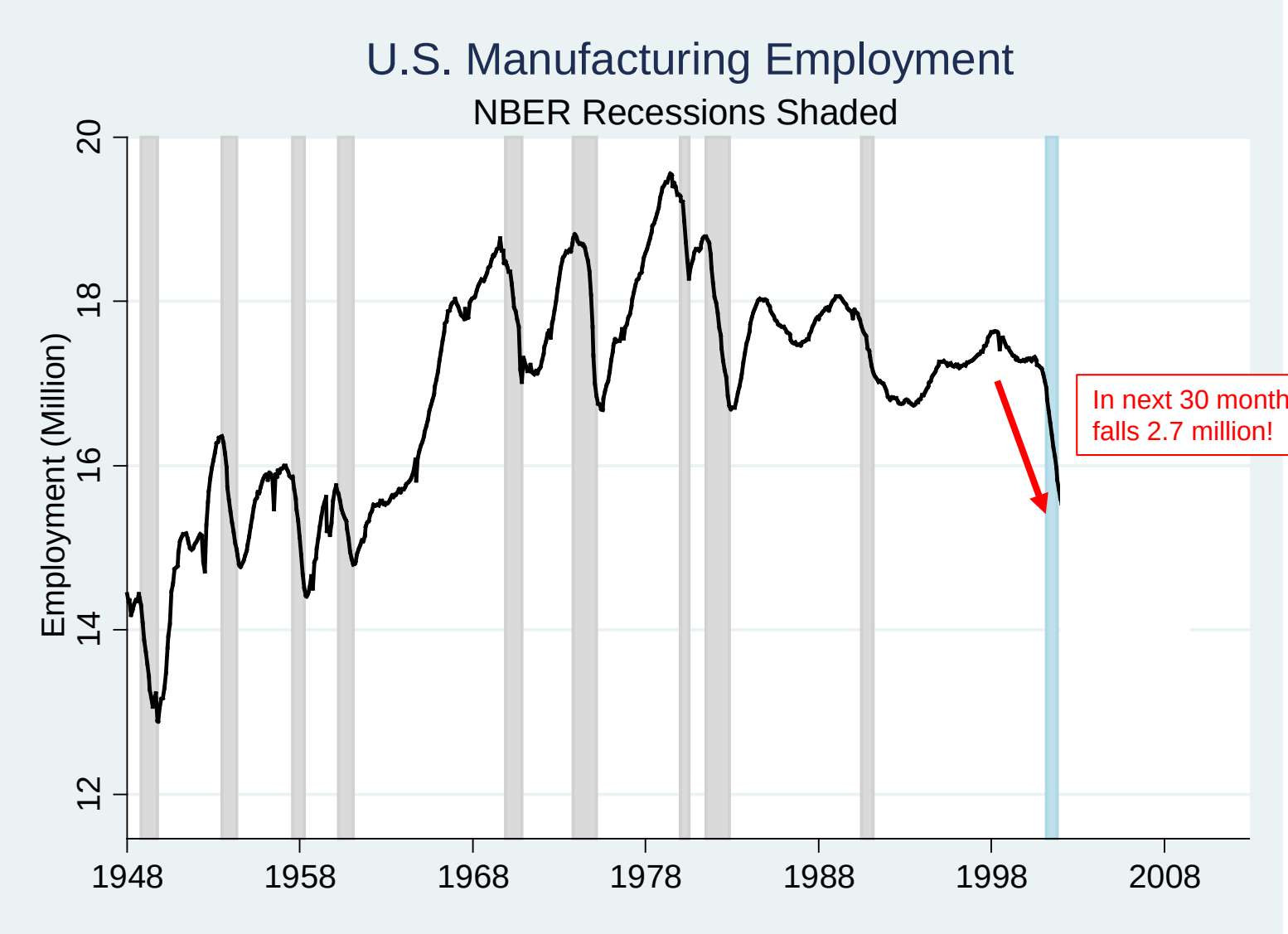

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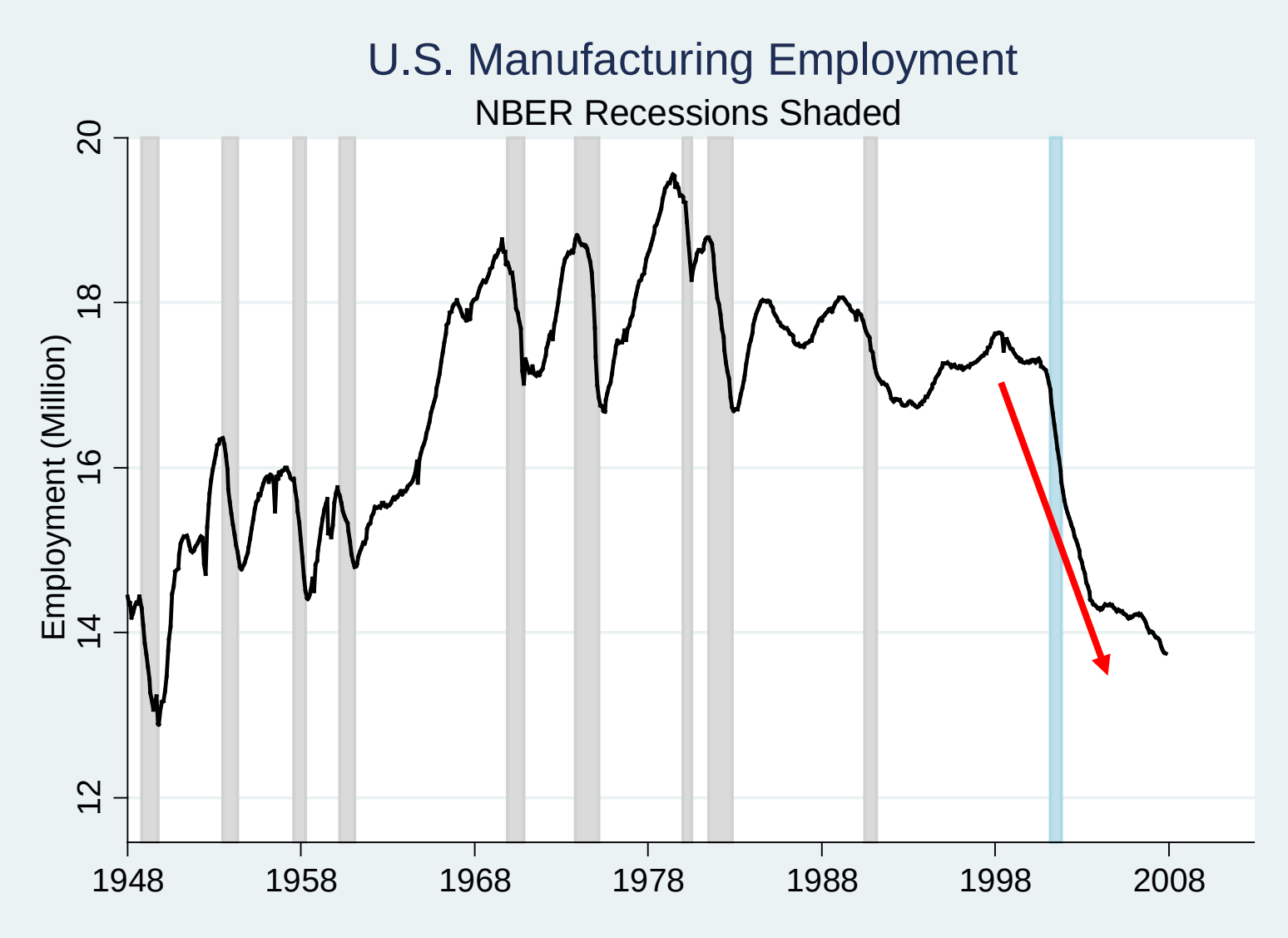
Post-War U.S. Manufacturing Employment



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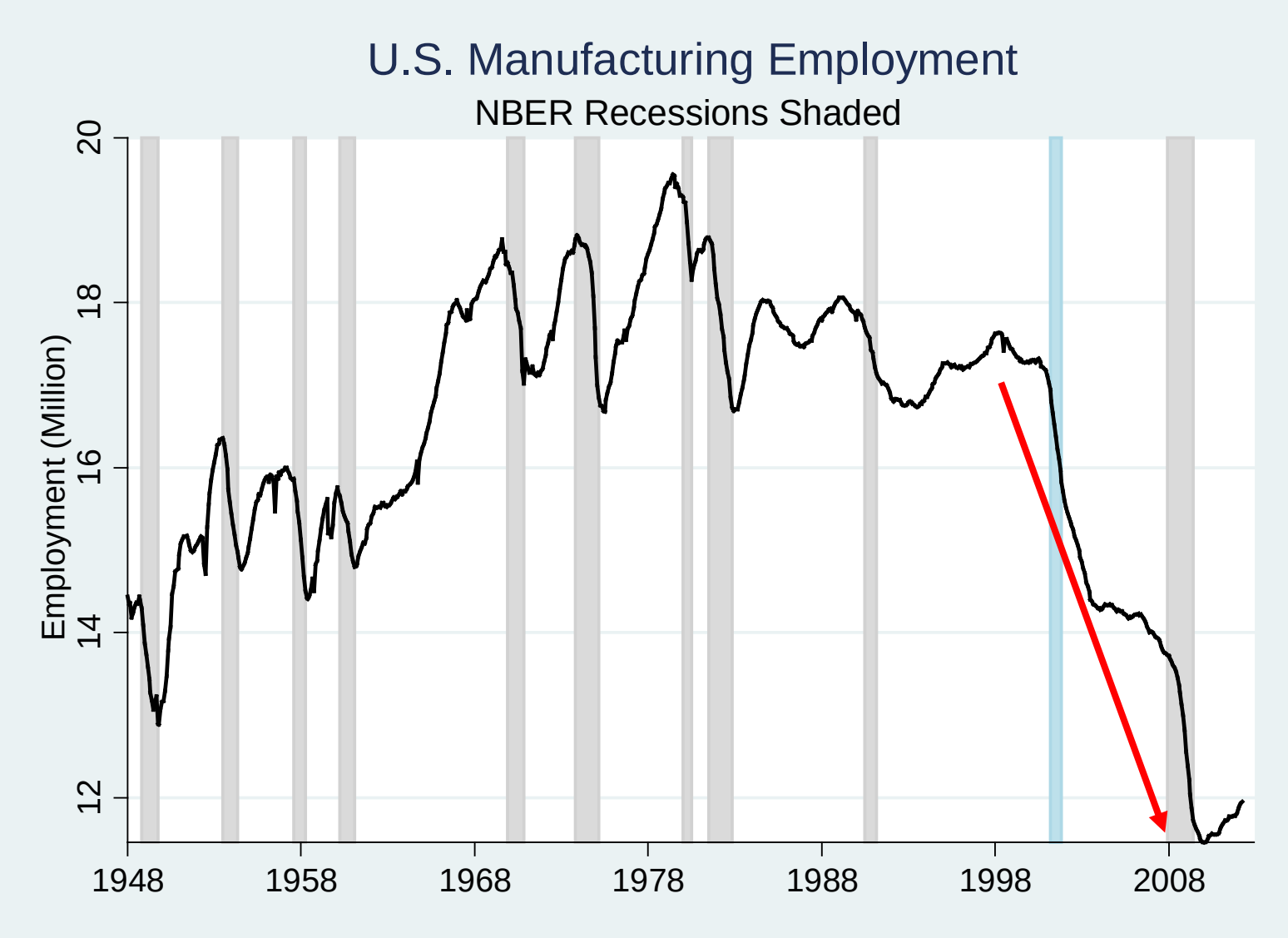
Post-War U.S. Manufacturing Employment



Source: Pierce and Schott (2016)

Predominant Focus is on Labor Markets

- Causal relationship between imports and mfg employment
  - Autor, Dorn and Hanson (2013)
  - Pierce and Schott (2016)

- Autor et al (2013) correlate U.S. manufacturing employment in ~700 commuting zones with Chinese import penetration into those zones (proxied by the zone's share of national employment in a sector)

- Pierce and Schott (2016) exploit the 2001 Congressional decision to enact "permanent" normal trading status with China

- Influential papers, but also subject to a lot of debate regarding the specifications, interpretation, and relevance for future U.S. trade

Consumption Effects of Trade

- The focus on labor market effects of trade only tells part of the story
- Comparatively little work studying the impacts of trade on consumption
- This is surprising given that changes in relative prices are first-order outcomes of basic trade models
- This is an area that is starting to get more research attention, and will be the focus on this talk

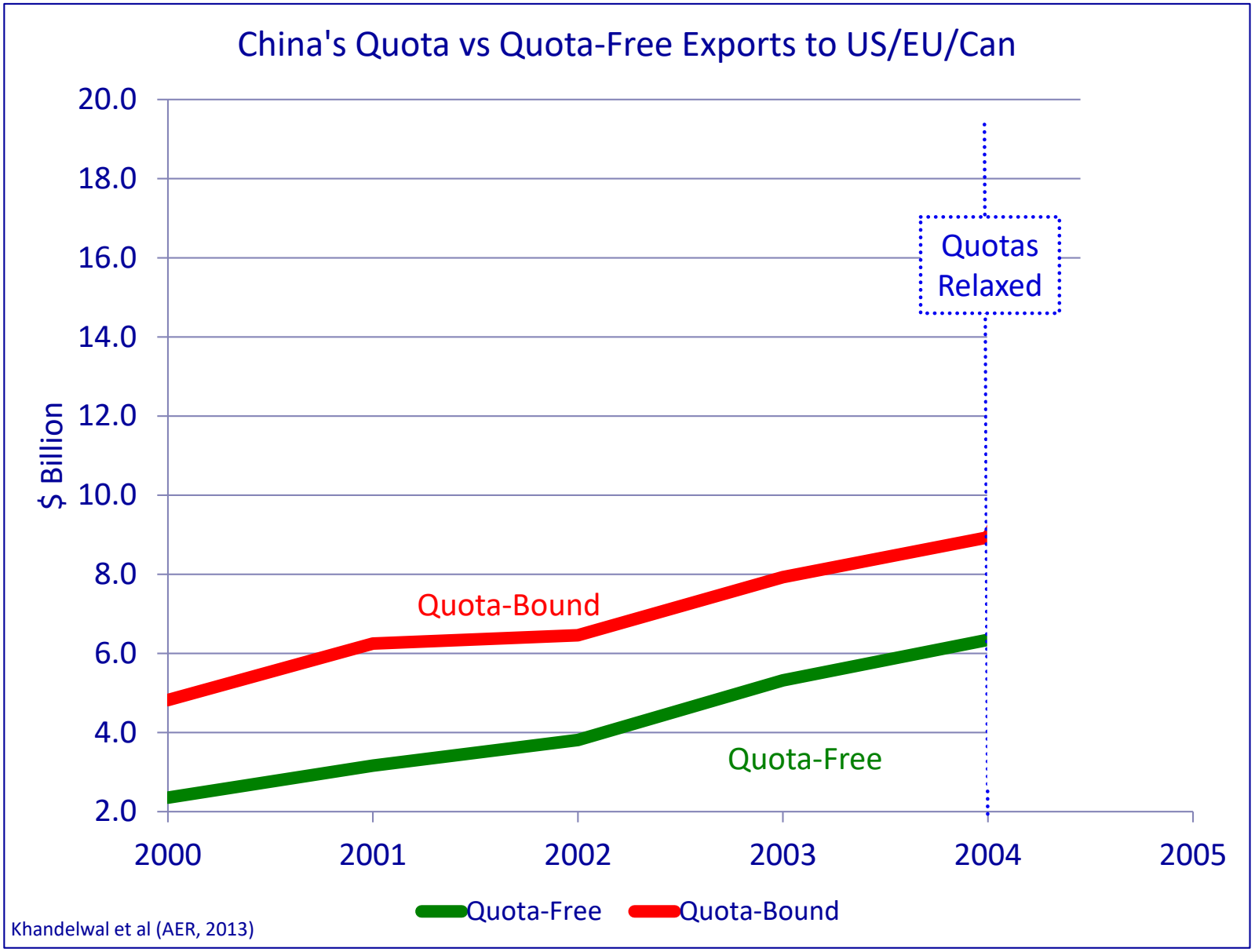
A Case Study: U.S. Apparel Imports

- Multi-fiber Arrangement
  - System of quotas imposed by the US, the EU, Canada and Australia on apparel and textile imports from developing countries
  - Kept these products out of the GATT/WTO
  - Ended January 1, 2005

Level Coverage & Description	Unit & CONV Fact	Base Level	Adjustments Made	Adjusted Level	Imports Charged	% Fill
341 : 01JAN1998-31DEC1998	DOZ	682,293	COS	718,719	698,089	97.13
W&G COT. SHIRTS/BLOUSES,N-KNIT	12.10	8,255,745		8,696,500	8,446,877	
341 -Y : 01JAN1998-31DEC1998	DOZ	409,376	CO	411,687	292,015	70.93
COT NK BLOUSE WG 2+COL WARP/FILL	12.10	4,953,450		4,981,413	3,533,382	
342 : 01JAN1998-31DEC1998	DOZ	266,599	CO	271,931	271,931	100.00
COTTON SKIRTS	14.90	3,972,325		4,051,772	4,051,772	

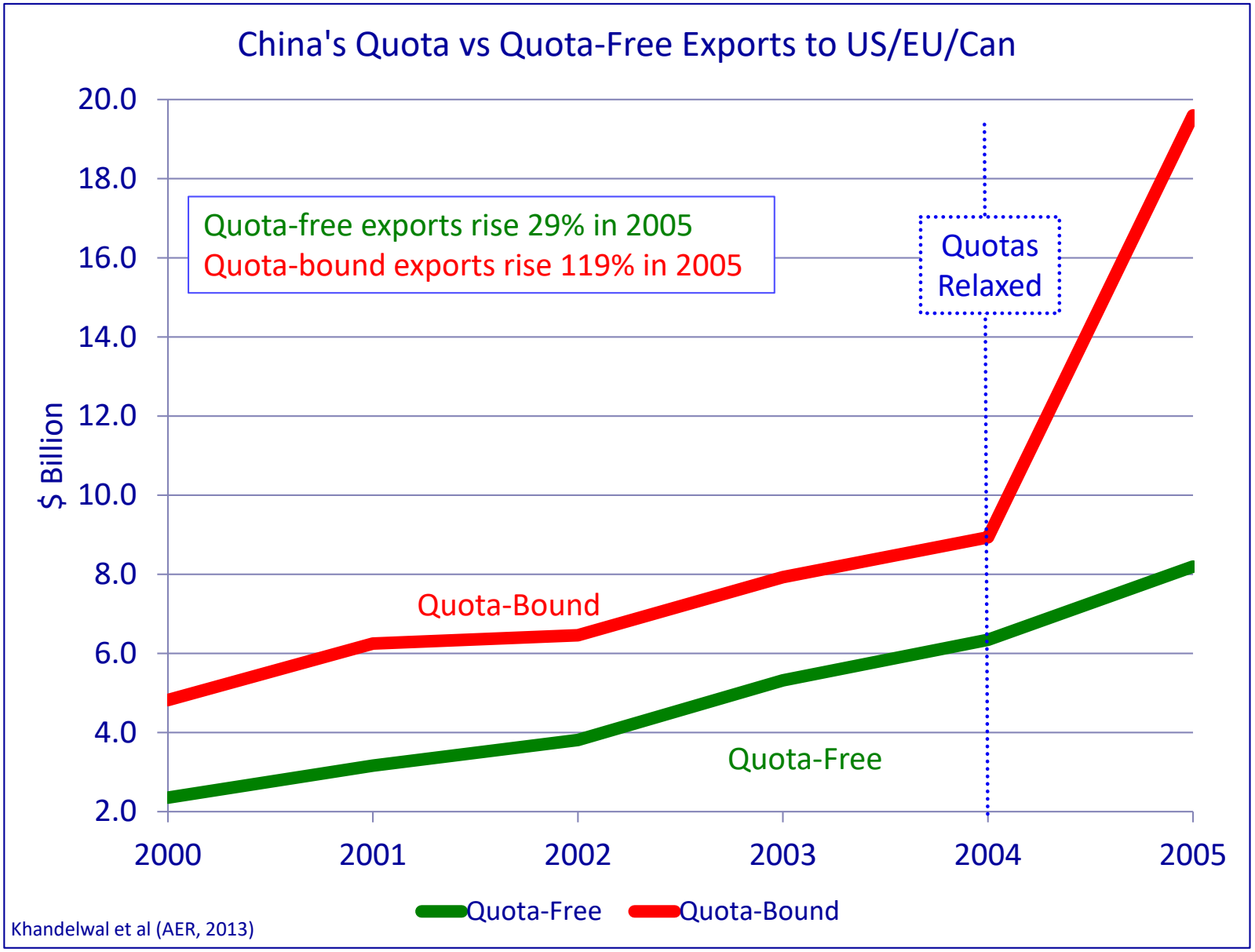
Source: Brambilla, Khandelwal and Schott (2008)

A Case Study: China's Textile & Clothing Exports to U.S.



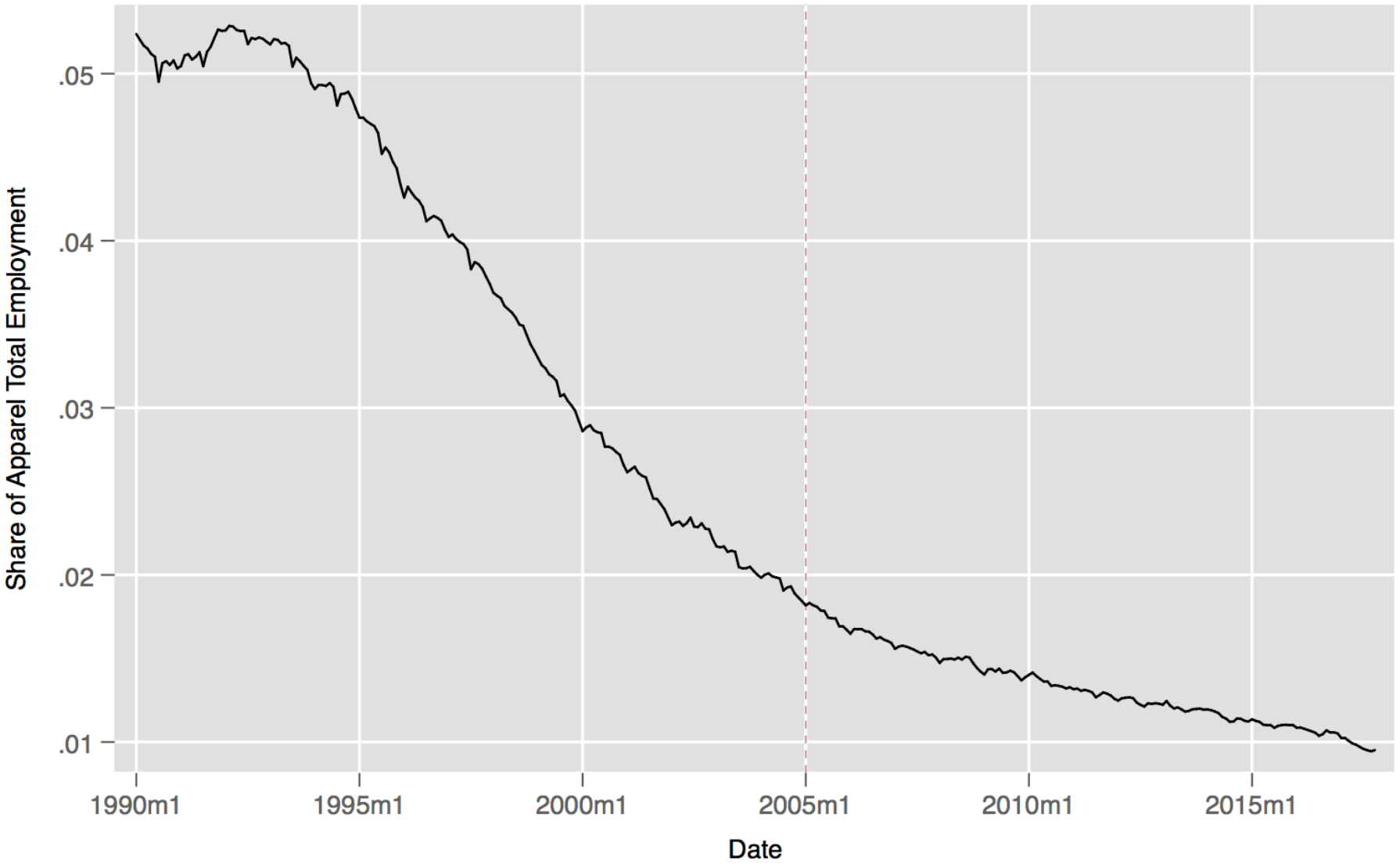
Notes: Quota-bound = any export constrained by a quota; quota-free = other textile and clothing goods not bound by quotas

A Case Study: China's Textile & Clothing Exports to U.S.



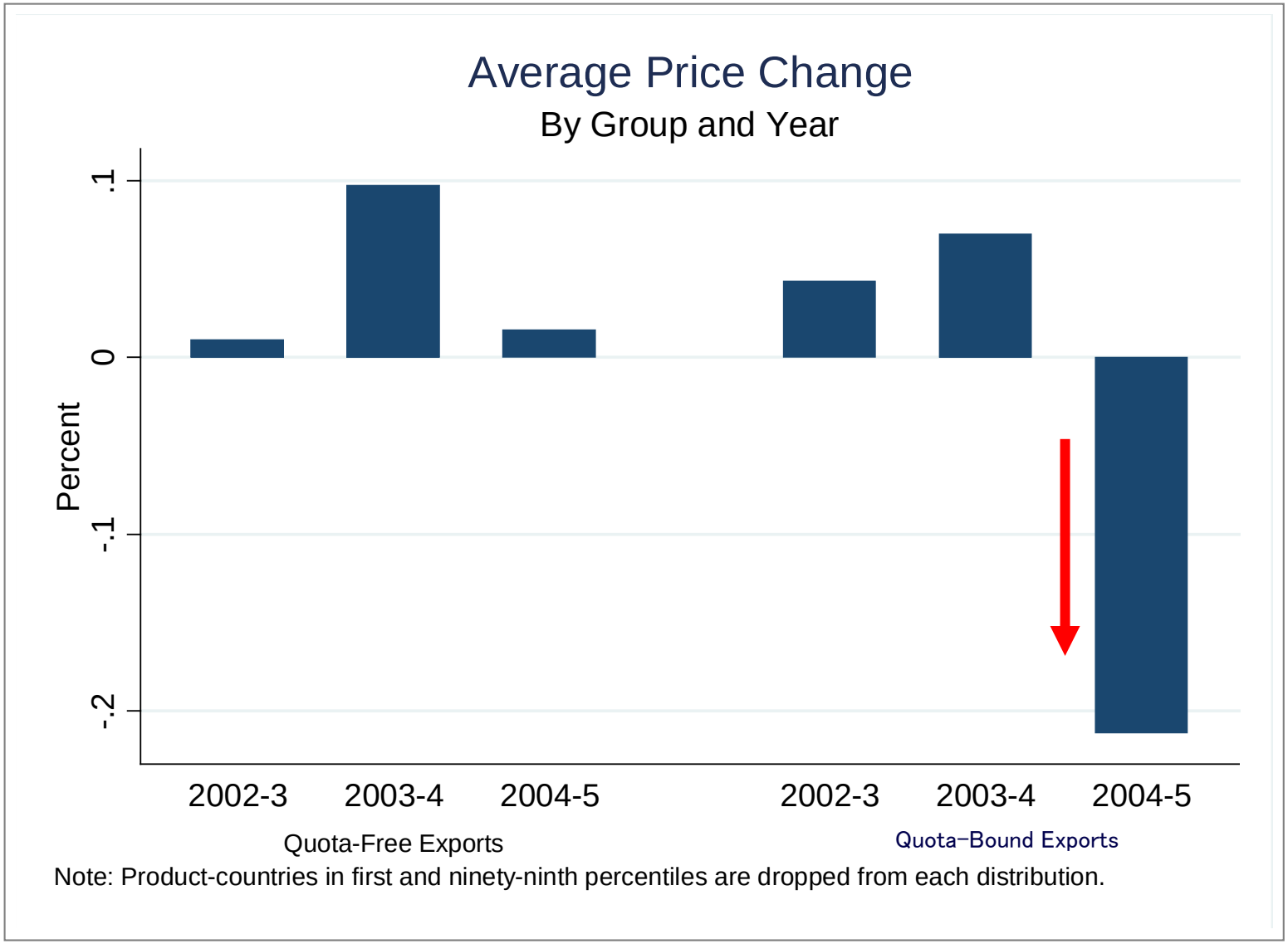
Notes: Quota-bound = any export constrained by a quota; quota-free = other textile and clothing goods not bound by quotas

U.S. Apparel Employment Share of Manufacturing



Data from BLS

Price Changes Before/After Quota Removal



Note: Product-countries in first and ninety-ninth percentiles are dropped from each distribution.

A General Framework

Notation

- *J* consumption goods, the price of a good denoted p_j
- Let *h* index households
  - Households have expenditure levels x_h
- Let s_{jh} denote the expenditure share of household h on good j
- Let S_j denote the aggregate expenditures on good j
- Denote the (indirect) utility of a household as $v(x_h, \mathbf{p})$

A General Framework

Utility

- What does international trade do? It changes prices!

- Let $\widehat{\omega}_h$ denote the equivalent variation (EV)
  - Suppose prices rise.
  - EV is the amount of money to give the individual to have an equivalent impact on her welfare at the original prices
  - It is a money-metric measure of welfare

- Applying Roy's identity:

$$\widehat{\omega}_h = \sum_{j=1}^{J} \left(-\widehat{p}_j\right) s_{j,h} + \widehat{x}_h$$

A General Framework

Consumption and Income Channels

- We can re-write as

$$\widehat{\omega}_h = \sum_{j=1}^{J} (-\widehat{p}_j) S_j + \sum_{j=1}^{J} (-\widehat{p}_j) (s_{j,h} - S_j) + \widehat{x}_h$$

- If budget shares are identical across people, the only reason that trade has distributional consequences is through the income channel

- "Standard" trade models with CES preferences (e.g., Arkolakis et al. (2012)) shut down distributional effects through consumption
  - May be one reason why the literature has focused on income effects
  - In reality, budget shares will differ across households

Measuring Consumption Effects with Aggregate Data

- Fajgelbaum and Khandelwal (2016) measure consumption effects of trade
- Relies on AIDS demand system (Deaton and Muellbauer, 1980)
- Welfare expression becomes

$$\hat{\omega}_h = \hat{W} - \hat{b} \times \ln\left(\frac{x_h}{\tilde{x}}\right) + \hat{x}_h$$

  where *b* is the covariance between goods' Engel curve and price changes

- Take a household that is richer than the representative household
  - Now suppose that trade lowers prices of high-Engel curve goods a lot
  - This implies $b < 0$, and the household is relatively better off
- In other words, all you need to know is if price changes occur in high- or low-income elastic goods to understand the bias of trade!

Implementation

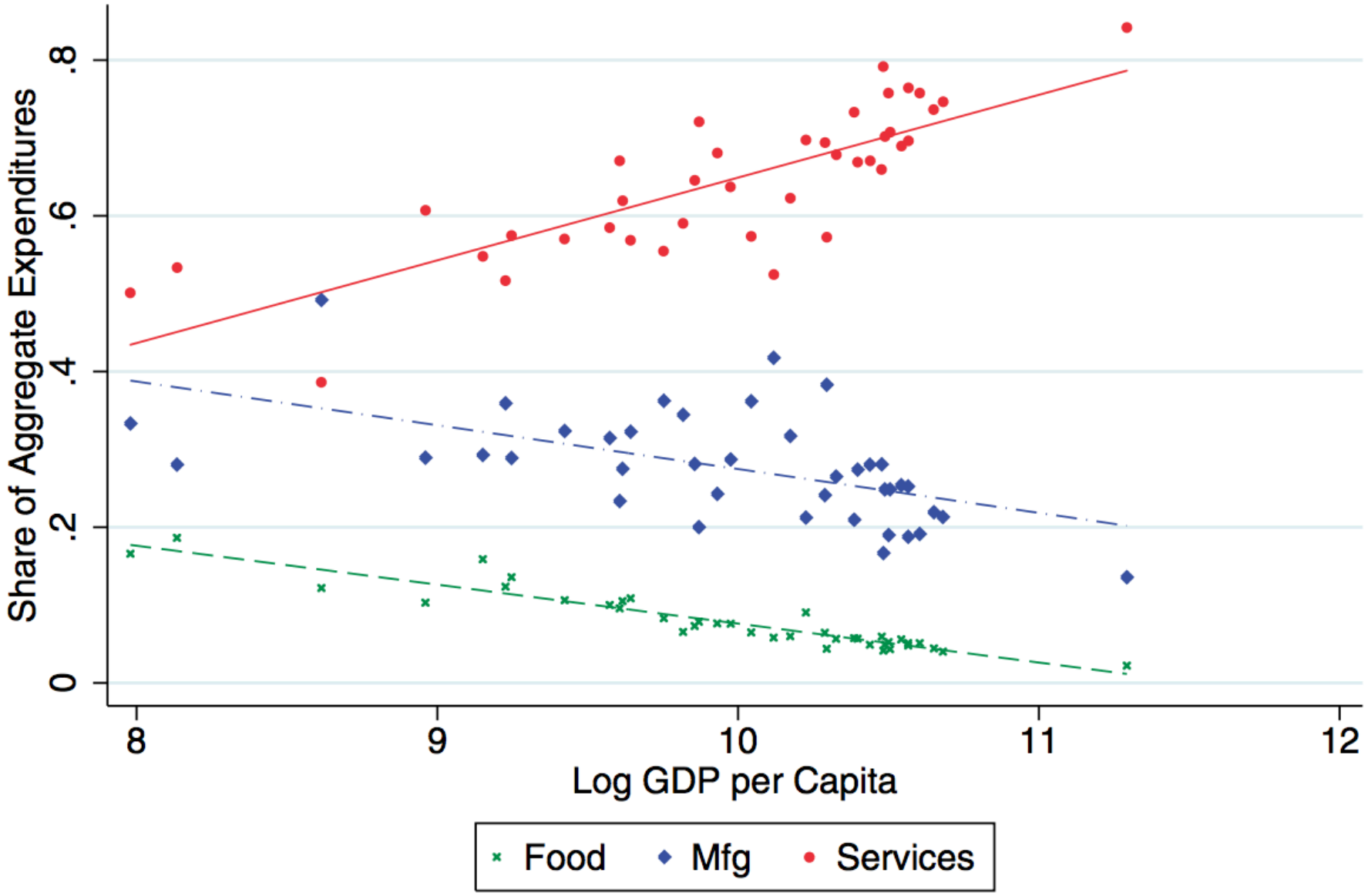
- We embed AIDS demand into a standard Ricardian model of international trade

- We calculate the gains from trade using aggregate expenditure data:
  - Aggregate expenditure shares of rich countries reflects expenditure shares of rich households

- What matters for determining how trade affects different households?
  - The strength of the sector's Engel curve
  - The tradeability of the sector

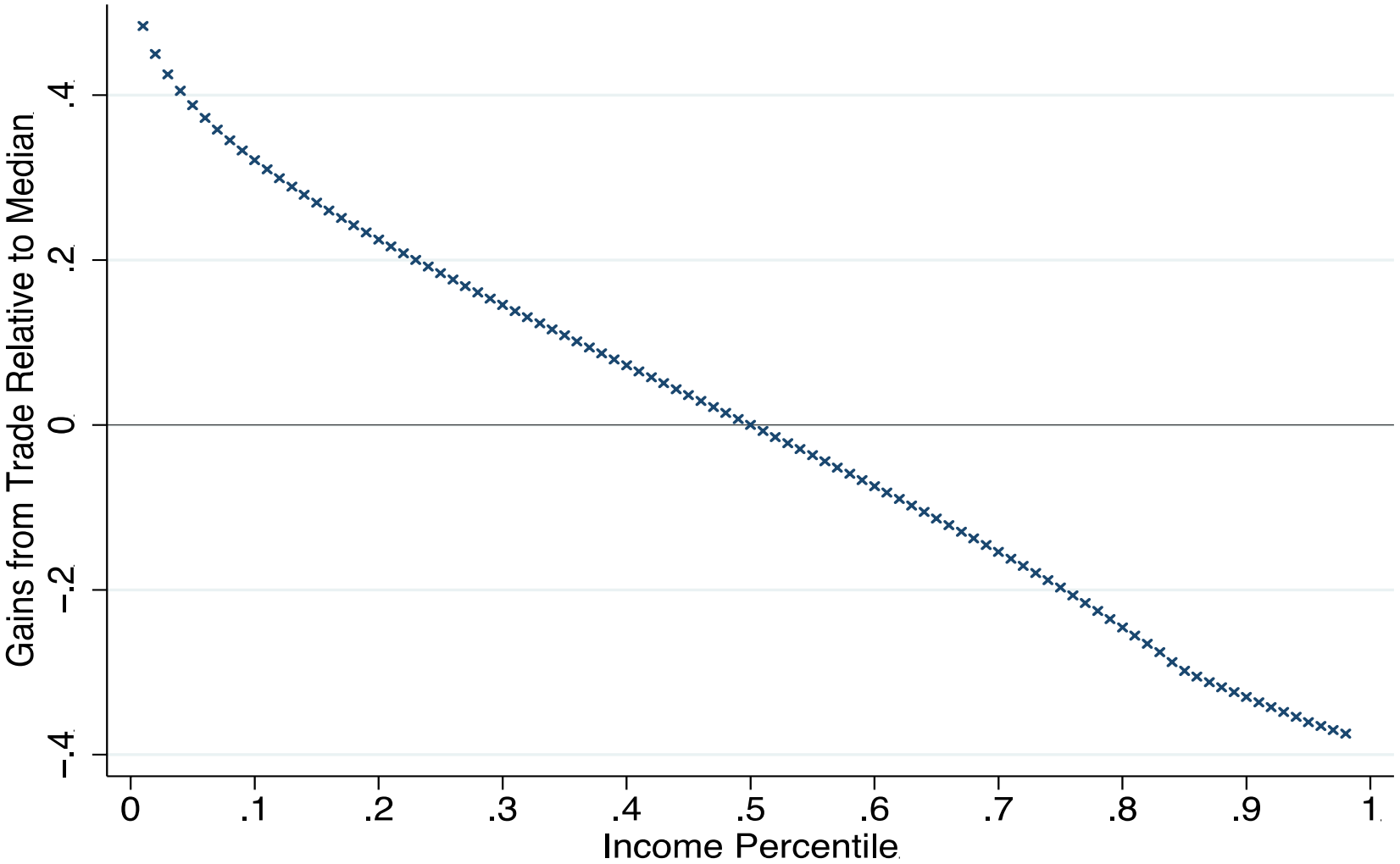
- Our results suggest that trade typically favors the poor, mainly because the poor tend to concentrate their expenditures on tradeable goods

Aggregate Expenditure Data



Unequal Gains from Trade: Consumption Channel

From Autarky to Current Trade Levels



The deviations are relative to the median individual.

Measuring Consumption Effects with Microdata

- Caveats with Fajgelbaum and Khandelwal (2016)
  - Uses aggregate data to infer spending across income distribution
  - Lots of structure, ignores supply-side and impact on wages
  - Counterfactual exercises:
    - "What if a country went to autarky?"
    - "What if tariffs on food went up 5%?"
    - "What if NAFTA is torn up?"

- Recent evidence has examined household microdata
  - Directly captures household expenditures
  - Often less structure imposed on the data
  - Ex post analysis: "What happened when India lowered tariffs?"
  - Larger data requirements, cross-country comparisons more challenging
  - Thorny data issues, like product quality, don't wash away

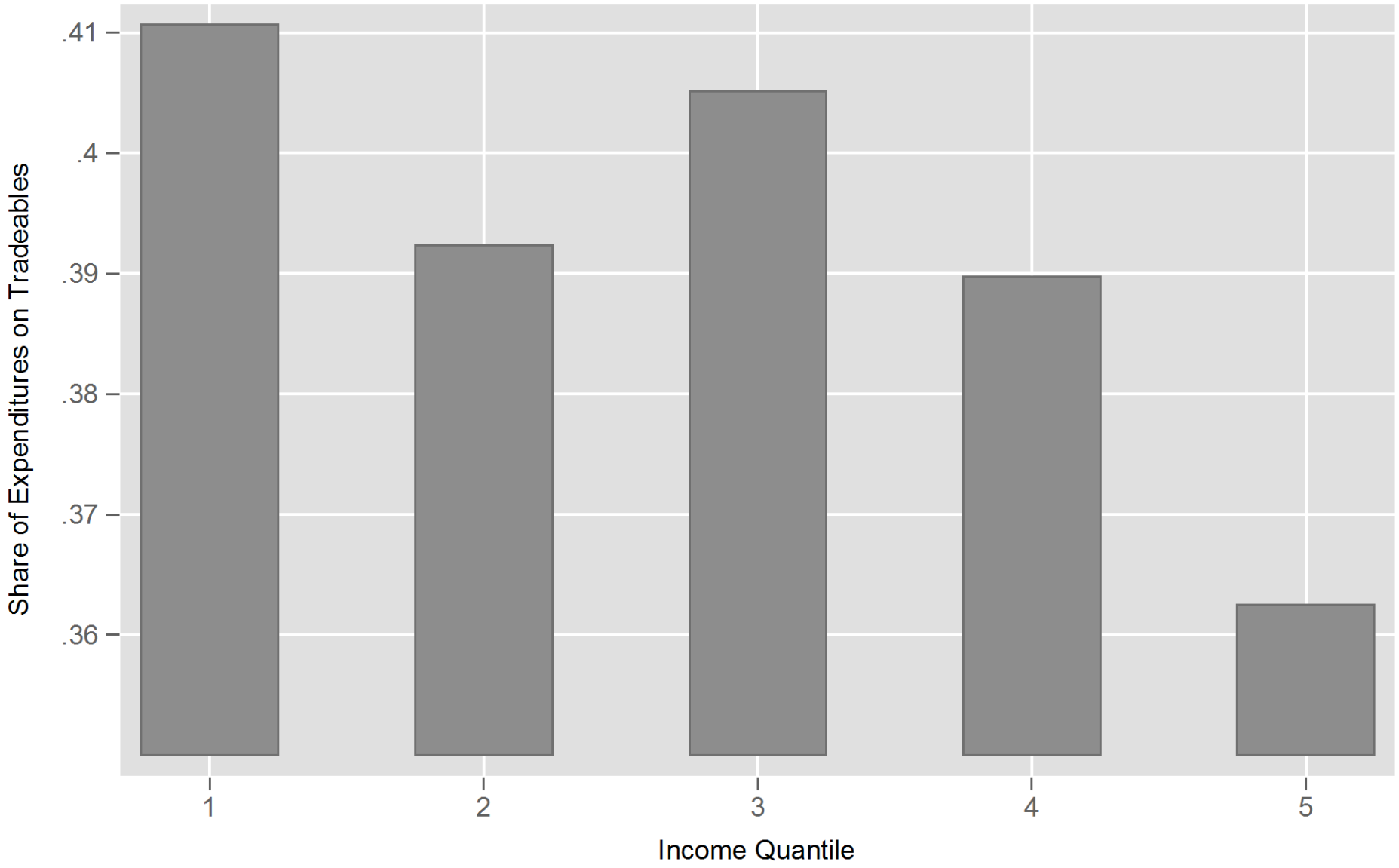
U.S. Consumer Expenditure Surveys

- In some on-going work, we are examining U.S. Consumer Expenditure Surveys

- Match consumer expenditures on categories to:
  - US CPI data
  - Trade data
  - Input-output tables

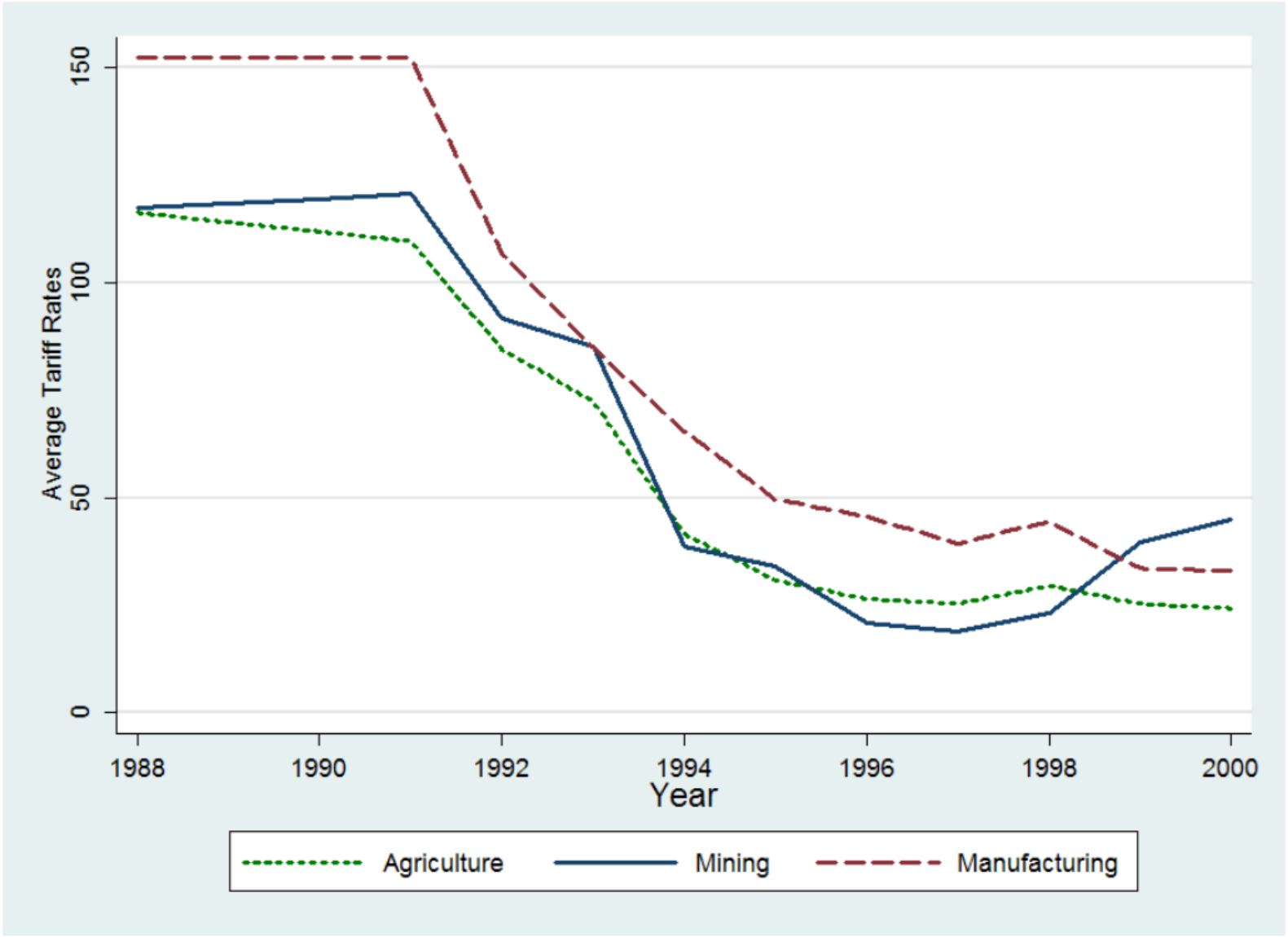
- What was the impact of China's imports on prices, across sectors?
- How did those impacts affect U.S. household differentially?

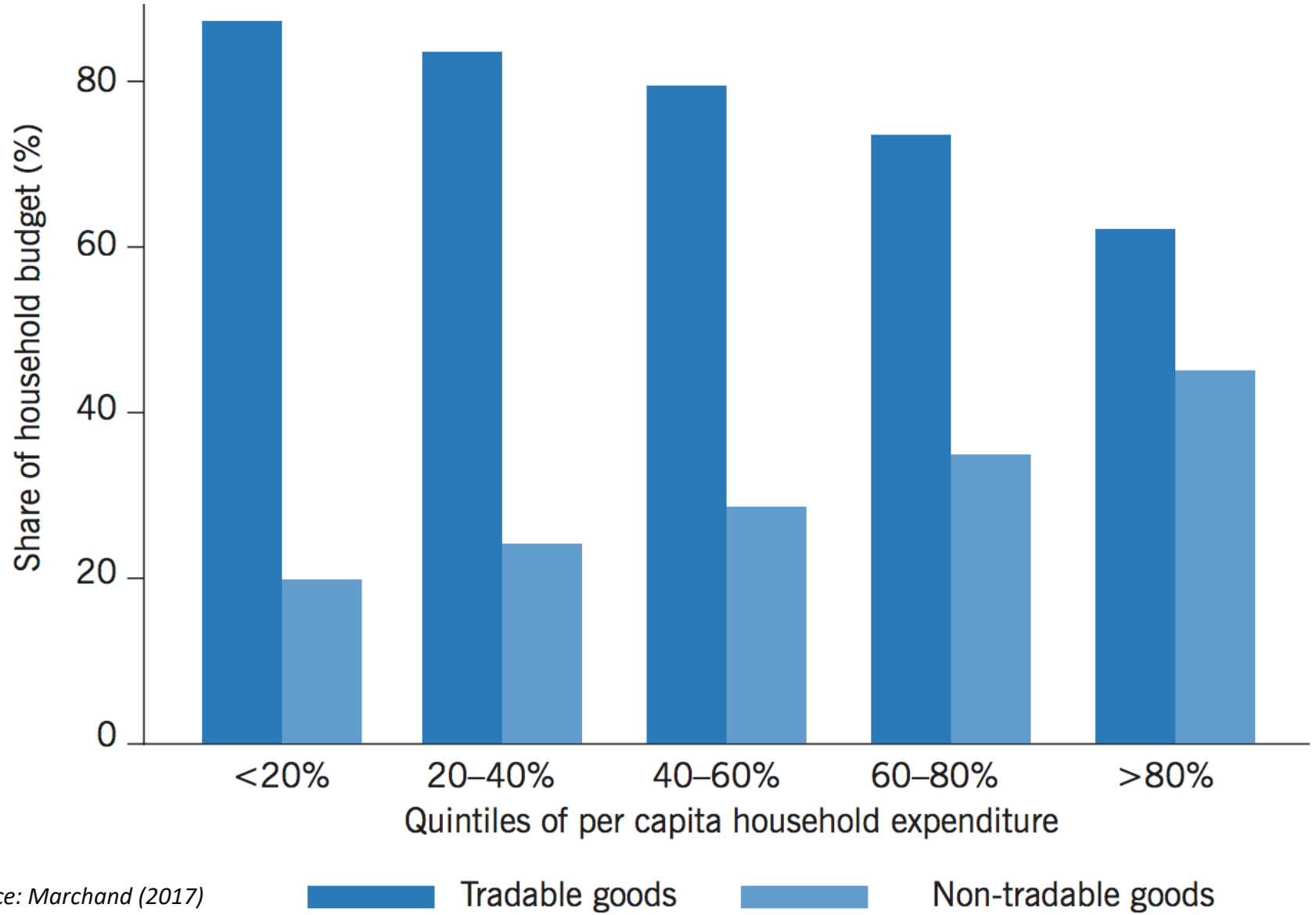
U.S. Consumer Expenditure Surveys



Source: U.S. Consumer Expenditure Survey, 1992

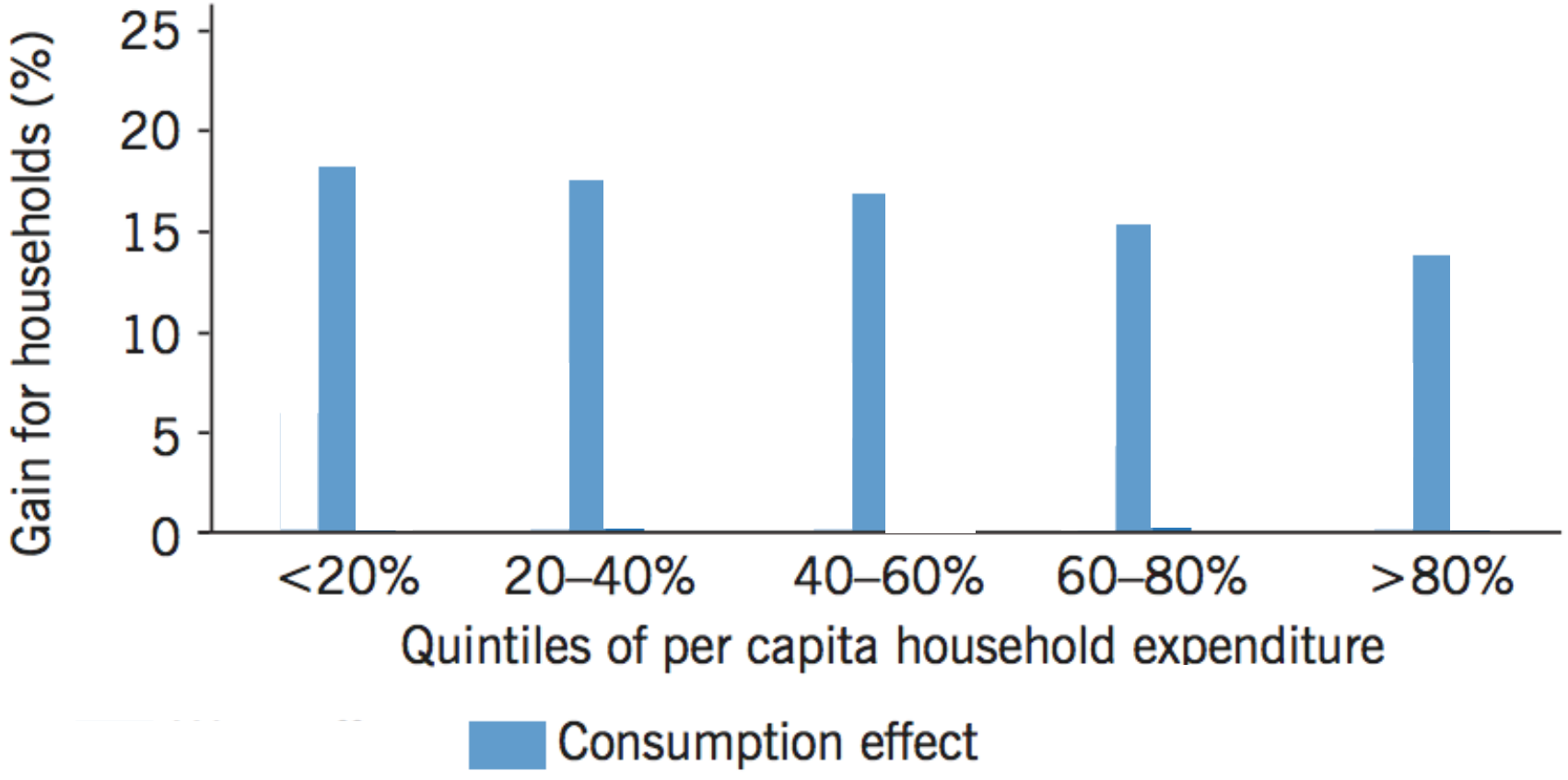
India's Tariff Rates





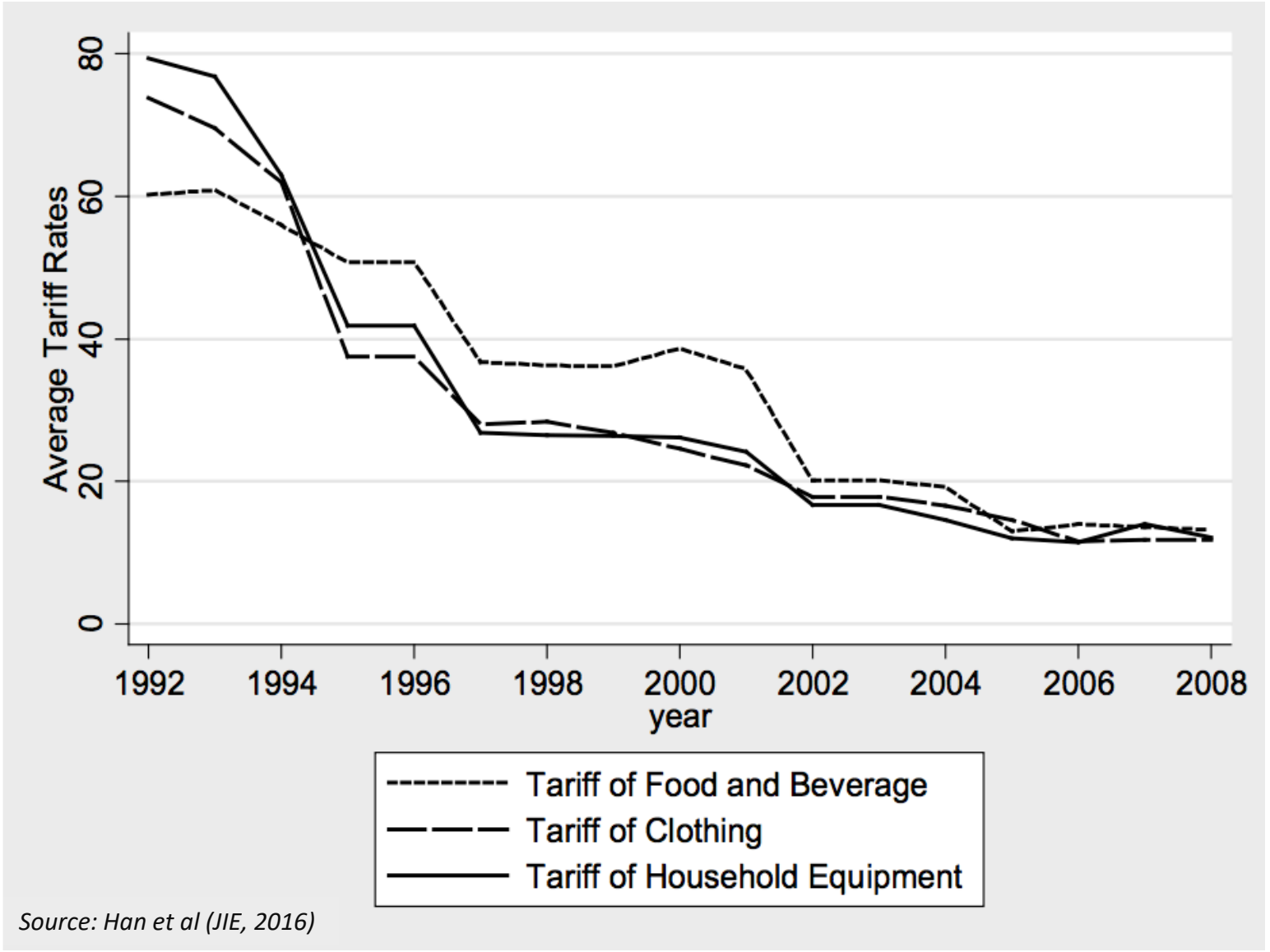
Source: Marchand (2017)

Consumption Effects in India



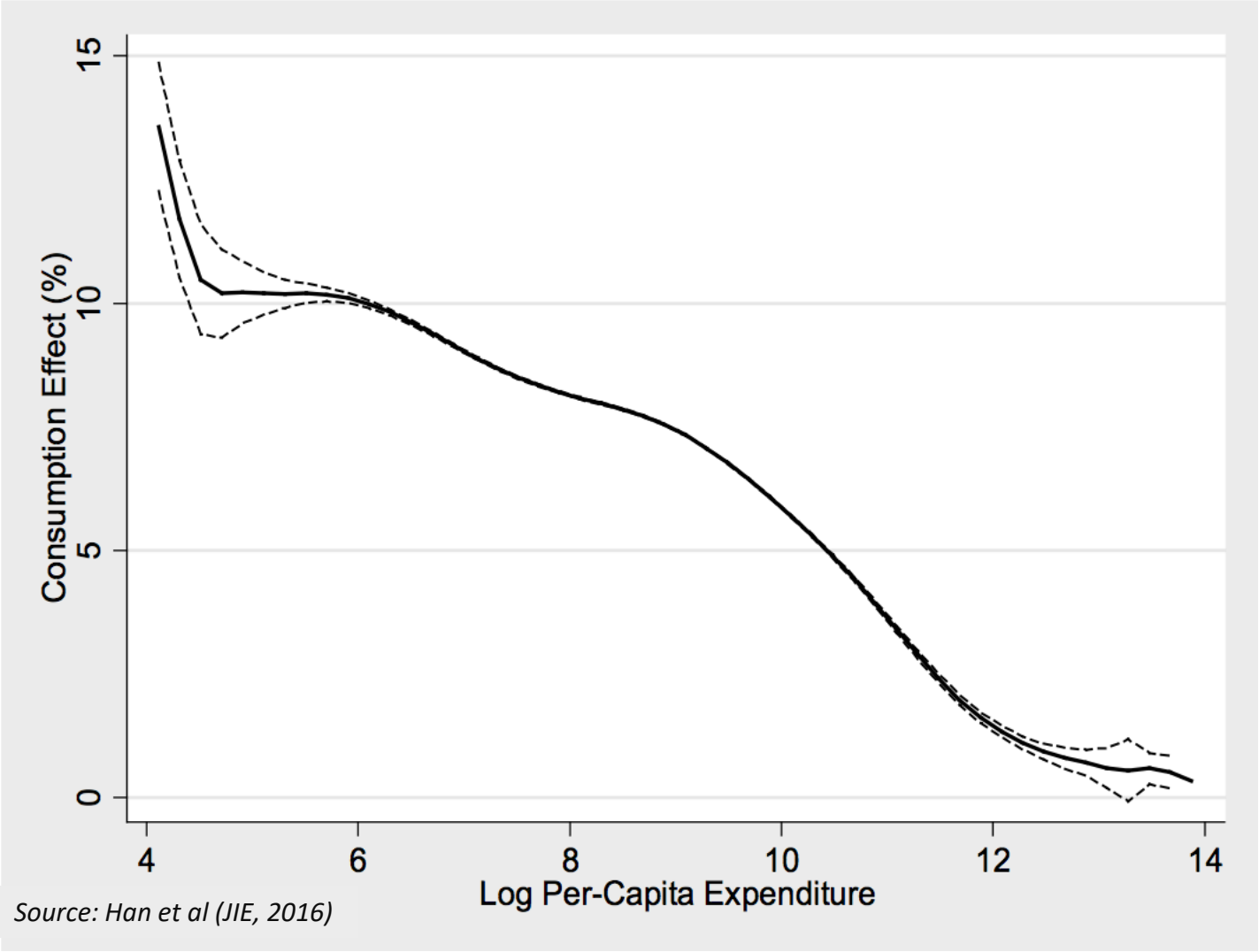
Source: Marchand (2017)

Chinese Tariff Rates



Source: Han et al (JIE, 2016)

Impact of Trade on Consumption in China



Source: Han et al (JIE, 2016)

Retail Globalization in Mexico

- Global retail chains is causing a radical transformation in the way that households source their consumption

- 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 (ILO, UN National Accounts)

- Retail globalization is pervasive and fast growing
  - Stock of retail FDI in EMs rose from $24 bil USD in 1990 to $522 bil in 2012
  - "The Supermarket Revolution"

- Heated debates, and stark differences in policy choices across countries
  - E.g. Latin America/E Europe liberalized, India still restricts retail FDI

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En todo
ALTO

Retail FDI into Mexico

Atkin et al (JPE, 2017)

- Foreign-owned supermarkets: 365 in 2001 to 1335 by 2014
- Causal effects of the opening of foreign stores on households and local retailers
- Data:
  - High-frequency barcode-level data used to construct the Mexican CPI
    - E.g., 16 pill package of Bayer Aspirin with 300 mg dosage
    - Fresh whole milk Alpura brand 1 liter carton
  - Proprietary data of household expenditures in modern vs traditional retail
  - Mexican retail census (store-level revenues, costs, profits)
  - Household income surveys

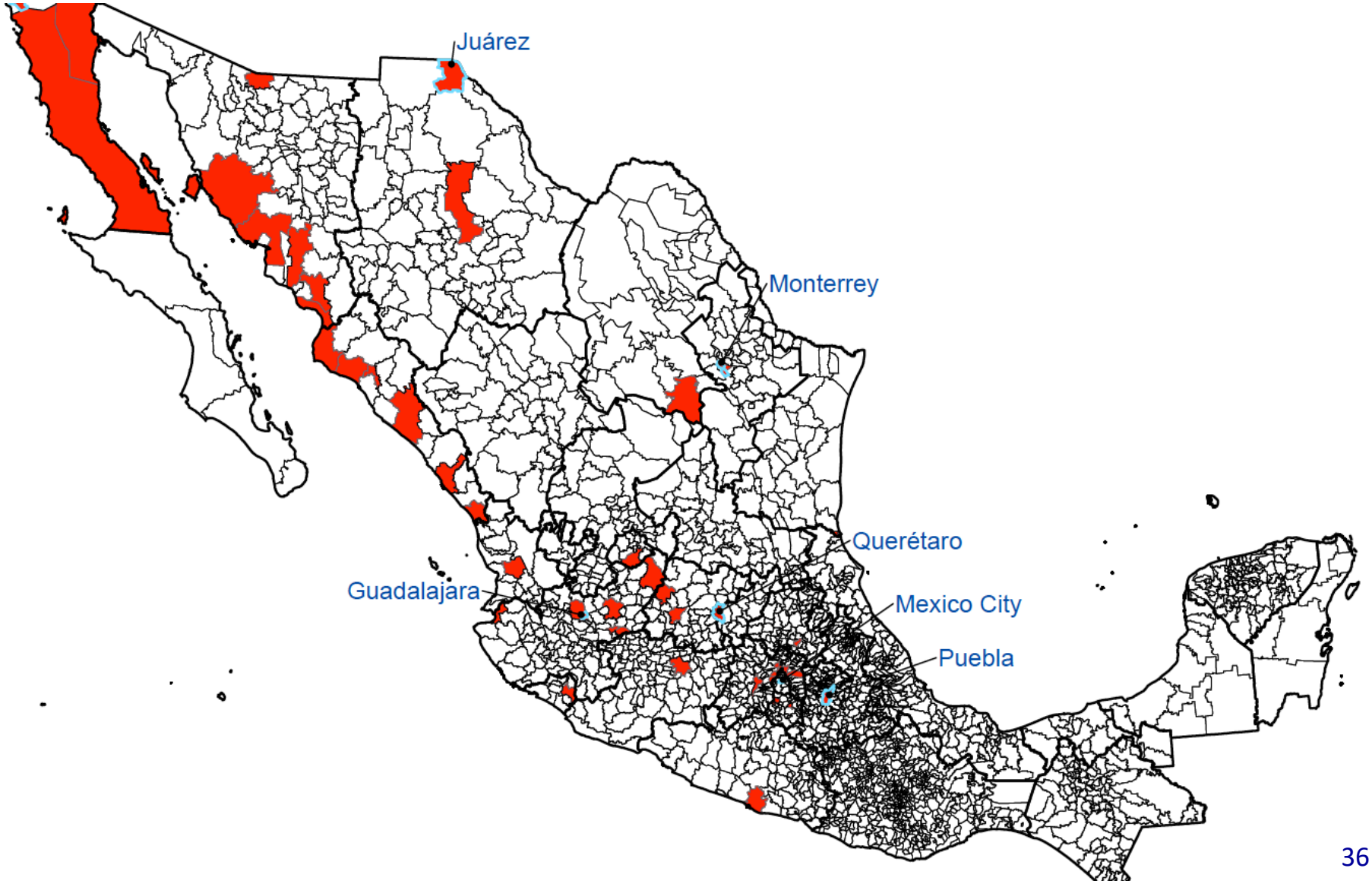
Timeline and Players

- Mexico fully liberalizes retail in 1993

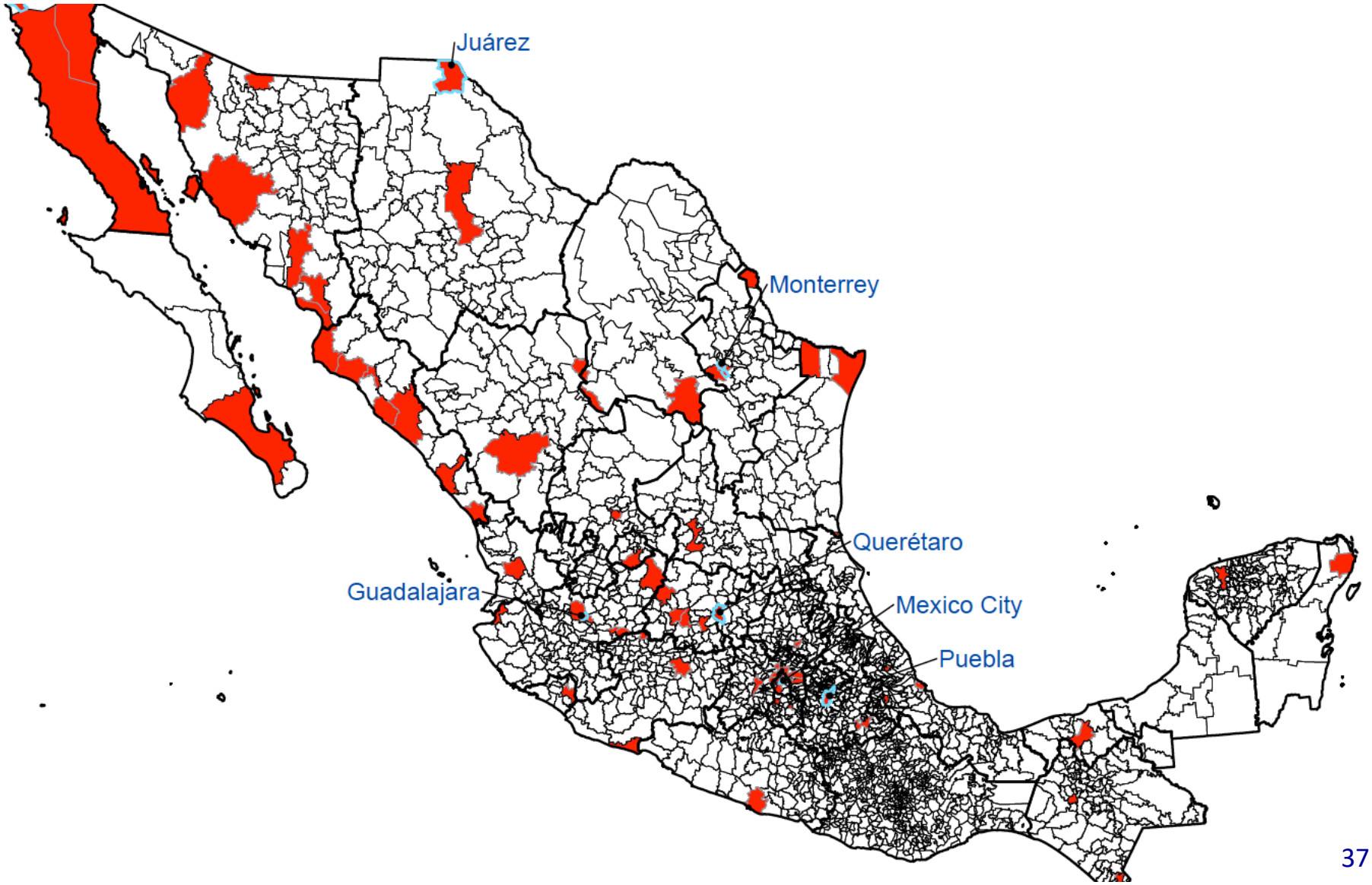
- Number of stores
  - December 1995: 204
  - December 2001: 365
  - March 2014: 1335

- Foreign Players
  - Walmart (Walmart, Sam's Club, Superama, Aurrera, Bodega Aurrera)
  - Costco
  - Safeway (Casa Ley)
  - HEB
  - S-Mart
  - Smart and Final
  - Carrefour
  - Auchan

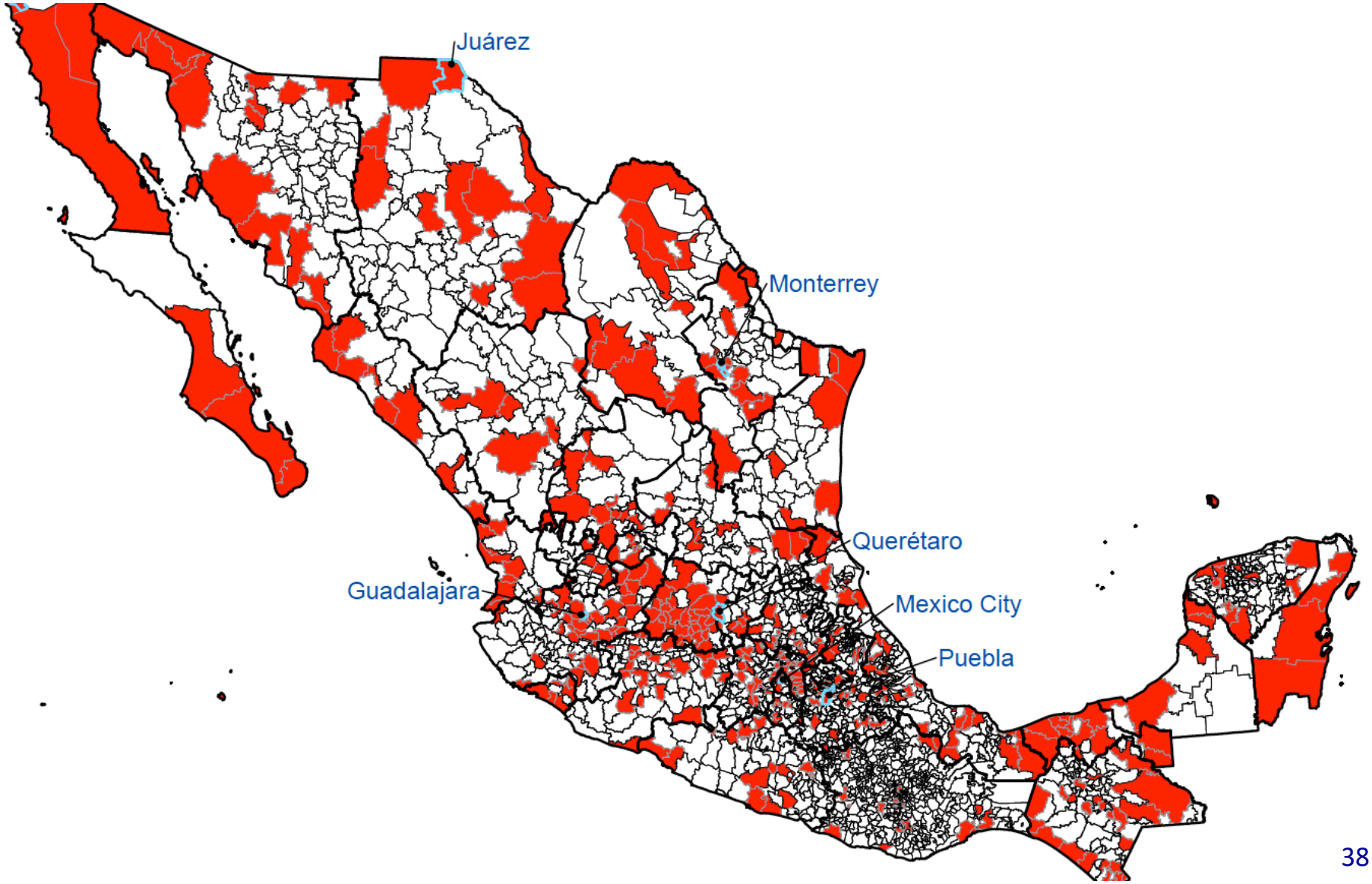
1995 (204 stores)



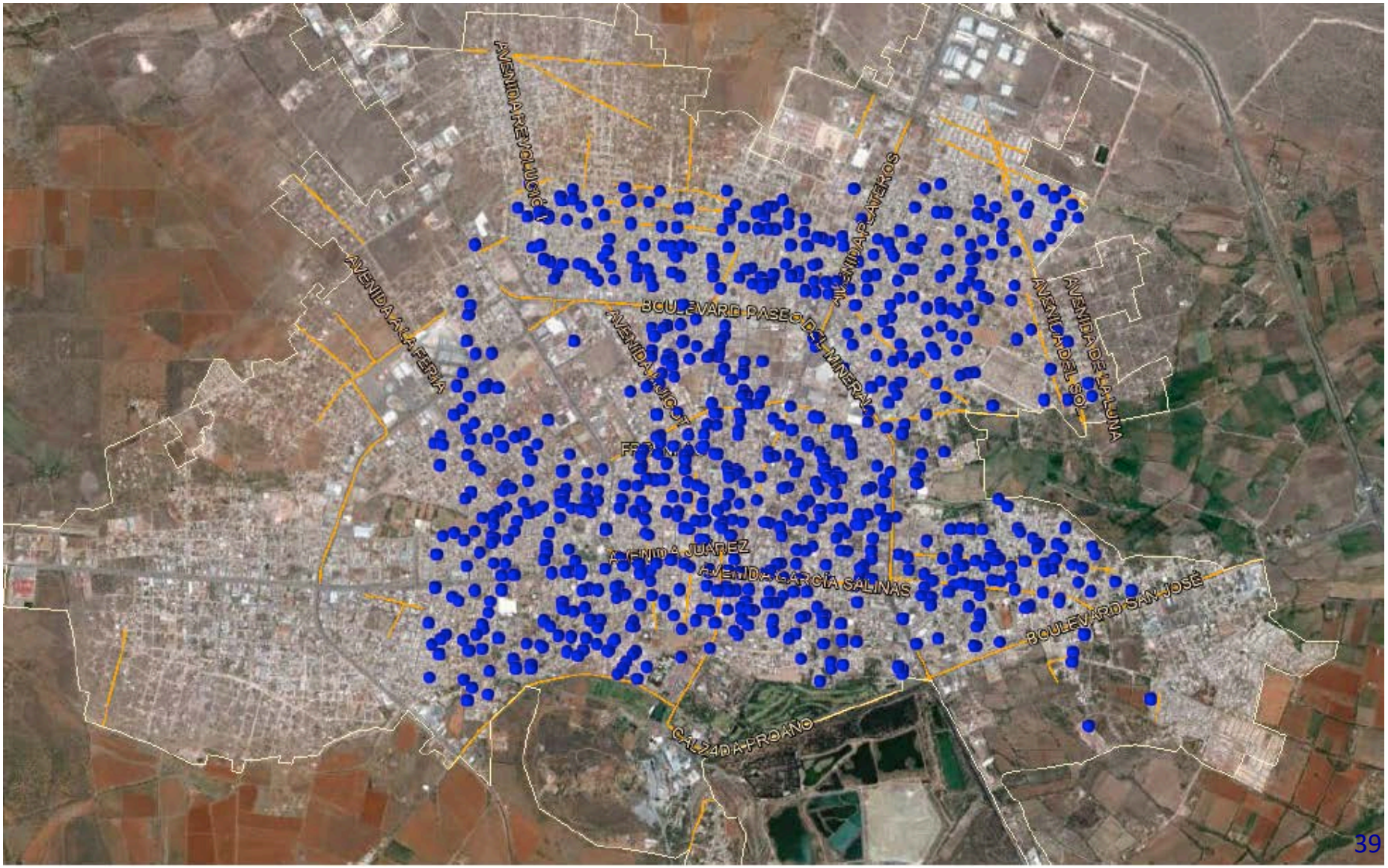
2001 (354 stores)



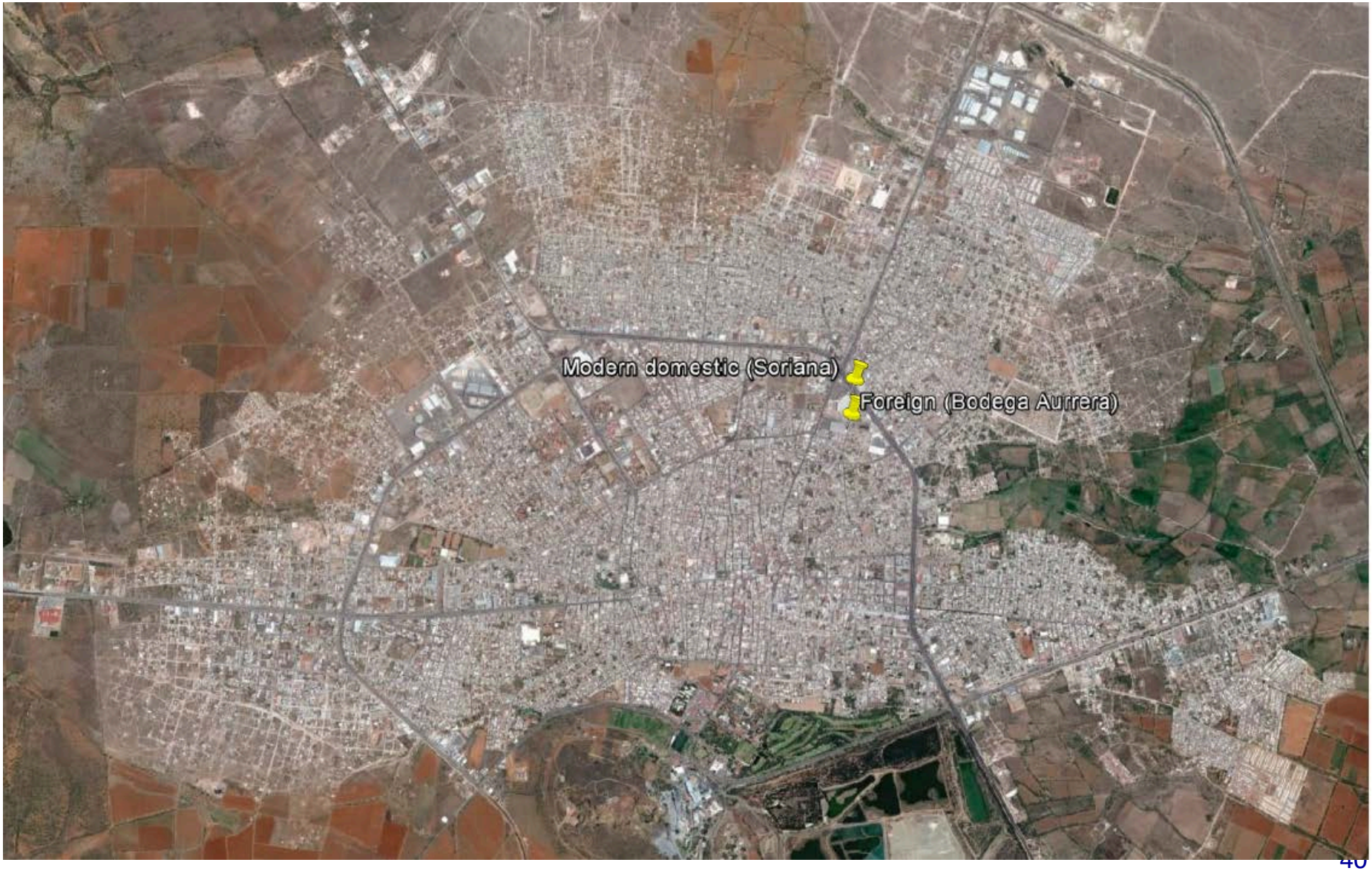
2014 (1335 stores)



Location of Traditional Shops (Frenillo, MX)



Location of Foreign Supermarkets (Frenillo, MX)



The impact of Foreign Retail on Local Prices

	(1)
Dependent Variable:	Log Price
Foreign Store Dummy	-0.118***
	(0.00913)
Municipality-By-Year FX	✓
Municipality-By-Product-By-Month FX	✓
Municipality-By-Barcode-By-Month FX	✓
Observations	18,659,777
R-squared	0.923
Number of Municipalities	151

The impact of Foreign Retail on Local Prices

Evidence that Foreign Stores sell higher quality barcodes

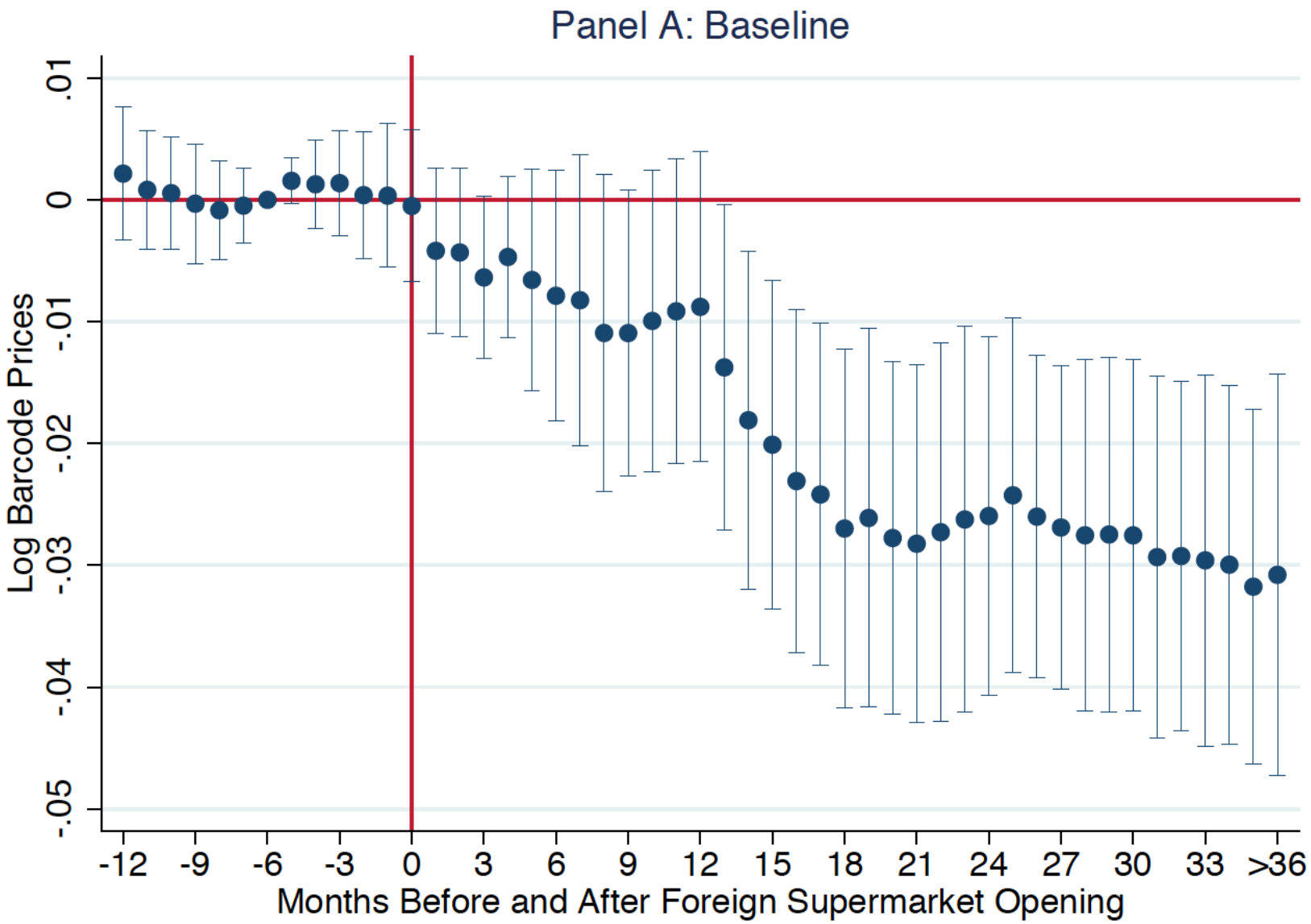
	(1)	(2)
Dependent Variable:	Log Price	Log Price
Foreign Store Dummy	-0.118***	0.249***
	(0.00913)	(0.0160)
Municipality-By-Year FX	✓	✓
Municipality-By-Product-By-Month FX	✓	✓
Municipality-By-Barcode-By-Month FX	✓	×
Observations	18,659,777	18,659,777
R-squared	0.923	0.368
Number of Municipalities	151	151

The impact of Foreign Retail on Local Prices

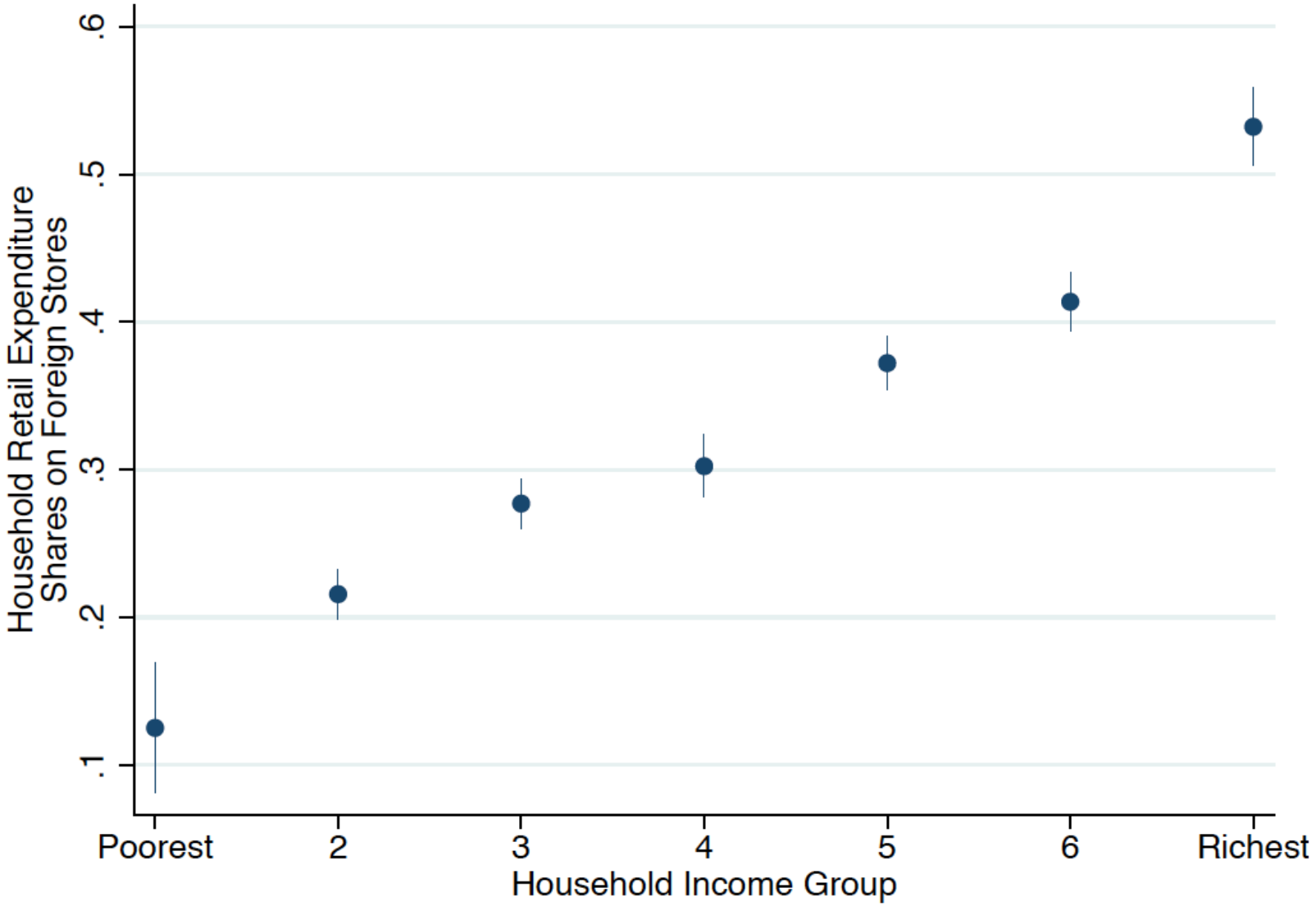
Dependent Variable:	(1) Log Price	(2) Log Price	(3) Log Number of Barcodes	(4) Log Floor Space
Foreign Store Dummy	-0.118*** (0.00913)	0.249*** (0.0160)	1.612*** (0.0671)	1.911*** (0.0416)
Municipality-By-Year FX	✓	✓	✓	✓
Municipality-By-Product-By-Month FX	✓	✓	×	×
Municipality-By-Barcode-By-Month FX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

CPI Prices after Foreign Supermarket Entry

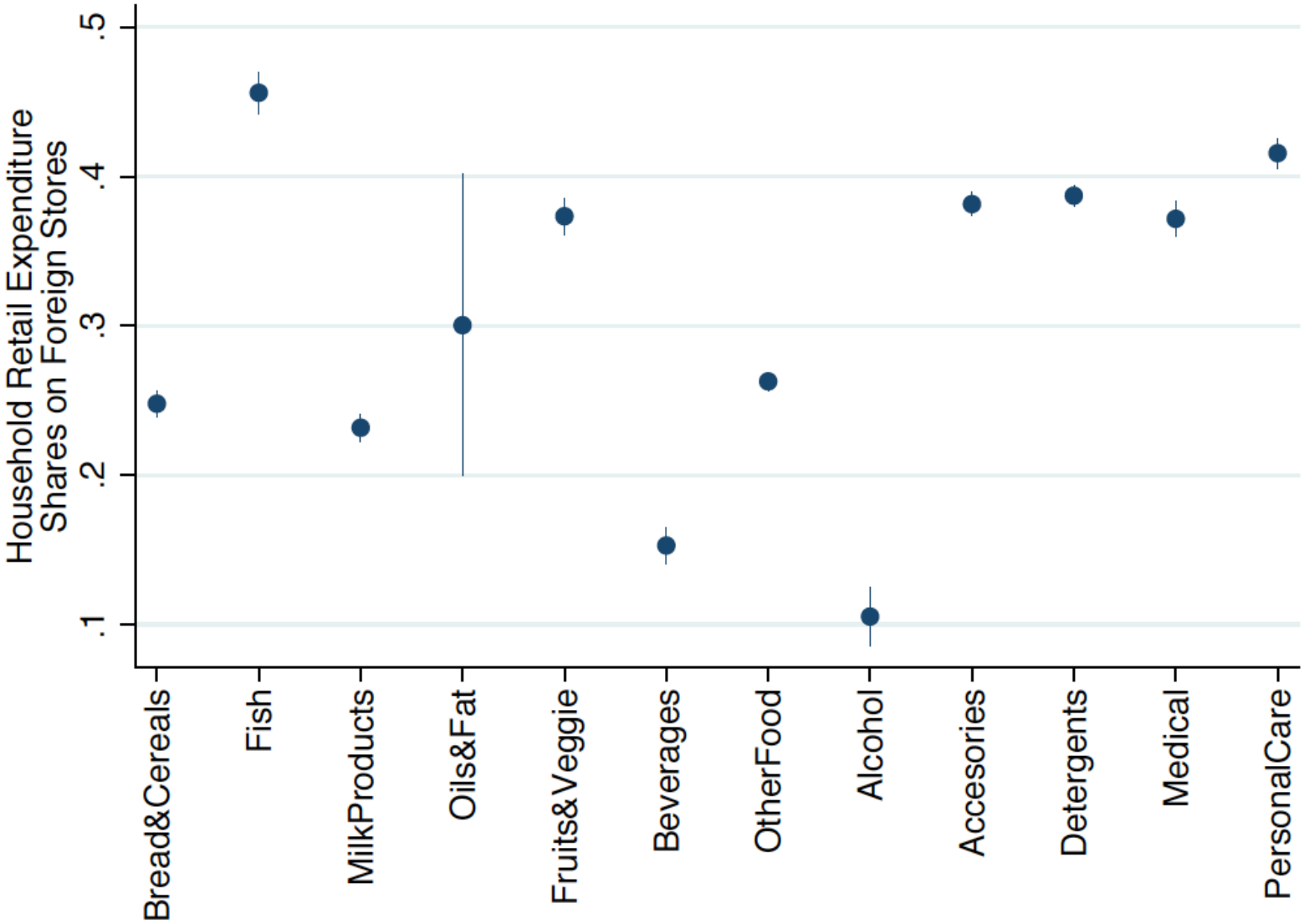
Event Study



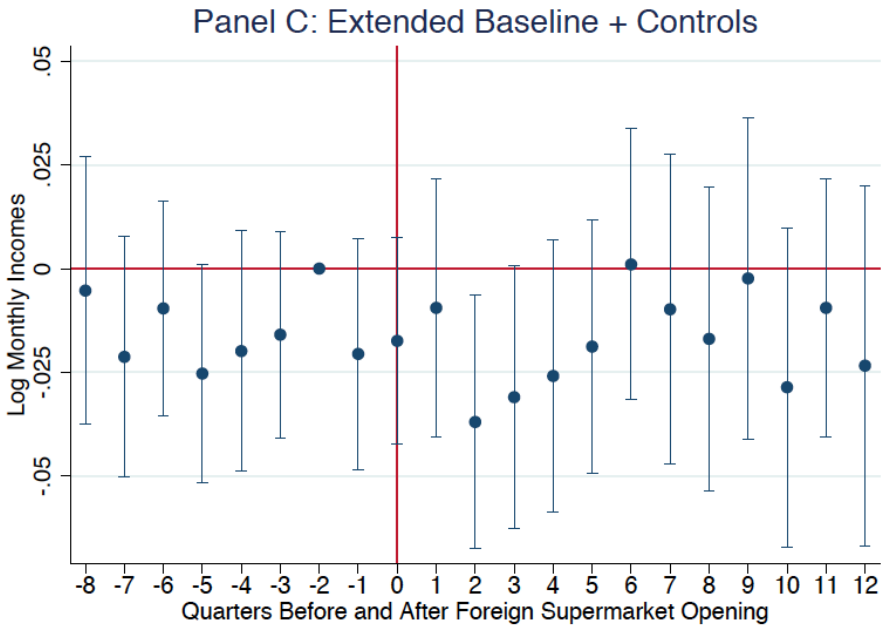
Foreign Store Expenditure Shares, by Income Group

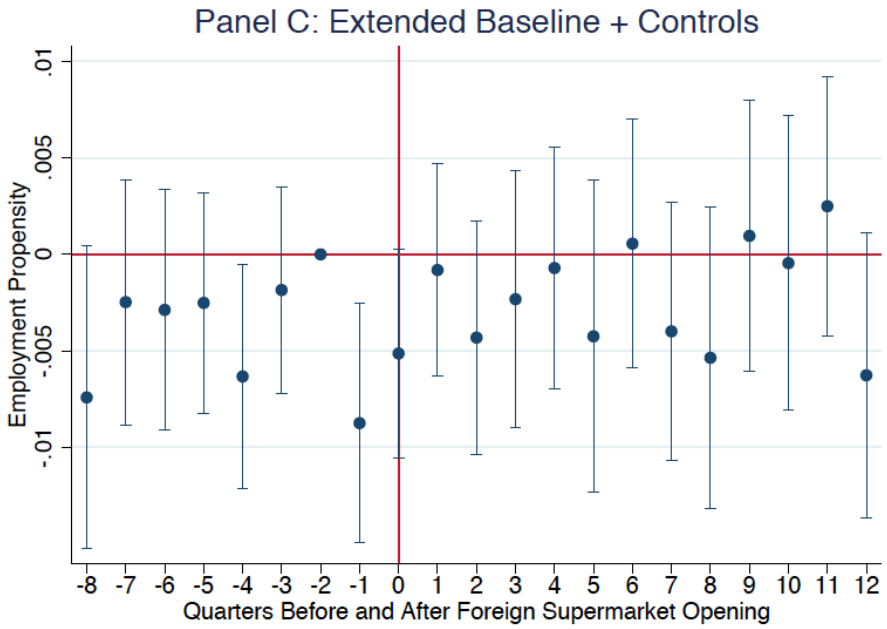


Foreign Retail Market Shares, by Product Group



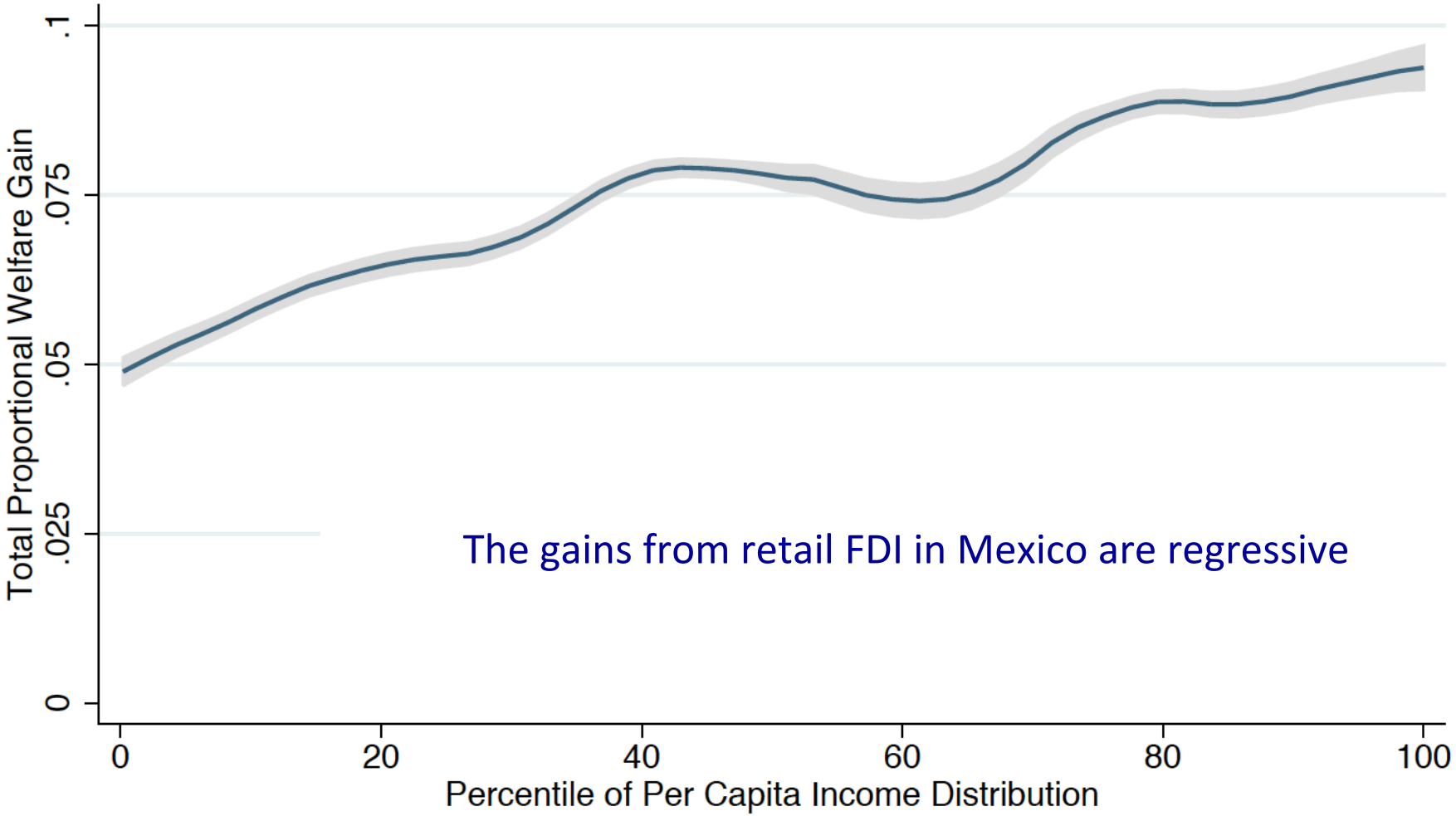
Average Monthly Incomes and Employment





- No effect on avg incomes/employment
- Domestic retailer profits fall 5%
- 5% of retailers exit

Welfare Gains Across Households



E-Commerce Integration in China

- A recent paper by Couture et al (2017) uses a randomized control trial to study the effects of e-commerce on rural China

- From 2000-15: Chinese e-commerce goes from 0 to 400 million users!

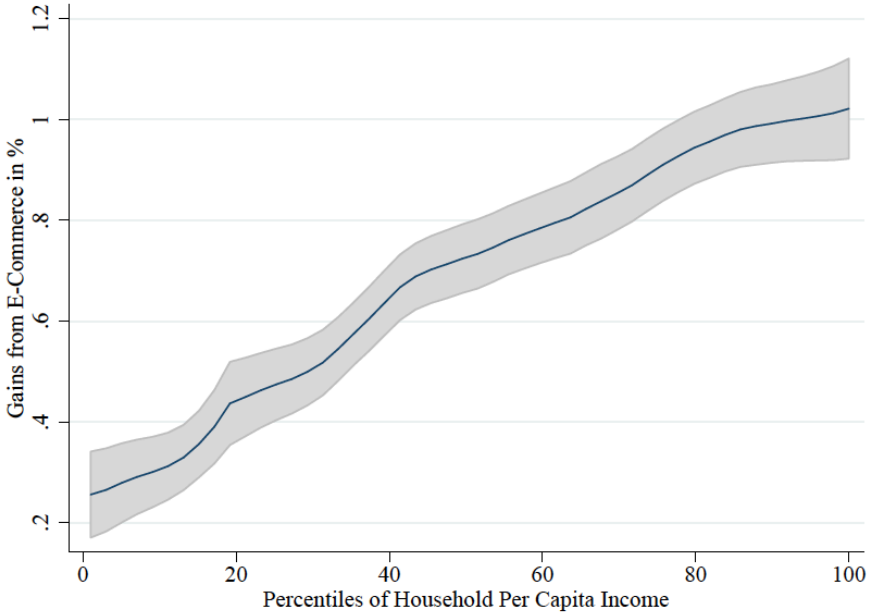
- Most of that growth occurred in cities
- Push to expand e-commerce to rural areas

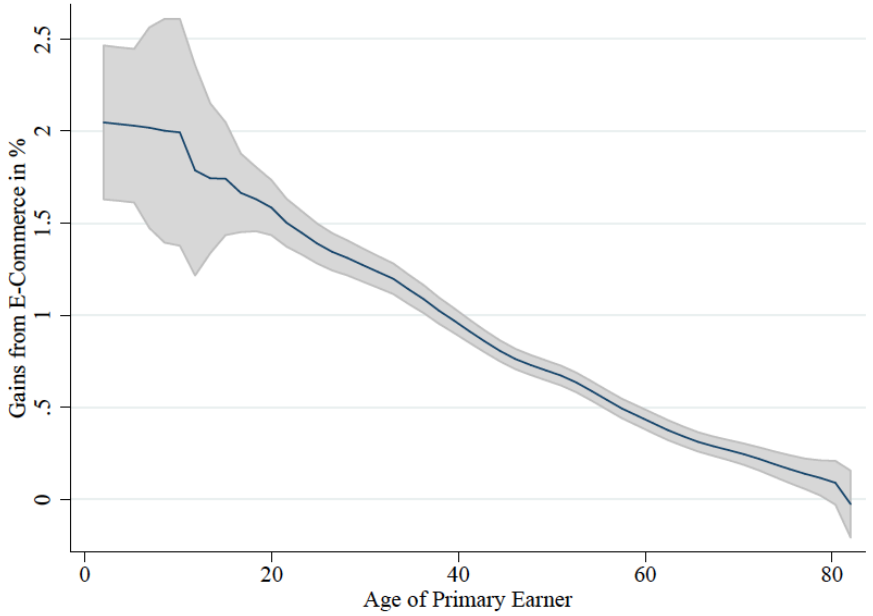
- Group of academics worked with a large firm to assess the impact of e-commerce terminals in villages
  - From 2014-16, 16,500 Chinese villages in 333 counties and 27 provinces had been connected to e-commerce through the program

E-Commerce Integration in China

- Authors survey 2800 households (roughly 8600 individuals) in the 100 villages.
  - Half are randomly selected within a 300m radius of the planned terminal location ("inner village zone"), half outside the village
  - Collect information about e-commerce/non-e-commerce purchases, expenditures on production inputs, etc.

E-Commerce Gains Biased Towards the Rich





Takeaways

- Trade affects **both** consumption and income channels
- Public debates have predominantly focused on the impacts of the price of labor
- Households consume different baskets of goods, so trade will have unequal consequences across households through consumption channel
- The bias of these gains appears to hinge on the nature of the reform
  - Cross-country evidence suggest that, on average, poorer households consume more tradeables than non-tradeables
  - Studies looking at particular types of liberalization (retail FDI, E-commerce) in developing countries find that welfare effects are pro-rich
- Exciting area for research
  - Structural vs reduced form
  - Increasing access to high-quality micro-datasets
  - Important public policy debate