

DISCUSSION OF “UNDERSTANDING MOVEMENTS IN AGGREGATE AND PRODUCT-LEVEL REAL-EXCHANGE RATES”

BY ARIEL BURSTEIN AND NIR JAIMOVICH

Emi Nakamura

Columbia

December 15, 2008

Data:

- Quarterly average wholesale prices on food products for a large grocery retailer for 2004-2006
- Stores in multiple US states and Canadian provinces
- Underlying weekly data (can use to calculate frequency of price change)

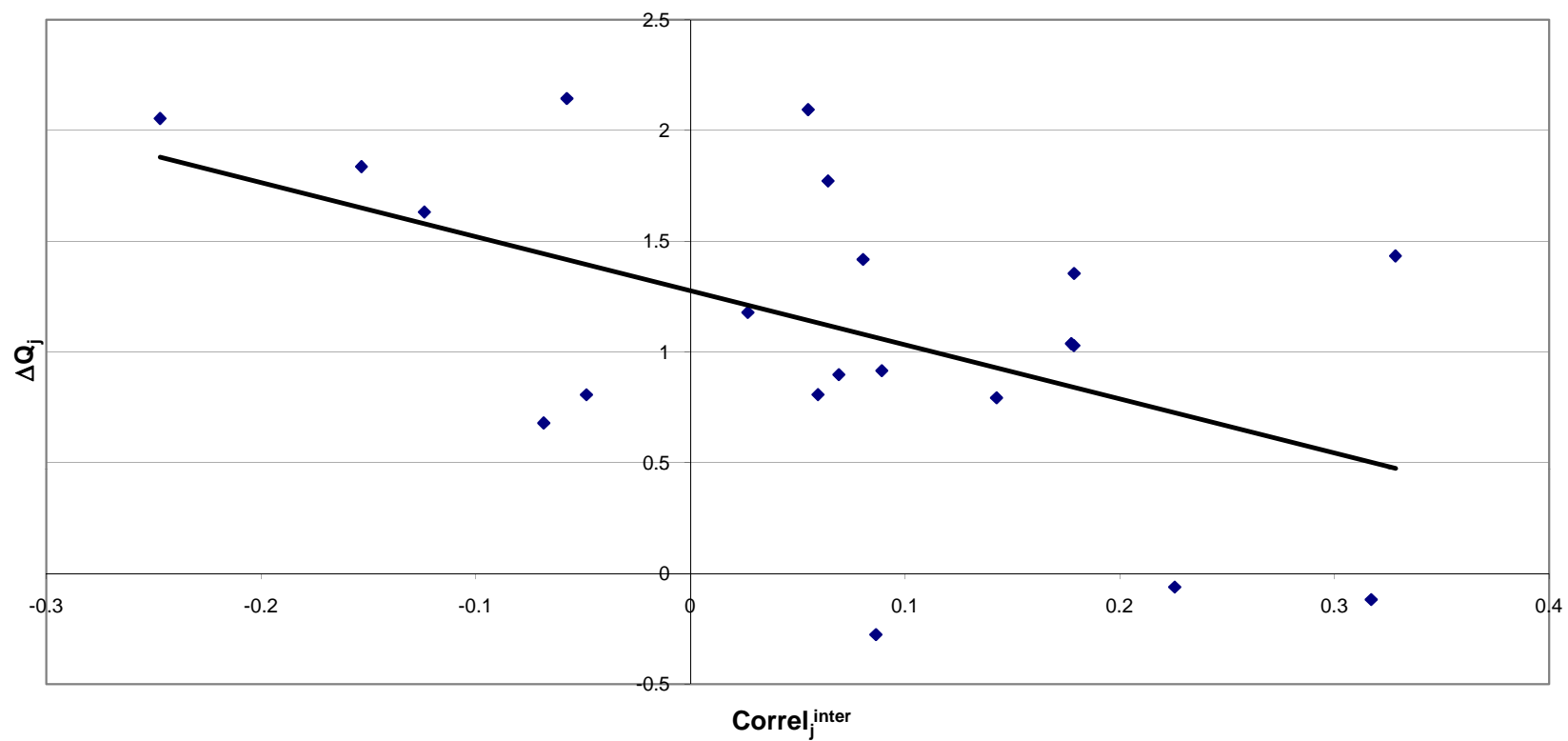
Goal: Isolate the effect of markup fluctuations on relative prices

- Match products across regions within US and between US and Canada
- Most matches not identical
- e.g. Schweppes Raspberry Ginger Ale 2 Lts, Schweppes Ginger Ail 24Oz
- Collect own data on country of origin (e.g. "Made in the USA")
- Assume matched products have same production cost if produced in the same country

Main Findings:

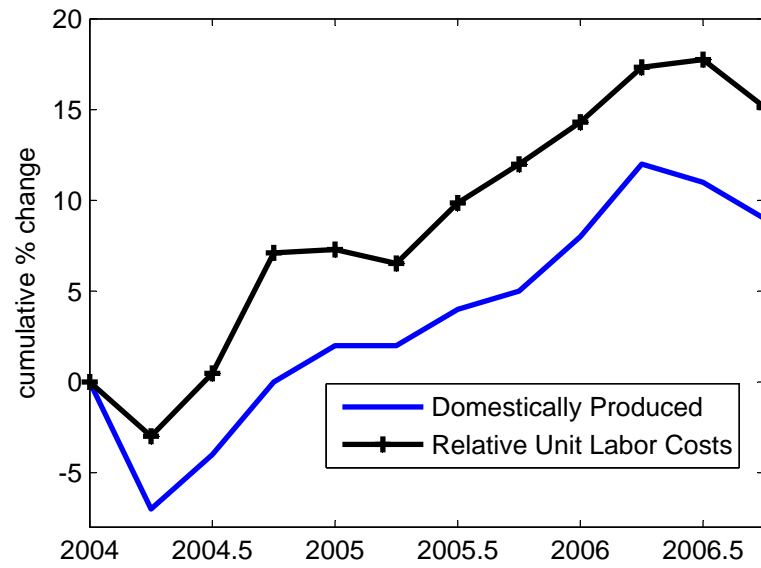
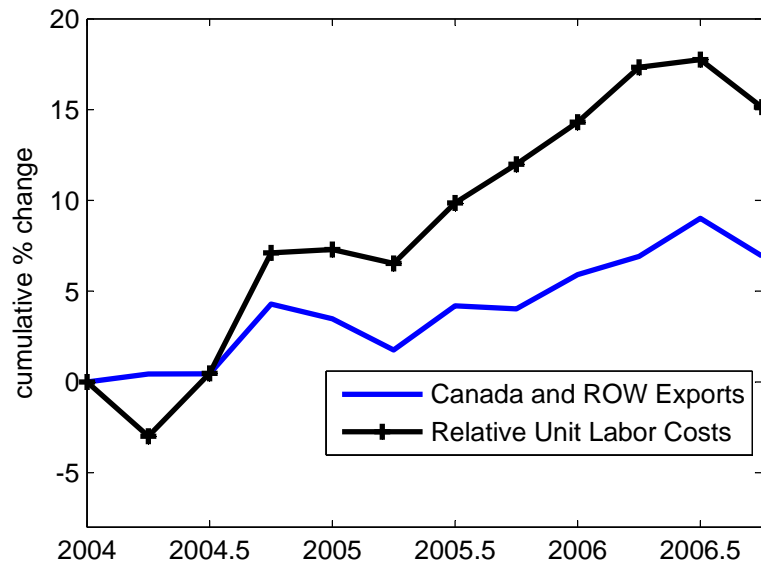
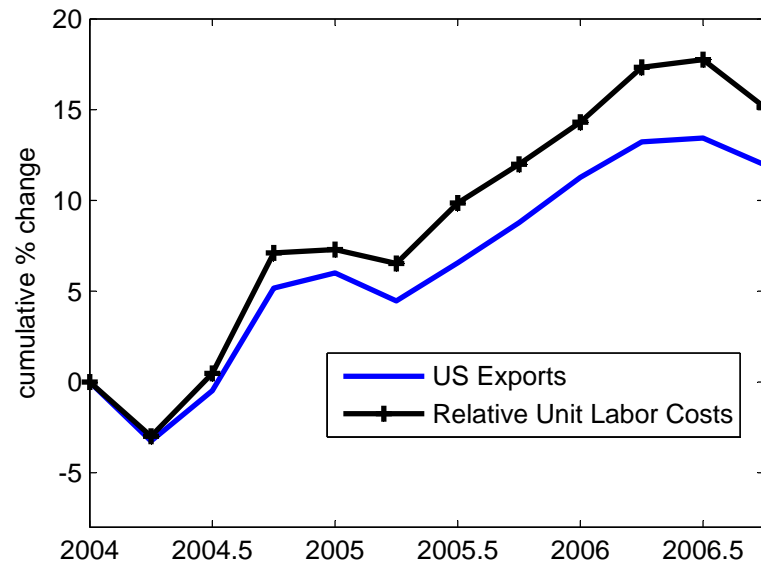
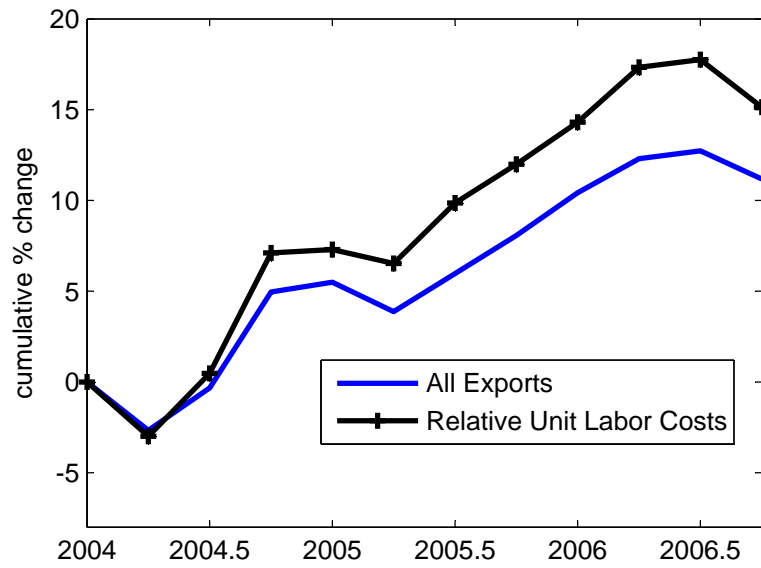
- 1 Aggregate RER tracks movements in relative Canada-US unit labor costs (and nominal ER)
- 2 Large amount of variability in product-level RER's
- 3 Product-level RER twice as variable for matches across countries as within countries
 - Product-level RER 3-4 times more variable than nominal ex. rate
 - True for both "exported" and domestically produced products
- 4 Tentative relationship between aggregate RER variability and price comovement across countries at category level
- 5 Inconclusive findings on RER for domestically produced vs. exported products (too few obs.)

Figure 4: Relation between Product and Aggregate Real Exchange Rates across Product Categories



	<i>Coeff.</i>	<i>Std. Err.</i>	<i>t Stat</i>
Intercept	1.277	0.148	8.625
X Variable	-2.441	0.938	-2.603

Figure 3: Canada-US Aggregate-Real Exchange Rates



Related Literature:

- Pricing to market: Knetter, Feenstra
- Variability in RER: Engel, Engel and Rogers, Mussa

What do we gain from micro data?

- Analyze RER behavior at product level rather than category level (e.g. Engel and Rogers used category-level analysis)
- Product-level RER much more volatile at product level than at higher levels of aggregation
- Micro data facilitates cross-sectional analysis across categories

Model:

- Partial equilibrium: Takes movements in relative wages as given
- Firms can price discriminate across regions and countries
- Nested demand structure
- CES preferences across varieties
- Within each variety, prices are determined by Bertrand competition for perfectly substitutable products
 - Yields one active firm and one latent producer in each category

Model:

- All else equal, as firms raise prices \rightarrow price elasticity rises
- Yields pricing to market *if* exporting firms face domestic competitors in their industry
 - Trade costs deliver this
- Paper emphasizes: Both trade costs and non-CES demand structure necessary to generate PTM

- 1 How to interpret product-level RER between countries vs. between regions?
- 2 Calibration: What is an industry?
- 3 Interpretation of country of origin statistics

TABLE 1—CATEGORIES OF GOODS IN DISAGGREGATED CONSUMER PRICE INDEXES AND CITIES USED

Good	United States	Canada
1	Food at home	Food purchased from stores
2	Food away from home	Food purchased—restaurants
3	Alcoholic beverages	Alcoholic beverages
4	Shelter	Shelter - 0.2135 (water, fuel, and electricity)
5	Fuel and other utilities	Water, fuel, and electricity
6	Household furnishings and operations	Housing excluding shelter
7	Men's and boy's apparel	0.8058 (Men's wear) + 0.1942 (boy's wear)
8	Women's and girl's apparel	0.8355 (Women's wear) + 0.1645 (girl's wear)
9	Footwear	Footwear
10	Private transportation	Private transportation
11	Public transportation	Public transportation
12	Medical care	Health care
13	Personal care	Personal care
14	Entertainment	0.8567 (Recreation) + 0.1433 (reading material)

Note: The cities included are: Baltimore, Boston, Chicago, Dallas, Detroit, Houston, Los Angeles, Miami, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis, and Washington DC; Calgary, Edmonton, Montreal, Ottawa, Quebec, Regina, Toronto, Vancouver, and Winnipeg.

TABLE 2—AVERAGE PRICE VOLATILITY

Good	City pairs		
	U.S.—U.S.	Canada—Canada	U.S.—Canada
1	0.0139	0.0198	0.0247
2	0.0130	0.0100	0.0214
3	0.0185	0.0149	0.0271
4	0.0217	0.0085	0.0250
5	0.0486	0.0279	0.0498
6	0.0203	0.0097	0.0236
7	0.0483	0.0167	0.0461
8	0.0880	0.0178	0.0813
9	0.0618	0.0192	0.0505
10	0.0111	0.0186	0.0260
11	0.0443	0.0240	0.0628
12	0.0133	0.0190	0.0259
13	0.0258	0.0143	0.0271
14	0.0203	0.0083	0.0232
1-14	0.0321	0.0163	0.0367
Distance (miles):	1,024 (66 pairs)	1,124 (36 pairs)	1,346 (126 pairs)

Notes: Entries give the mean value of price volatility across all intercity combinations within the United States, within Canada, and across the U.S.—Canadian border, respectively. The measure of volatility is the standard deviation of the relative price series. Prices are measured as two-month differences. The average distance between cities is given in the final row. The sample period is September 1978–December 1994.

Table 2: Movements in Product-Level Real-Exchange Rates

		North California and British Columbia					
		All	All Exporters	US Exporters	Can Exporters	ROW Exporters	Domestic
1	Std ^{intra,U.S.}	0.06	0.06	0.05	0.09	0.07	0.06
2	Std ^{intra,Can}	0.04	0.04	0.04	0.03	0.05	0.03
3	Std ^{inter}	0.12	0.11	0.11	0.15	0.14	0.13
5	Correl ^{intra,U.S.}	0.78	0.76	0.76	0.73	0.74	0.79
6	Correl ^{intra,Can}	0.88	0.85	0.85	0.95	0.84	0.89
7	Correl ^{inter}	0.07	0.08	0.08	0.07	0.10	0.07

1. VOLATILITY OF PRODUCT-LEVEL RER

- BJ: product-level RER between countries *much* more volatile than product-level RER across regions
- Difference can't be accounted for by variability in nominal exchange rate (contrast vs. Engel and Rogers)
- Interpretation: Country-specific cost shocks combined with pricing to market

1. VOLATILITY OF PRODUCT-LEVEL RER

Alternative interpretation:

- Recall that BJ analysis is based on many different stores for a single retail chain
- I analyzed a large cross-section of US supermarket retailers using barcode-level data (Nakamura, 2008)
 - 16% of the variation in prices common across all stores selling an identical product
 - 65% common to stores within a particular retail chain (but not across retail chains)
 - 17% is completely idiosyncratic to the store and product.
- Since BJ analyze only one store, intra country analysis picks up “retail chain” component (65% of variation)
- In Engel-Rogers analysis, these chain-level effects wash out since indexes are based on many products and stores

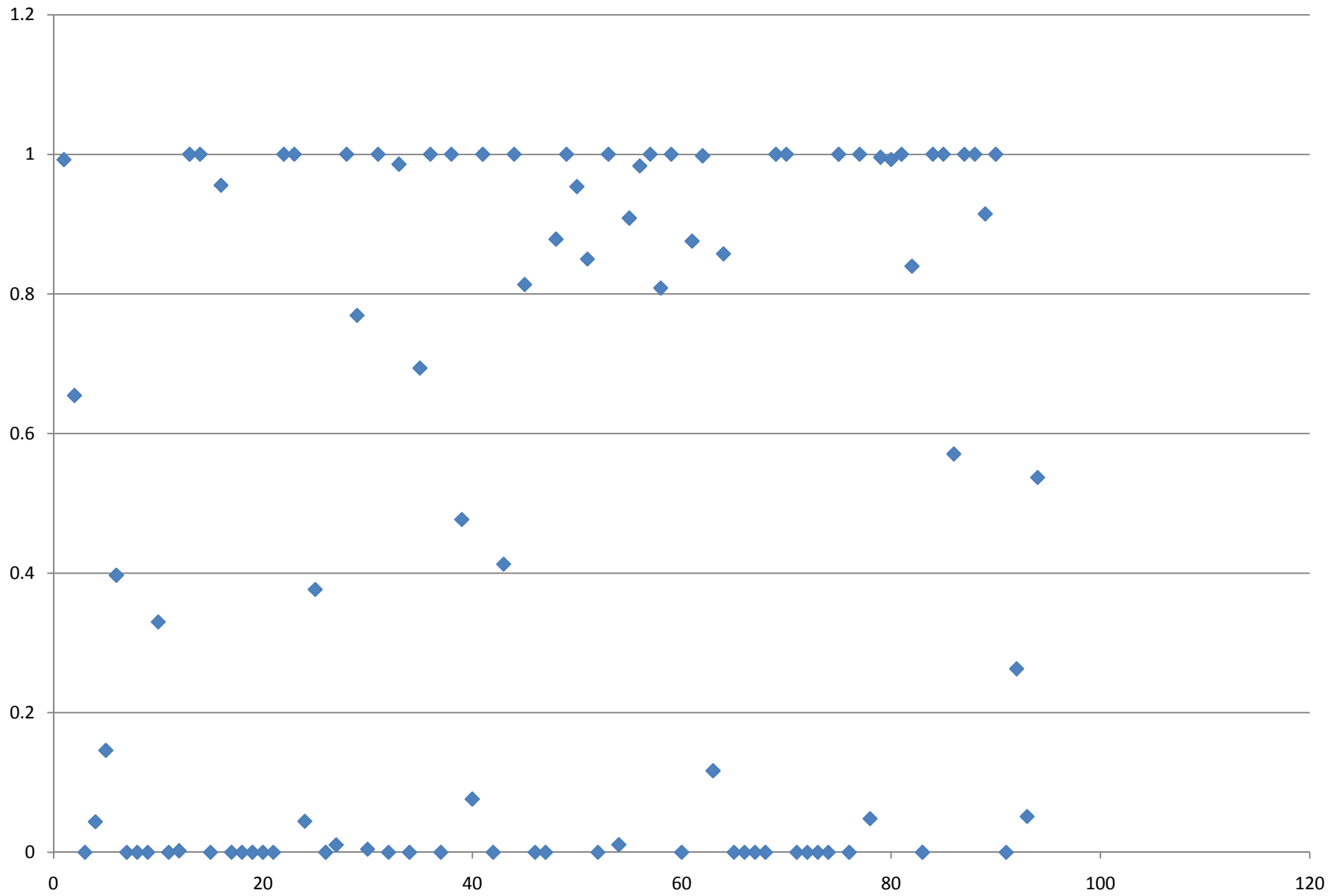
1. VOLATILITY OF PRODUCT-LEVEL RER

- Suppose in contrast that US and Canada branches of Retailer X act like separate retail chains
- Estimate based on only one chain would underestimate the true volatility of the RER across regions within a country
- Remaining difference between inter and intra country RER volatility might be explained by exchange rate (Engel-Rogers conclusion)
- I also argue that large price movements uncorrelated across stores and products more likely to arise from dynamic pricing strategies than static demand/supply shocks (recall they are close to 10% per quarter!)
- Could matter for welfare implications

2. CALIBRATION: WHAT IS AN INDUSTRY?

- Burstein and Jaimovich model: Pricing to market arises from the presence of a latent foreign competitor in an industry who is unaffected by foreign wage shock
- Could look for evidence of such competitors by studying average market shares of US exports by category

Market Share of US Exports in Categories



2. CALIBRATION: WHAT IS AN INDUSTRY?

- Scatter plots suggest that many categories have a market share of 1 or 0 for US exports
- Not necessarily supportive of presence of latent foreign competitor (definitely not true for orange juice!)
- Predictions of model depend crucially on this parameterization
- No latent competitor in industry \rightarrow No PTM
 - Note: Importance of industry definition for extent of PTM not fundamental to all models of PTM

2. CALIBRATION: WHAT IS AN INDUSTRY?

- Paper focuses on model as a tractable way of generating PTM
- Model also has predictions for how pricing to market differs across categories depending on the “strength” of competition
- Paper does not analyze model’s predictions for relationship between PTM and presence of latent competitor because of the difficulty of defining the “industry”
 - e.g. Should market for juice include only orange juice, all juice or should it include soft drinks as well
- But BJ do use category market shares as a target in model calibration
 - Unclear whether we are supposed to take model’s predictions for market shares by category seriously or not
- Alternative approach: Use direct estimates of the curvature of demand based on price and quantity data

3. INTERPRETATION OF COUNTRY OF ORIGIN STATISTICS

- BR collected country of origin statistics by looking at labels on product in US and Canada
- Objective: distinguish between true markup differences vs. differences in costs

Country of origin labeling:

- US: Products labeled as made in the U.S. must be “all or virtually all” made in the U.S.
- Canada: Country of origin reflects country of origin of *food contents*
- Canadian products must often be repackaged because of differences in labeling (French required), nutritional content requirements, sizes etc.
 - Probably one reason why the vast majority of BR matches are not “exact matches” (slight differences in size, name etc.)

3. INTERPRETATION OF COUNTRY OF ORIGIN STATISTICS

- Key assumption: Matched products have same production cost if produced in the same country
- Canadian repackaging process may drive a wedge between cost of product sold in U.S. and Canada even if it is labeled as “Made in U.S.A.”
- Such “local costs” could exacerbate observed variability in the aggregate RER beyond the effects of true PTM