The Distributional Consequences of Large Devaluations

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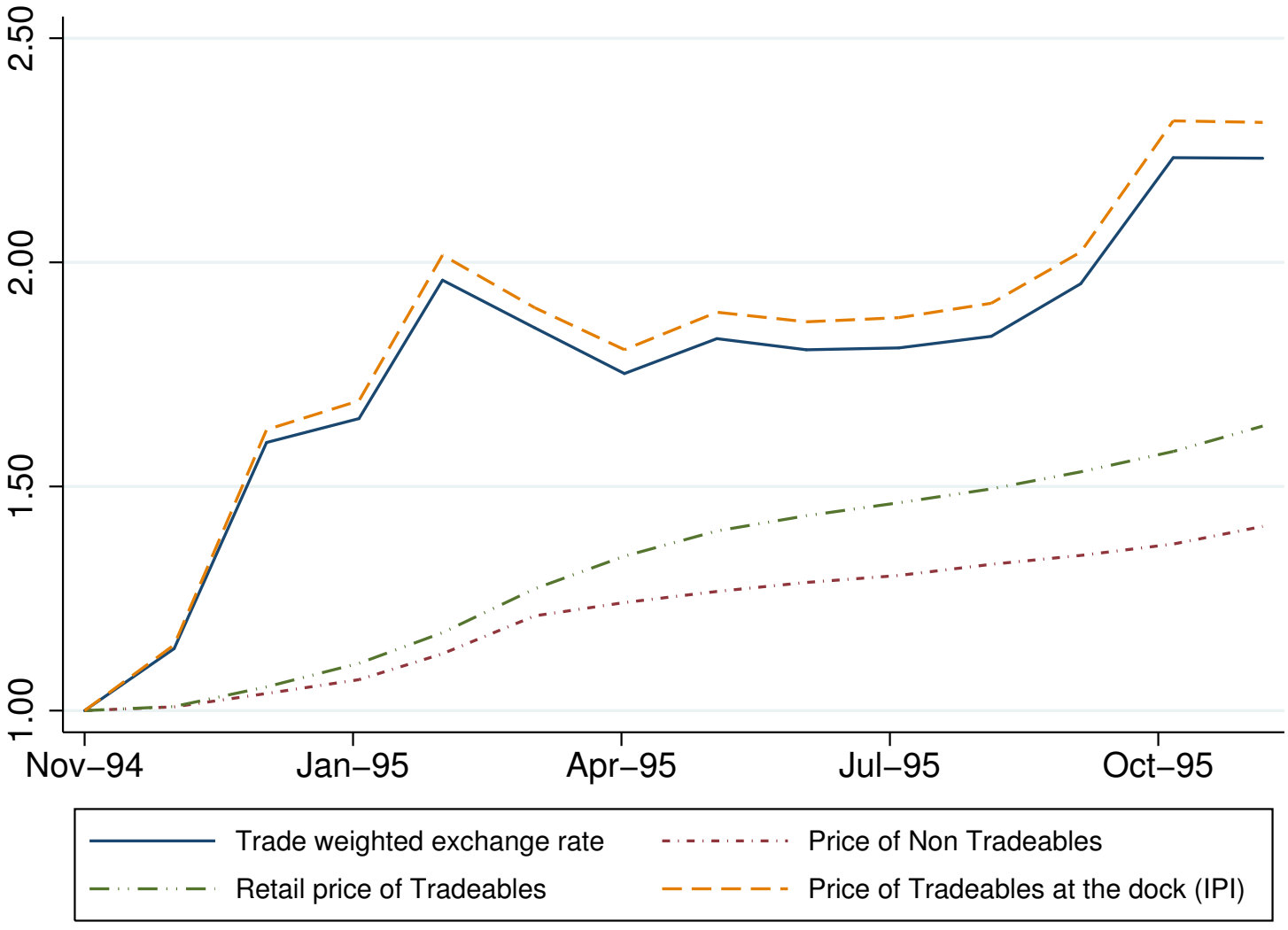
Mexico Devaluation 1994



Observations

1. Large devaluations followed by big changes in relative prices
   - "At the dock" prices move with the exchange rate
   - Low pass-through into retail prices
   - Limited movements in non-tradeable prices

2. Households at different income levels consume different goods (Engel's Law, ..., Almås 2012)

This paper: Quantify the differential impact of large devaluations on the cost of living across the income distribution

What we do

1. Construct income-specific price indices following the 1994 Mexican devaluation
    - Monthly product-outlet level price data (28,675 goods in $\sim$ 300 categories)
    - Households expenditure surveys for 1994 and 1996
2. Theory and evidence linking observed changes in relative prices to the devaluation
    - Use differences of distribution margins and prevalence of local goods to account for relative price changes

Main findings

1. *Across* product categories
   - The poor consume relatively more tradeables
   - Inflation was 20 % points higher for households in the bottom vs top income decile

2. *Within* product categories
   - The poor consume cheaper varieties
   - Inflation was between 13 and 21 % points larger for those buying low- vs. high-priced varieties

3. Combined effect roughly additive
   - 32 to 40 % point difference in the cost of living change between top and bottom

Mechanisms

The poor consume less non-tradeable goods

1. Spend less in non-tradeable categories (i.e. food vs education)

2. Across tradeable categories: Spend more in categories where distribution margins are low (i.e. food vs school supplies)
   - Exception is cars
   - Expenditure on local goods does not appear to vary systematically with income

3. Within categories: Purchase in low end outlets, that have lower distribution margins
   - Differences in distribution margins can account for differences in price changes across varieties

Data: Mexico 1994

- Individual price data underlying the CPI, monthly from January 1994 (Diario Oficial de la Federacion)
  - Product×city×store: 28,675 prices in 282 product categories
  - Product example: "Kellogg's, Corn Flakes, 500gr box"
- Household surveys, 1994 and 1996 (Encuesta Nacional de Ingresos y Gastos de Hogares)
  - 597 consumption categories, mappable to price data

Measurement

- Goods $g \in 1, ..., G$, varieties $v_g \in g \ \forall g$
- Aggregate price index:

$$\widehat{P}_t \equiv \sum_{g \in G} \omega_g \widehat{P}_{g,t},$$

where $\omega_g \equiv \frac{\sum_h P^h_{g,t_0} q^h_{g,t_0}}{\sum_h \sum_g P^h_{g,t_0} q^h_{g,t_0}}$ and $\widehat{P}_{g,t} \equiv \frac{1}{V_g} \sum_{v_g \in g} \widehat{P}_{v_g,t}$.

- Household-specific change in cost of living

$$\widehat{P}^h_t \equiv \sum_{g \in G} \omega^h_g \widehat{P}^h_{g,t},$$

where $\omega^h_g \equiv \frac{P^h_{g,t_0} q^h_{g,t_0}}{\sum_g P^h_{g,t_0} q^h_{g,t_0}}$ and $\widehat{P}^h_{g,t} \equiv \sum_{v_g} s^h_{v_g} \widehat{P}_{v_g,t}$.

Measurement

$$\widehat{P}_t^h \equiv \sum_{g \in G} \omega_g^h \widehat{P}_{g,t}^h$$

Across: $\widehat{P}$ for h facing the average price change in each category

$$\widehat{P}_{Across,t}^h \equiv \sum_{g \in G} \omega_g^h \widehat{P}_{g,t}$$

Within: $\widehat{P}$ for h with aggregate consumption shares facing $\widehat{P}_g^h$ in each g:

$$\widehat{P}_{Within,t}^h \equiv \sum_{g \in G} \omega_g \widehat{P}_{g,t}^h$$

Difference between two households $\Delta \widehat{P}_t \equiv \widehat{P}_t^h - \widehat{P}_t^{h'}$

$$\Delta \widehat{P}_t = \Delta \widehat{P}_{Across,t} + \Delta \widehat{P}_{Within,t} + \Delta \widehat{P}_{Cov,t}$$

Across price index

$$\widehat{P}^{h}_{Across,t} \equiv \sum_{g \in G} \omega^{h}_{g} \widehat{P}_{g,t}$$

- ω^{h}_{g} by income decile from household expenditure survey
- $\widehat{P}_{g,t}$ construct disaggregated CPIs by product

Across price index

	1994 Cons. Shares			1996 Cons. Shares		
	Income Decile			Income Decile		
	1	10	Aggregate	1	10	Aggregate
Oct. 94	1.00	1.00	1.00	1.00	1.00	1.00
Oct. 95	1.51	1.42	1.45	1.51	1.45	1.47
Oct. 96	1.95	1.76	1.82	1.98	1.80	1.85

Fit

Expenditure differences within categories

- Unit values paid by household h in category g:

$$u_{g,t}^{h} \equiv \frac{\sum_{v_g \in g} P_{v_g,t} q_{v_g,t}^{h}}{\sum_{v_g \in g} q_{v_g,t}^{h}}$$

- Estimate

$$\ln u_{g,t}^{h} = \alpha_t + \sum_{j=2}^{10} \beta_{j,t} \mathbb{I}_{[h \in Dec.j]} + \delta_{g,t} + \varepsilon_{g,t}^{h}$$

- $\delta_{g,t}$'s are category fixed effects
- Data on u_g^h and income deciles from household surveys for 1994 and 1996

Unit values and household income

	(1)	(2)	(3)	(4)
	Household level		Decile level	
	1994	1996	1994	1996
Decile 2	0.0115	0.0331***	0.0282	0.00958
	(0.00806)	(0.00610)	(0.0347)	(0.0294)
Decile 3	0.0165**	0.0448***	0.0598*	0.0265
	(0.00809)	(0.00604)	(0.0350)	(0.0269)
Decile 4	0.0403***	0.0343***	0.0949***	0.0547**
	(0.00749)	(0.00610)	(0.0335)	(0.0266)
Decile 5	0.0465***	0.0531***	0.125***	0.0797***
	(0.00756)	(0.00605)	(0.0335)	(0.0260)
Decile 6	0.0425***	0.0662***	0.118***	0.109***
	(0.00734)	(0.00605)	(0.0333)	(0.0267)
Decile 7	0.0686***	0.0731***	0.157***	0.108***
	(0.00745)	(0.00605)	(0.0346)	(0.0266)
Decile 8	0.0837***	0.0897***	0.205***	0.139***
	(0.00747)	(0.00595)	(0.0327)	(0.0257)
Decile 9	0.115***	0.110***	0.250***	0.200***
	(0.00730)	(0.00608)	(0.0340)	(0.0259)
Decile 10	0.200***	0.186***	0.330***	0.301***
	(0.00775)	(0.00618)	(0.0355)	(0.0280)
Number of categories	170	170	170	170
Observations	205,533	232,690	1,700	1,700
R^2	0.808	0.826	0.933	0.952

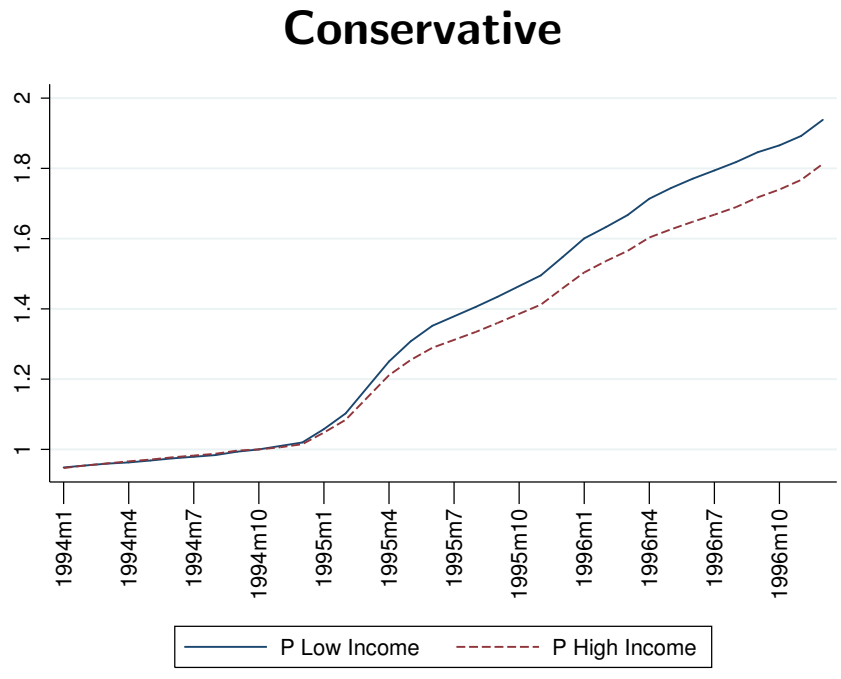
Fit

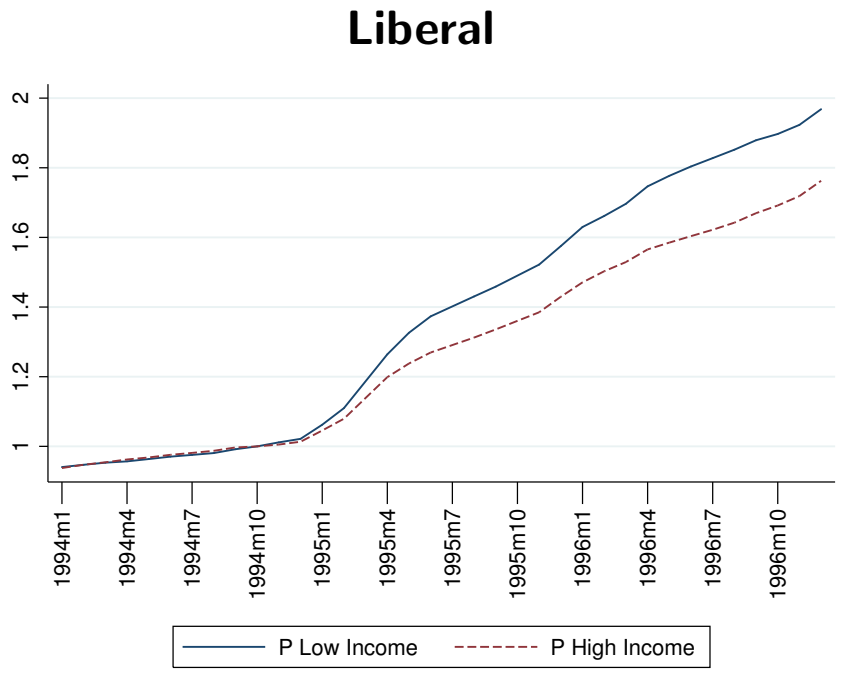
Within price index

$$\widehat{P}^h_{Within,t} \equiv \sum_{g \in G} \omega_g \widehat{P}^h_{g,t}$$

- ω_g: aggregate expenditure shares from household survey
- $\widehat{P}^h_{g,t}$: Price index by category computed from the DOF
  - Above/below median
- Issue: missing product categories in Diario data (45% of expenditures)
  - Conservative: no within effect in unmeasured categories
  - Liberal: within effect equally strong in unmeasured as in measured categories

Within


Conservative
1
1.2
1.4
1.6
1.8
2
1994m1
1994m4
1994m7
1994m10
1995m1
1995m4
1995m7
1995m10
1996m1
1996m4
1996m7
1996m10
P Low Income
P High Income


Liberal
1
1.2
1.4
1.6
1.8
2
1994m1
1994m4
1994m7
1994m10
1995m1
1995m4
1995m7
1995m10
1996m1
1996m4
1996m7
1996m10
P Low Income
P High Income

Within

	Conservative		Liberal	
	Below Median	Above Median	Below Median	Above Median
Oct. 94	1.00	1.00	1.00	1.00
Oct. 95	1.50	1.41	1.52	1.39
Oct. 96	1.87	1.74	1.90	1.69

Other Periods

Combined effects

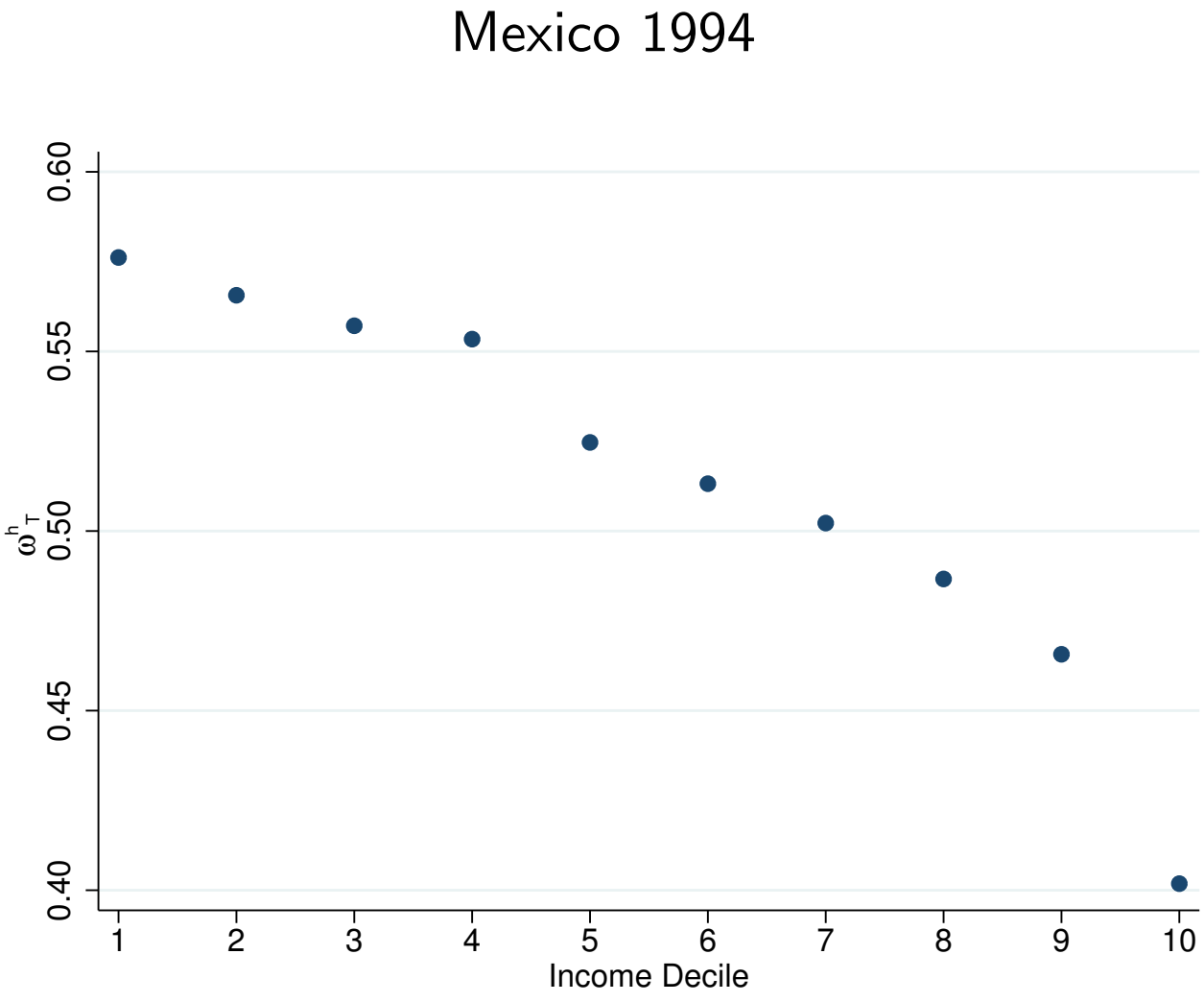
$$\widehat{P}_t^h = \sum_{g \in G} \omega_g^h \widehat{P}_{g,t}^h.$$

Two consumers:

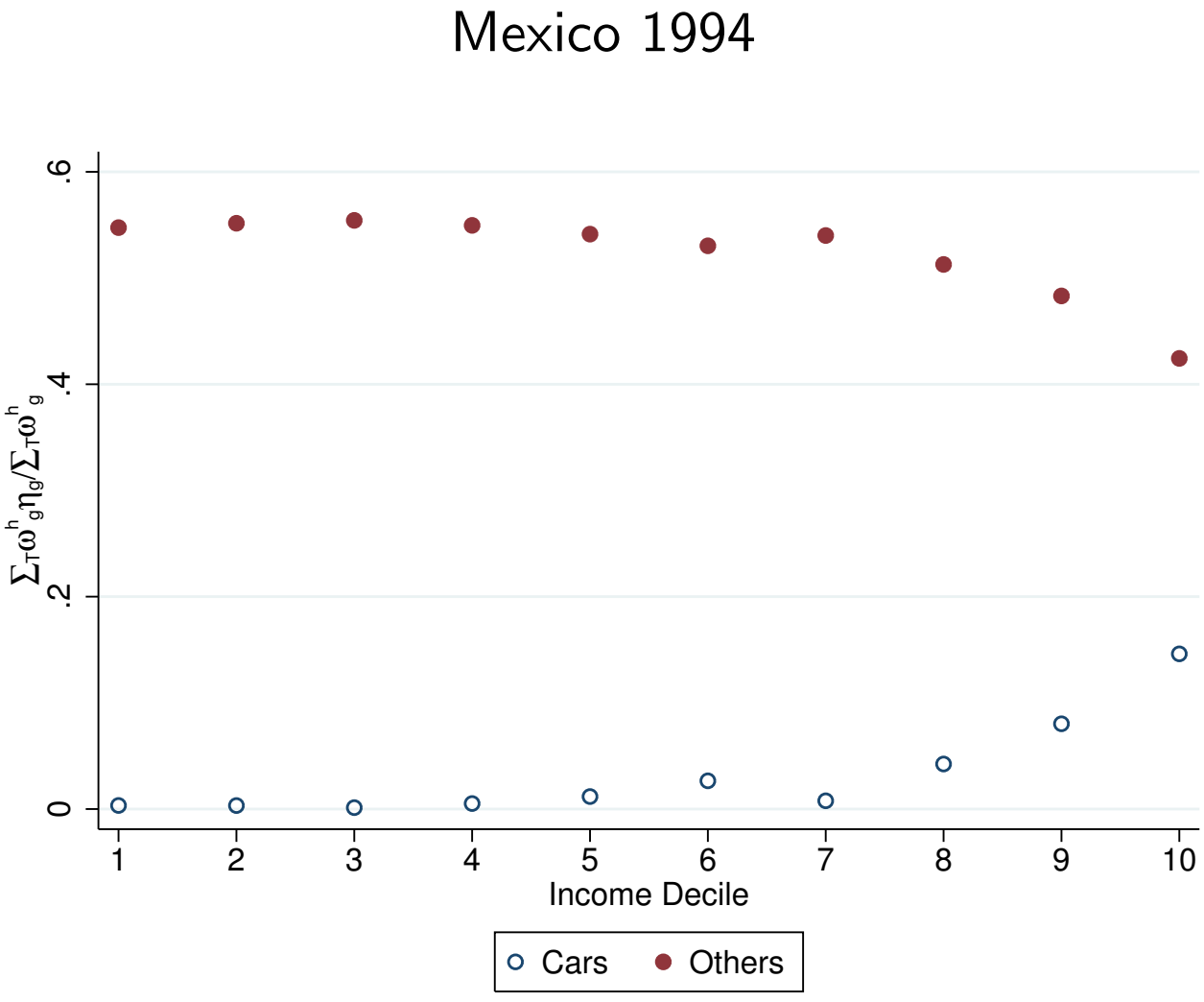
- High-income: ω_g^h from the top income decile; $\widehat{P}_{g,t}^h$ above the median
- Low-income: ω_g^h from the bottom income decile; $\widehat{P}_{g,t}^h$ below the median

	Conservative		Liberal	
	Low-Income	High-Income	Low-Income	High-Income
Oct. 94	1.00	1.00	1.00	1.00
Oct. 95	1.56	1.39	1.58	1.37
Oct. 96	2.02	1.70	2.04	1.65

Consumption of tradeables by household income



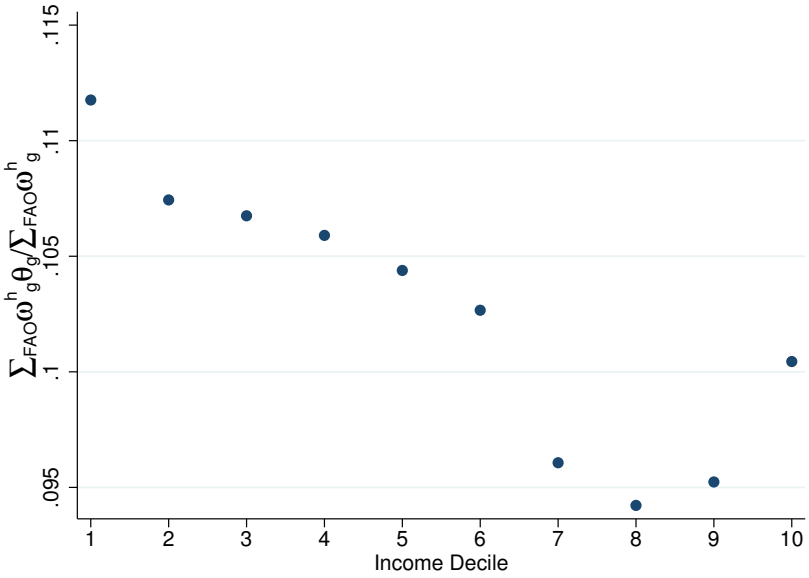
Distribution margins by household income



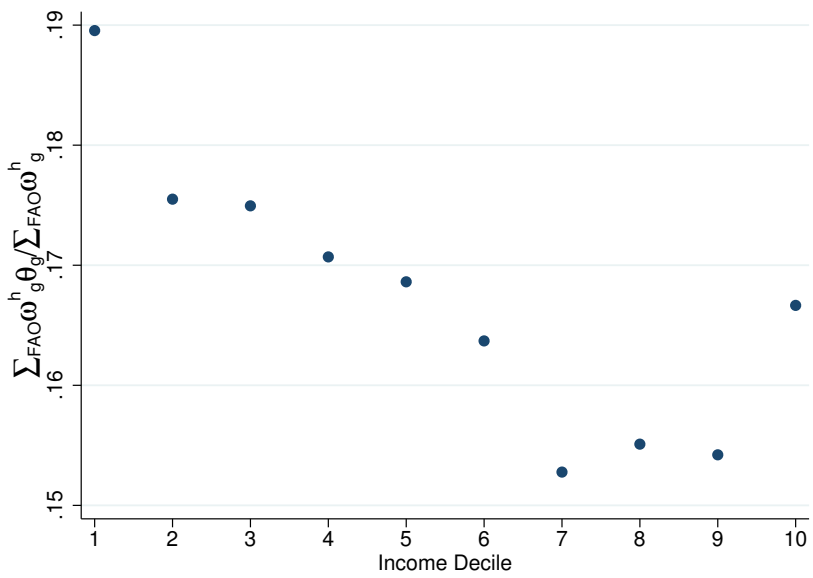
Local goods by household income

Mexico 1994

Imports to absorption ratio



Openness



Predicted vs. observed price changes: Oct. 94 - Sept. 95

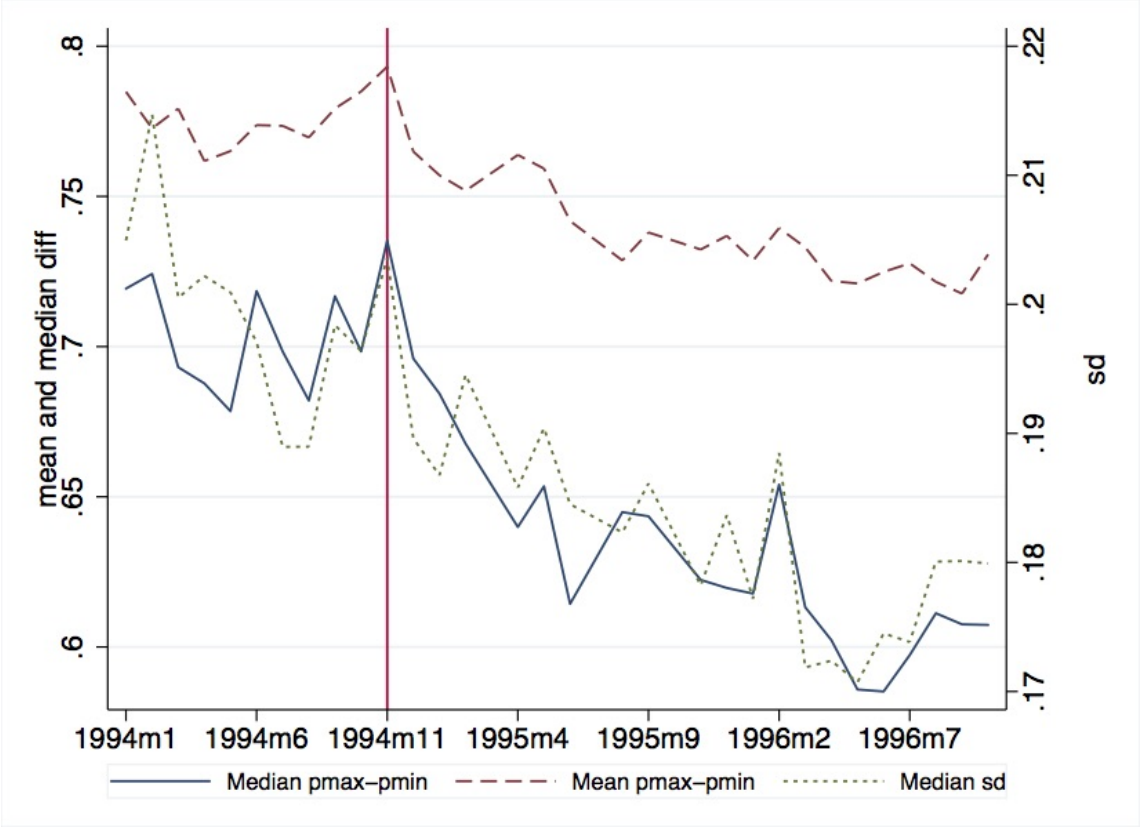
Taking stock

- Devaluations affect the prices of goods consumed by the rich and the poor differentially
  - Anti-poor in Mexico 1994
- The poor appear to consume a higher true share of tradeables, both across and within goods
  - Mechanisms likely more general for emerging markets

Predicted vs observed price changes

	Devaluation: Oct94 – Sept95	Placebo I: Jan94 – Oct94	Placebo II: Jan04 – Jan05
Slope	1.355***	0.108	-0.0865*
	(0.287)	(0.0788)	(0.0519)
Observations	4,193	4,194	5,742
R^2	0.140	0.001	0.003

Price dispersion



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EIU CityData

- 140 cities, 1990-, semi-annual frequency (March/April and September/October)
- 160 product categories $\times$up to 3 stores: "supermarket/chain store," "mid-priced/brand store," "high-priced store"
- Intended to compute cost of living for expats
- No implicit or explicit expenditure shares

Differences in distribution margins across outlets

Economist Intelligence Unit CityData, 3 store prices for each good

$$\ln P_{vg} = \beta_{Med} MED_{vg} + \beta_{High} HIGH_{vg} + \alpha_g + \varepsilon_{vg}$$

	Log-difference in price			
	β_{Med}	β_{High}	N. prices	N. categories
Exact same good	0.135***	0.230***	23	8
Not exact same good	0.237***	0.489***	309	105

Differences in price changes across outlets

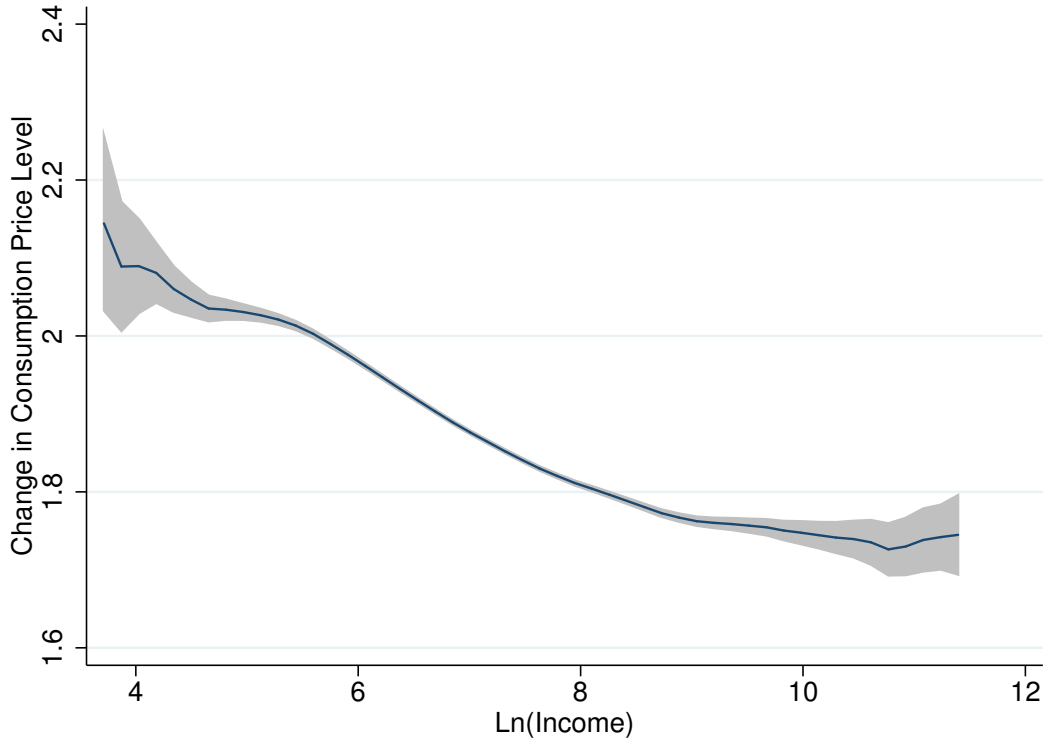
EIU CityData for Mexico City 1994:

$$\widehat{P}_{v_g} = \beta_1 MED_{v_g} + \beta_2 HIGH_{v_g} + \delta_g + \varepsilon_{v_g},$$

Horizon	<1 year	<2 years	<3 years
MED_{v_g}	-0.068**	-0.068***	-0.098***
	(0.028)	(0.025)	(0.026)
$HIGH_{v_g}$	-0.118***	-0.120***	-0.128***
	(0.030)	(0.027)	(0.031)
Obs.	236	236	239
R^2	0.803	0.874	0.862

Also Brazil 1998, Argentina 2001, Korea 1997, Iceland 2007-8; not Thailand 1997

Fit across households



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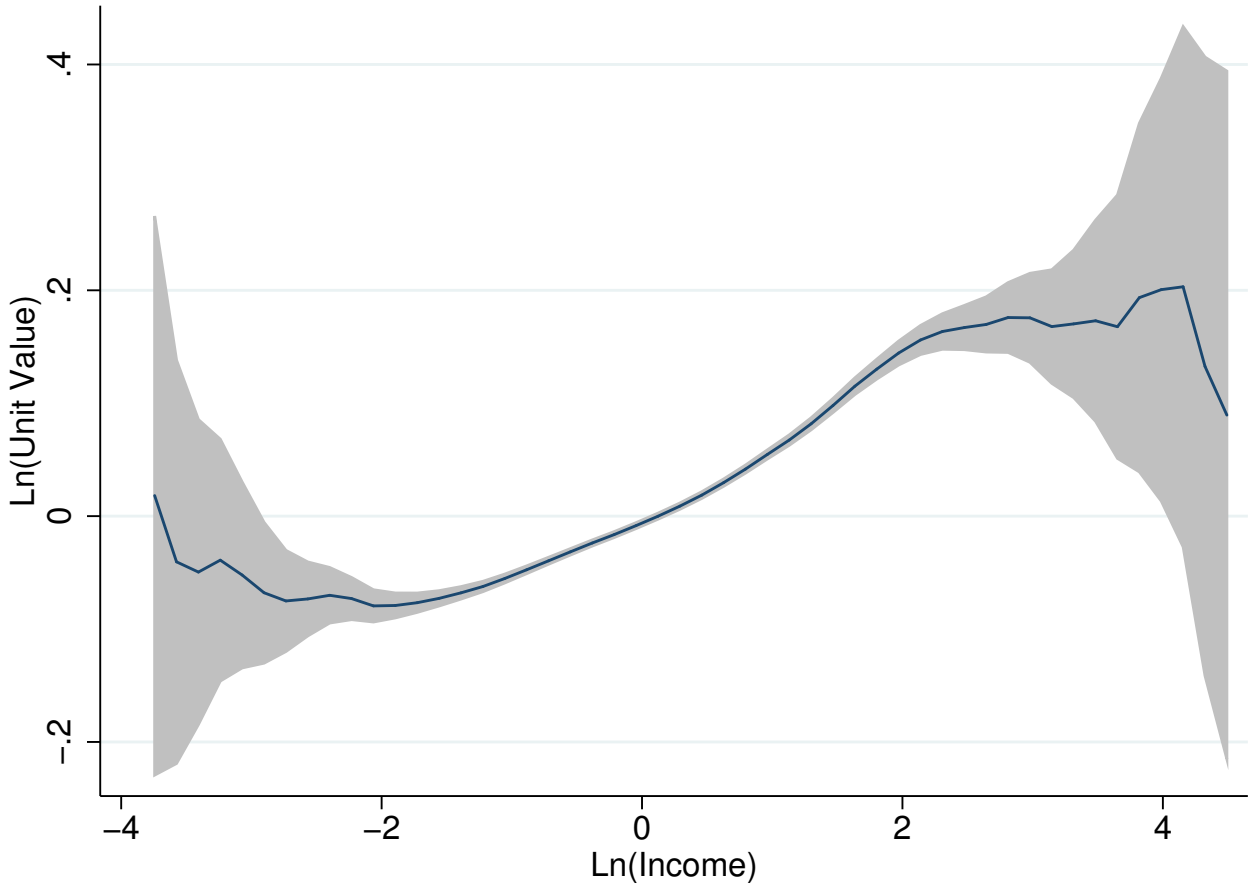
Unit values and household income



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Robustness II

	Conservative		Liberal	
	Low prices	High prices	Low prices	High prices
Oct. 94	1.00	1.00	1.00	1.00
Oct. 95	1.54	1.45	1.65	1.49
Oct. 96	1.89	1.80	2.01	1.83

Mexico city

	Conservative		Liberal	
	Below Median	Above Median	Below Median	Above Median
	Overall			
Oct. 94	1.00	1.00	1.00	1.00
Oct. 95	1.50	1.38	1.53	1.36
Oct. 96	1.90	1.69	1.96	1.67

Within Liberal Placebo

	2004	2005	2006	2007	2008
1 year	0.03	0.01	0.02	0.02	0.01
2 years	0.04	0.03	0.02	0.03	0.02

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