

Evidence from Micro Consumer Price Data

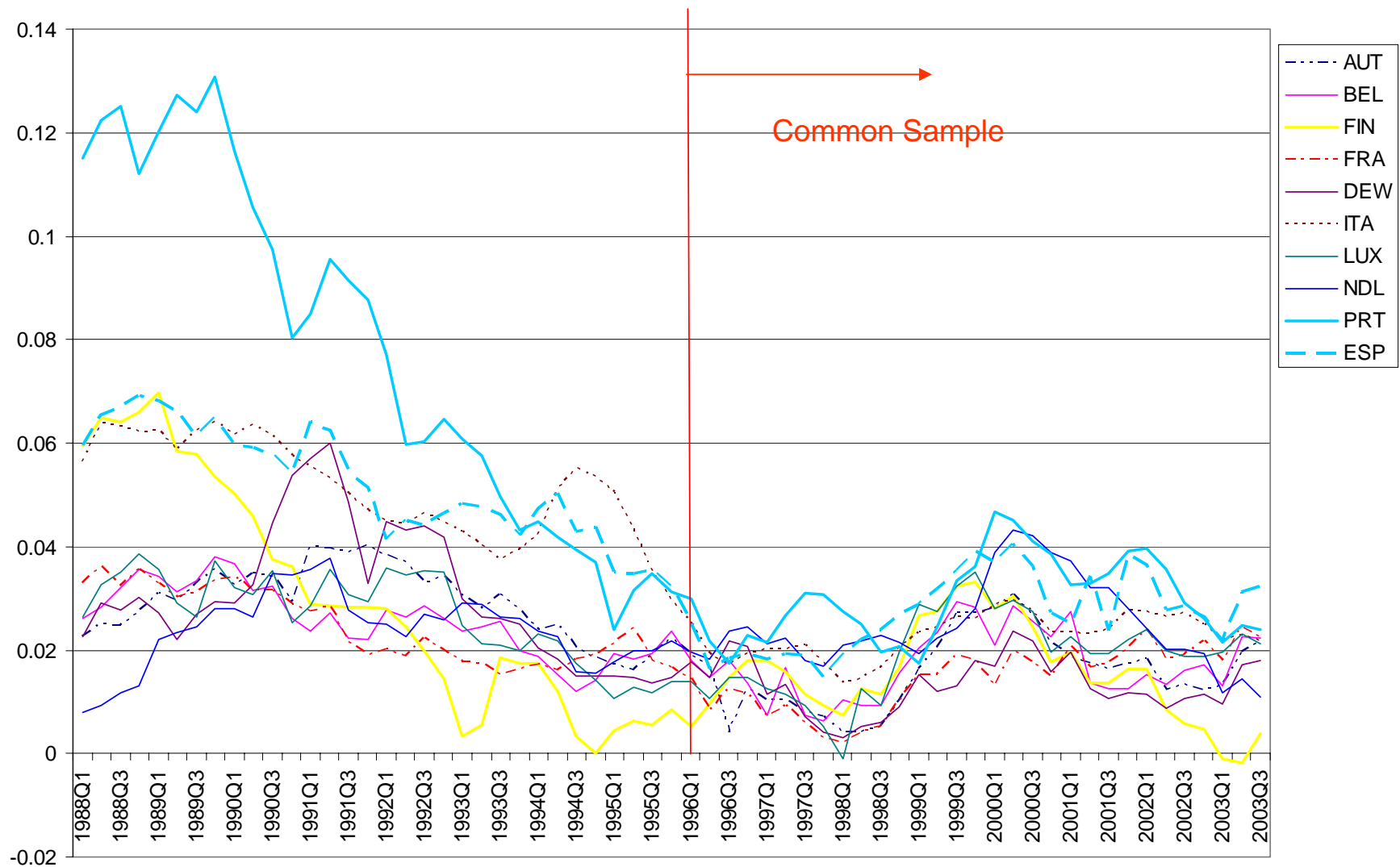
Discussion

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Price Dynamics and Inflation

- Bils and Klenow (2004) and the Eurosystem Inflation Persistence Network document behavior or price setting in low inflation environments.
- What are the patterns in large inflation environments?
 - Are there similarities with low inflation environments?
- Issues suggested by high-inflation environments
 - Publicly-controlled prices
 - Stock outs
 - Flight from quality in consumption
 - Pricing complementarities
 - Imported versus domestic products
 - At-the-dock prices versus retail prices
 - Importance of distribution margins

Euro Area Inflation
Year-on-year Logarithmic Changes



- The bulk of the IPN analysis is for a period during which inflation fluctuated at around 2 percent per annum.

Our Survey of Prices in Buenos Aires

- Conducted between March 27 and December 24, 2002.
- Comprises prices for 53 goods in eight supermarkets and 17 services
- Goods were sampled at daily frequency, services at weekly frequency
- Goods
 - Apples, aspirin, bananas, adhesive bandages, batteries, bedsheets, Big Mac, Bic pens, bleach, blue jeans, bottled beer, bread, cereal, chicken, chocolate, chocolate biscuits, cigarettes, coffee, color film, computer mouse, cooking oil, two types of deodorant, diapers, diesel, diskettes, dulce de leche (a local desert), eggs, filet mignon, flour, gasoline, hake (an ocean fish), herbal tea (yerba mate), leather shoes, light bulbs, mayonnaise, milk, microwaves, mineral water, music CDs, osso bucco, polenta, potatoes, printers, printer paper, printer toner, recordable CDs, rice, shampoo, razor blades, soft drinks, spaghetti, sugar, televisions, toothpaste, veal scallops, wine, and writing paper.
- Services
 - Bus fares, haircuts, movie theater tickets, newspapers, parking, payphone calls, stamps, taxi fares, train fares, and video rentals.

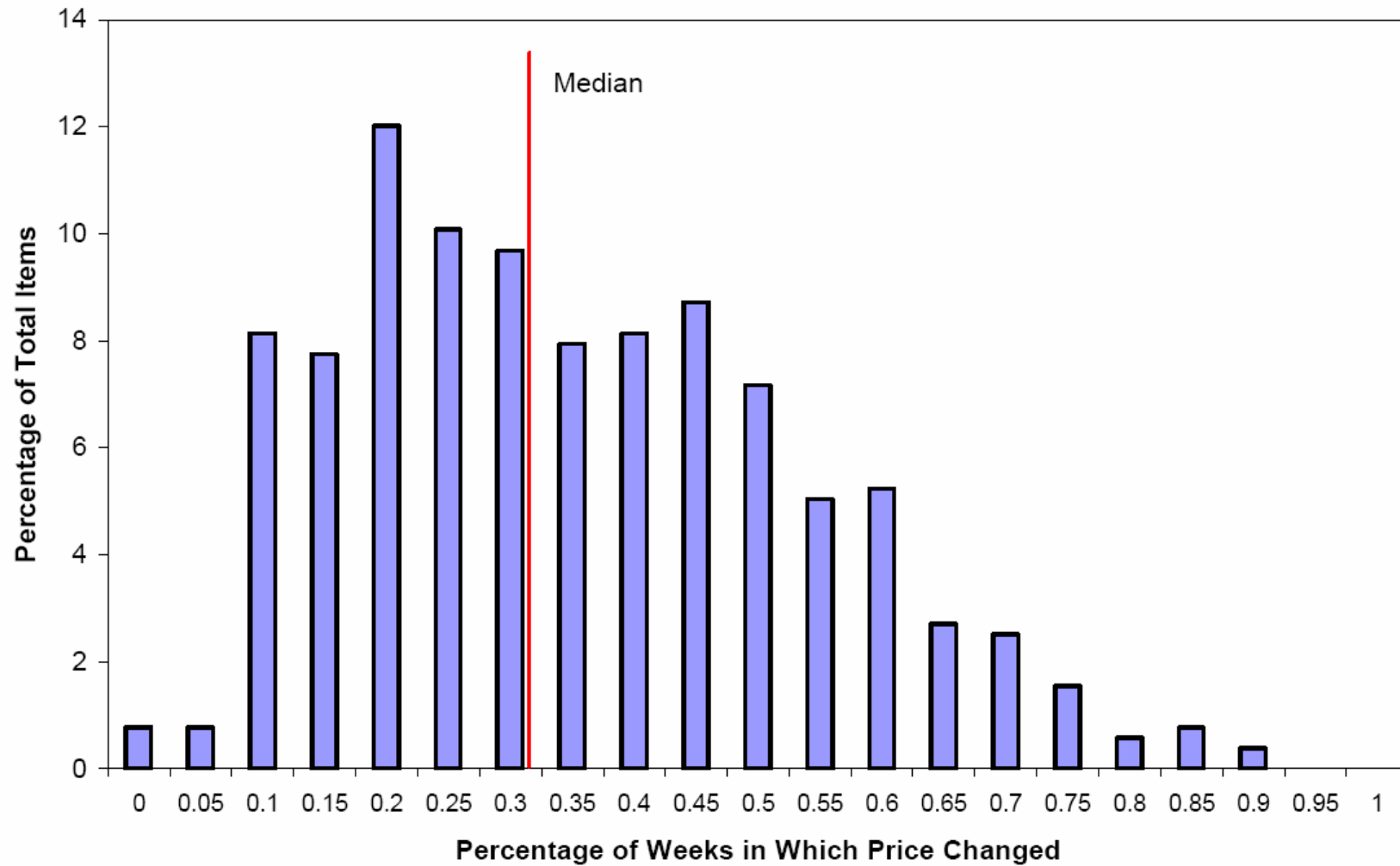
Comparing Price Movements in Europe, U.S. and Argentina

	Monthly Frequency of Price Adjustment						
	Argentina			U.S.		Euro Area	
	Goods and Services	Goods	Services	Goods and Services	Services	Goods and Services	Services
Frequency of Price Adjustment (%)		31.1	0.0	24.8	15	15.1	5.6
Fraction of times price goes up		61	100	55		58	80
Average Price Increase		10				8	
Average Price Decrease		7				10	
Average Rate of Inflation	25.7			3.1		1.9	

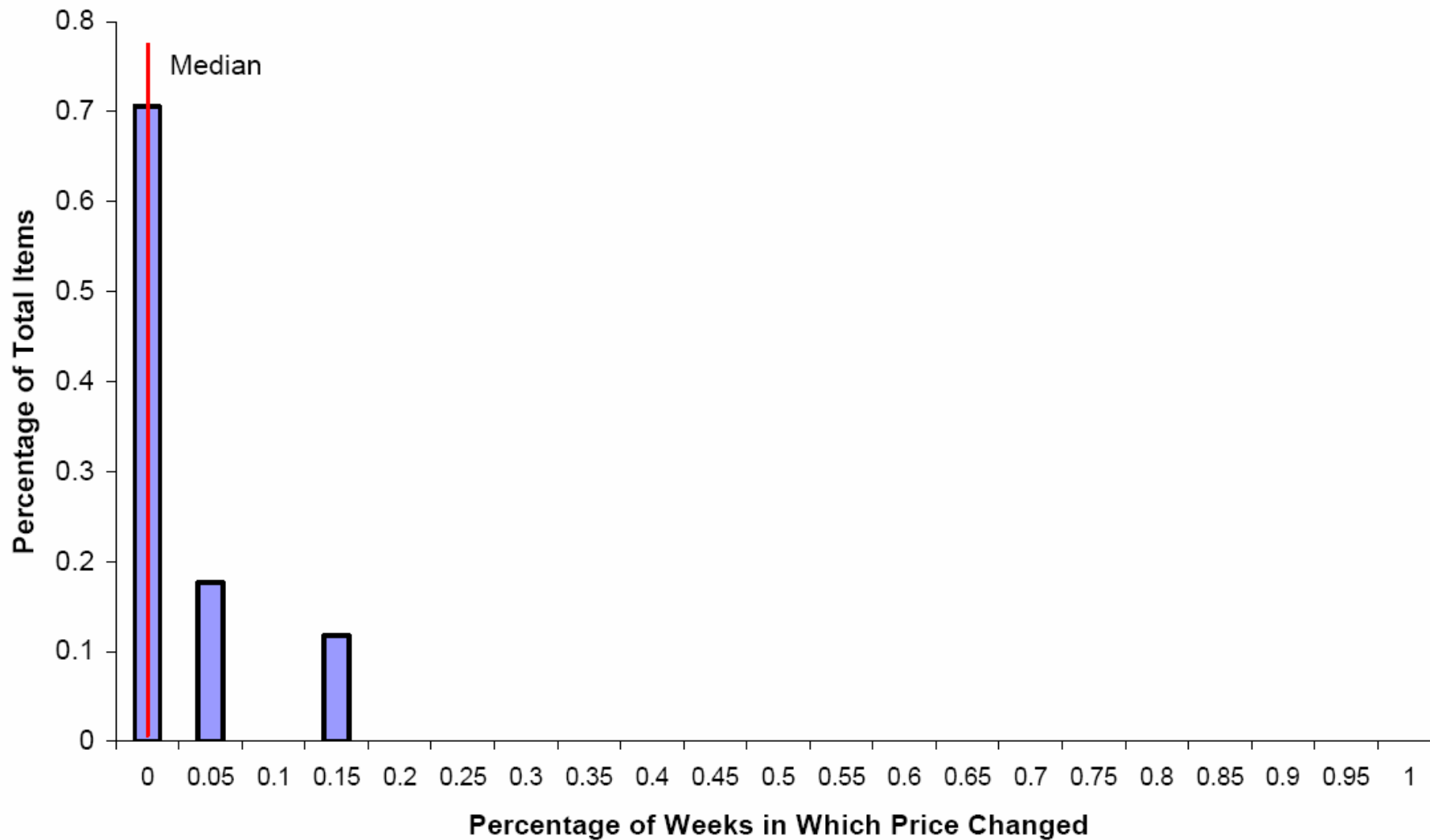
Comparing Price Movements in Europe, U.S. and Argentina

- Despite the much higher rate of inflation in Argentina (25.7 percent) there are some surprisingly common features with the U.S. and the Euro area
 - Goods prices move much more than service prices
 - This highlights the need, highlighted in several IPN papers, of models with two types of goods.
 - The fraction of times goods prices decrease is broadly similar
 - Average price movements are broadly similar
 - The same asymmetry between services and goods prices (price increases are much more frequent in services) are common to Europe and Argentina,
- The high inflation evidence suggests that there was a nominal anchor in Argentina that kept the price of nontradables stable.
- It is hard to believe that this stability was the result of purposeful monetary policy, since this was the period during which regional governments issued their own currencies.

Histogram, Frequency of Price Changes: Goods



Histogram, Frequency of Price Changes: Services



Burstein, Ariel, Martin Eichenbaum and Sergio Rebelo "Large Devaluations and the Real Exchange Rate," mimeo, Northwestern University, 2004.

Publicly Administered Prices

Prices and Exchange Rates in Large Devaluations
Cumulative Logarithmic Change

	Argentina December 2001	Brazil January 1999	Korea - September 1997	Mexico December 1994
Consumer price index	34.3	26.6	6.6	39.5
Nontradable prices	13.0	8.3	5.1	31.6
Retail price of tradables	51.5	41.6	8.2	45.6
Public goods prices	4.7	8.1	7.5	29.1

- IPN found evidence that administered prices move less than other prices
- In our data publicly administered prices do not seem responsible for the low services inflation.
 - Caveat: pricing complementarities can be an issue. Private providers of services that are also publicly provided (e.g. health and education) may decide not to change their prices when the price of public services remains constant.
- In Argentina the low frequency of price adjustments for nontradable services does not seem to be driven by government controls
- The median weekly frequency of price changes for services whose price is not administered by the government is still very low--1.8 percent.

Synchronization of Price Movements

(Fisher-Konieczny Index)

- Synchronization of prices within supermarkets
 - Synchronization is low: 0.26.
- Synchronization of prices across supermarkets
 - There is high synchronization within brand and products, but little synchronization across different categories.
 - A natural explanation is that the elasticity of substitution is high within categories.
 - For individual items, defined by brand and size (e.g. oil, Mazzola, 1 liter): 0.62;
 - For product categories (e.g. all oils in all supermarkets), average across all products: 0.53;
 - For all products and brands: 0.15.
- Synchronization at the level of individual products seems higher in Argentina than in Europe, where medium synchronization is 0.18.
 - This may be an artifact of the fact that our data is only for Buenos Aires. The Italian study found that synchronization is higher at the city level.

Synchronization of Price Movements

- Synchronization of prices across supermarkets:
 - Substantial heterogeneity in the synchronization of different products
 - 0.93 for gasoline;
 - 0.71 for tobacco;
 - 0.29 for herbal tea.

Price Changes and Stock-outs

- Using a daily-frequency version of our survey data, we find that most price adjustments occur after a stock-out.
 - Is there data on stock outs for Europe?
- The probability of a price change, conditional on the good not being on the shelf on the previous day, is 33 percent.
- This evidence is consistent with:
 - Rotemberg's (2003) argument that retailers worry about customer anger associated with price changes.
 - Marketing literature on stores investing on being perceived as low-price outlets
 - "Everyday Low Pricing" Lal and Rao, Marketing Science, 1997
- Some of the evidence from IPN is also consistent with Rotemberg (2003)
 - The fact that price movements cluster around events that can easily justify price changes, such as VAT changes,

Pricing Complementarities

Inflation and Market Share of Imports and Exportables in Argentina

Product Category	Inflation (log percent) Dec 01 - June 02	Market Share Imported + Exportables Oct-02
Beer	32.4	12.7
Bread	33.4	52.7
Cereals	40.3	55.7
Cleaning liquids	50.4	86.2
Coffee	45.1	55.8
Deodorant	50.0	86.4
Detergents for clothes	67.1	66.0
Diapers	83.3	72.4
Dish detergents	50.1	32.1
Female protection	67.0	85.7
Hamburgers	17.9	0.7
Insect killer	53.3	77.7
Juice	50.0	11.5
Mayonnaise	64.5	95.4
Milk	41.9	0.2
Paper towels	52.4	50.8
Shampoo	47.3	71.4
Soap	46.0	70.1
Soda	31.5	3.9
Toothpaste	67.0	68.3
Yogurt	27.7	4.1

- Inflation dispersion is much more important across categories than within categories.
- In categories dominated by importers, the behavior of local producers is similar to importers.
- In categories dominated by local producers, the behavior of importers is similar to that of local producers.

Correlation coefficient: 0.69.

Source: CCR, INDEC, and our own survey.

Flight From Quality in Consumption

- In a recession high quality goods lose market share to lower quality goods.
- When brands disappear this forces unplanned substitutions of items in the CPI that make it difficult to measure the difference in quality between incoming and outgoing items.

Flight From Quality in Consumption

Product destruction
Percentage of SKUs destroyed in previous 6 months

Average price of SKUs whose market share
fell by > 2% between June t, t+1 /
Average price of SKUs whose market share
increased by > 2% between June t, t+1

Product Category	Product destruction					Average price of SKUs whose market share		
	June 2000	Dec. 2000	June 2001	Dec. 2001	June 2002	June 2000 June 1999	June 2001 June 2000	June 2002 June 2001
Beer	19	15	26	17	32	0.91	0.86	1.24
Bread	13	11	13	15	20	1.01	1.34	1.08
Cereals	12	11	14	14	17	1.27	0.96	1.78
Cleaning products	15	11	15	15	26	1.08	0.78	1.30
Clothes detergents	22	18	19	18	25	1.00	1.00	1.31
Coffee	11	11	10	16	17	1.10	1.08	0.99
Cooking oil	13	7	10	17	25	0.97	0.91	1.04
Deodorants	11	9	10	11	28	0.92	0.91	1.27
Diapers	15	13	20	27	44	1.09	1.08	1.76
Dish detergents	19	10	16	16	28	0.74	1.57	1.59
Feminine protection	14	9	9	11	21	0.87	1.21	1.28
Hamburgers	15	12	20	13	17	1.24	1.11	1.16
Ice cream	18	14	21	14	22	1.25	0.96	1.48
Insects killers	16	5	15	7	23	0.89	1.01	1.14
Juice	13	16	17	16	37	0.68	1.64	2.15
Mayonnaise	13	14	15	15	32	1.11	0.89	1.06
Milk	12	10	18	18	24	1.05	1.11	0.98
Paper towels	25	22	16	15	31	0.95	1.07	1.28
Shampoo	18	15	19	17	37	1.05	1.10	2.16
Soap	19	11	18	14	27	1.22	1.00	1.39
Soft drinks	21	16	25	26	38	1.06	1.10	0.88
Toothpaste	12	10	9	10	25	1.03	1.14	1.35
Wine	12	9	11	14	15	1.21	0.72	1.13
Yogurt	16	11	19	16	28	1.26	1.45	1.31
Average	16	12	16	16	27	1.04	1.08	1.34
Median	15	11	16	15	26	1.05	1.08	1.28

Source: CCR.

- 6-month rate of product destruction increases from 15 percent before the devaluation to 26 percent after the devaluation
- The ratio of average price of products that gained market share to those that lost market share rises from 1.08 to 1.28.

Flight From Quality in Consumption

Table 11: Flight From Quality in Argentina

	Price of category/ Average price across categories, in 2001	Market Share		
		2001	2002	2003
Premium brands	1.5	13.7	10.7	10.4
First brands	1.1	57.3	53.2	52.7
New first brands	0.8	6.4	10.0	9.6
Supermarket brands	0.8	6.5	7.8	9.5
Low price brands	0.8	16.0	18.3	17.8
Premium and first brands	1.2	71.0	63.9	63.1
New first, supermarket, and low price brands	0.8	28.9	36.1	36.9

Source: CCR.

Flight From Quality in Consumption

CPI and Economist Intelligence Unit (EIU) Inflation Rates

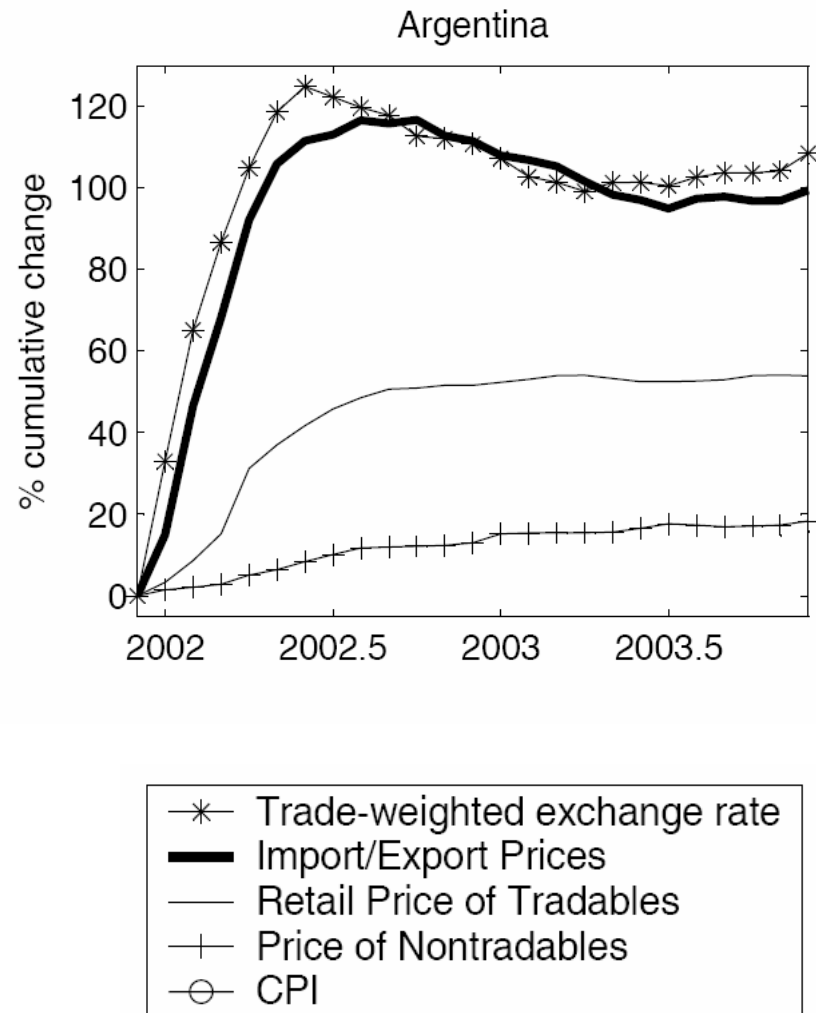
	Partial CPI Inflation	EIU Inflation Low price outlet	EIU Inflation High price outlet
One-year inflation rate, starting in September			
Argentina, 2001	54.1	68.4	68.8
Brazil, 1998	7.2	15.2	14.6
Korea, 1997	5.1	23.4	14.4
Mexico, 1994	44.0	49.0	44.0
Two-year inflation rate, starting in September			
Argentina, 2001	53.4	75.1	71.9
Brazil, 1998	14.1	19.4	16.1
Korea, 1997	5.4	30.8	20.9
Mexico, 1994	70.8	72.0	69.3

Partial CPI inflation is a weighted average of clothing, durables, food, and housing non-durables.

Source: Economist Intelligence Unit and National Statistical Agencies.

Prices of Imports at the Dock

- We found no evidence of price rigidities at the dock
 - This is not surprising given the large size of the peso devaluation
- Relative PPP is a good approximation for prices at the dock.
 - Also holds in other large devaluation episodes
- Retail prices of imported goods are much more stable than prices at the dock
 - Distribution sector acts as a buffer between prices at the dock and retail prices.



Importance of Distribution Costs

- To understand retail prices we need a model of the retail sector.
- Distribution costs account for a large fraction of retail prices.

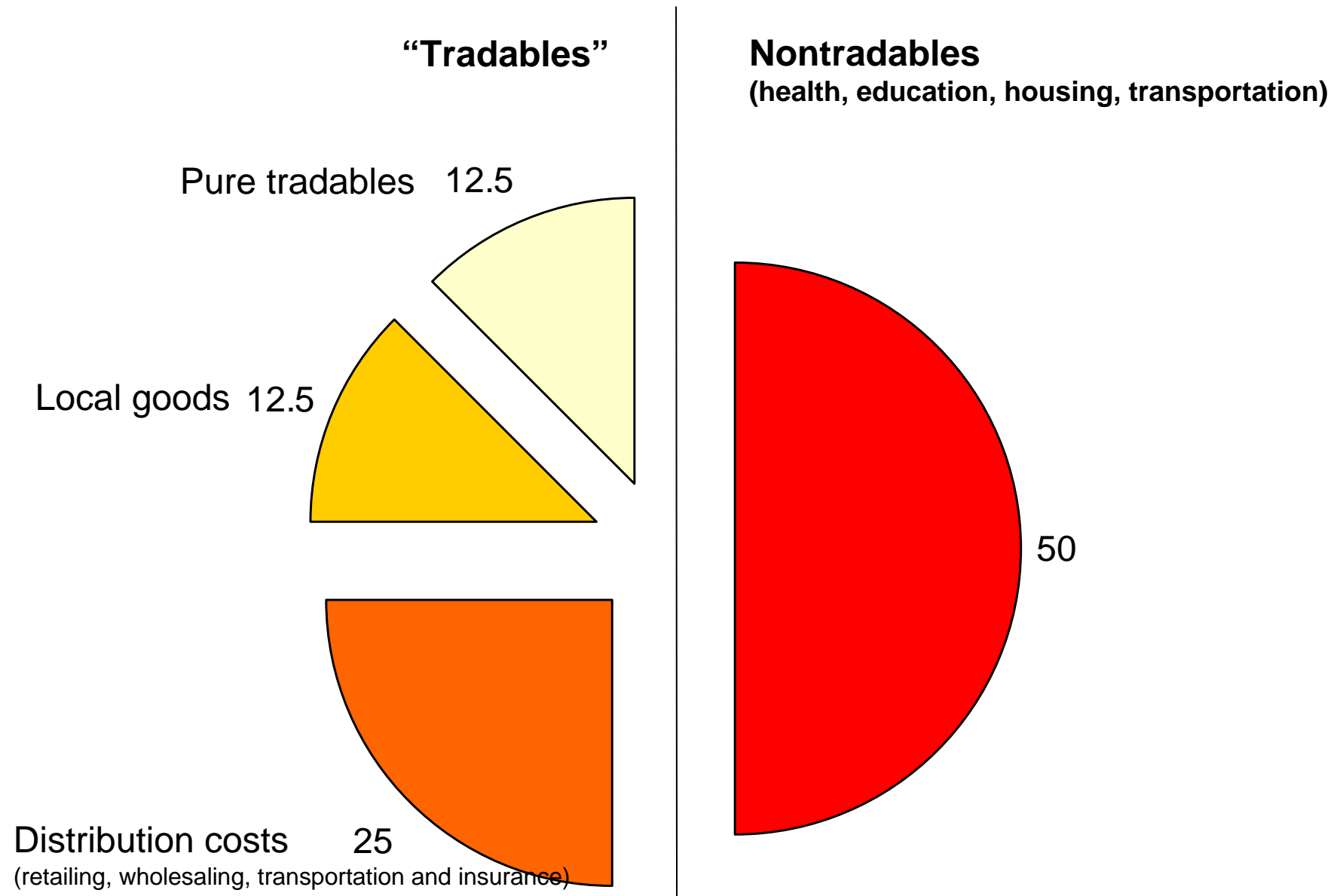
Distribution Margin by Expenditure Category¹
(tradable goods only)

Country	Year	Personal	Gross Private
		Consumption Expenditures	Fixed Investment
Canada	1990	41.2	15.1
France	1995	35.0	10.1
Germany	1995	41.5	10.3
Italy	1992	43.3	14.0
Japan	1995	50.1	22.2
UK	1998	45.4	11.1
US	1997	43.4	14.1 ¹

Source: Input-Output Tables for various countries.

¹ Burstein, Ariel, Joao Neves, and Sergio Rebelo, "Distribution Costs and Real Exchange Rate Dynamics During Exchange-Rate-Based Stabilizations," *Journal of Monetary Economics*, 50: 1189–1214, 2003.

Structure of Consumer Price Index



Prices and Exchange Rates in Argentina

Cumulative Logarithmic Change

December 2001 - December 2002

	Price change percent	Share in CPI percent
US\$ nominal exchange rate	123.5	
Trade-weighted nominal exchange rate	110.6	
Import prices (at the dock)	111.4	
Producer prices	78.0	
Consumer price index	34.3	100.0
Nontradables	13.0	47.0
Tradables	51.5	53.0
Disaggregated Tradables in CPI		
Imported	83.2	3.0
Exportables	62.6	8.5
Mixed origin	71.7	5.8
With imported inputs	49.6	10.0
With exportable inputs	44.8	9.6
Local goods	41.8	16.0
Disaggregated Nontradables in CPI		
Public services	4.7	
Private services	14.7	

Source: INDEC.

- The recent sharp appreciation of the Euro provides an opportunity to see how prices at different stages of the distribution cycle (at the dock versus at the retail sector) and different exposure to international trade behave.

Questions for Low Inflation Environments

- What is the relation between at-the-dock prices and retail prices?
- What is the relation between prices of imported goods and prices of local goods?
- What is the behavior of price changes after stock outs?