



An Update on Research on Price Measurement Implications of Globalization

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Past Research on Price Measurement and Globalization

- Previous presentation to the committee on Laspeyres index bias in XPI and MPI, and on unmeasured gains to import buyers implied by net gains in share of new supplying countries calculated using Feensta's (1994) variety adjustment formula.
- Gains from variety growth missed because MPI uses matched models to handle changes in sample composition.
- Nakamura and Steinsson (2012) found artificial rigidity in the MPI because price changes coinciding with characteristics changes are linked out of the index ("product replacement bias").
- M. Mandel (2007 and 2009) and Houseman, Kurz, Lengermann, and B. Mandel (2011) discussed mismeasurement of price changes when sourcing of intermediate inputs moves offshore.

Conferences on Globalization and Measurement

- Upjohn Institute conference on Measurement Implications of Globalization held in February 28-March 1 of 2013.
- Preceded by Upjohn Institute globalization conference of 2009.
- Today I'll talk about results on price measurement in papers from those conferences, focusing mostly on the 2013 papers.

Bias in manufacturing VA caused by bias in deflators for intermediate inputs

- Houseman, Bartik and Sturgeon (2013) discussed upward bias in manufacturing productivity, especially computers.
- Neither the PPI nor the MPI can pick up the price change that occurs when production moves offshore to a country where costs are lower (Houseman, Kurz, Lengermann, and Mandel, 2011).
- Informed assumptions about offshoring discount in HKLM imply bias in growth of real VA of manufacturing of 0.2-0.5 percent/year.
- For computer industry, bias estimate is 0.5 to 1.4 pct./year.

Country Substitution Bias

- At 2009 conference Reinsdorf & Yuskavage discussed bias in MPI due to shifting between source countries for imports along with outsourcing bias.
- We compared price indexes for supply of final consumption goods that are imported calculated as weighted average of MPI and PPI with matched CPIs.
- For nondurables, growth rate gaps averaged around 0.
- For durable goods and apparel, higher growth rate of MPI made supply index grow faster than the matched CPIs.
- If take CPI as correct, suggests our supply price indexes have upward bias from offshoring and country substitution.

Average Growth Rate Gaps between Indexes for Supply (MPI+PPI) and CPIs

Average growth rate gaps of supply indexes relative to matched CPIs, 1997-2007

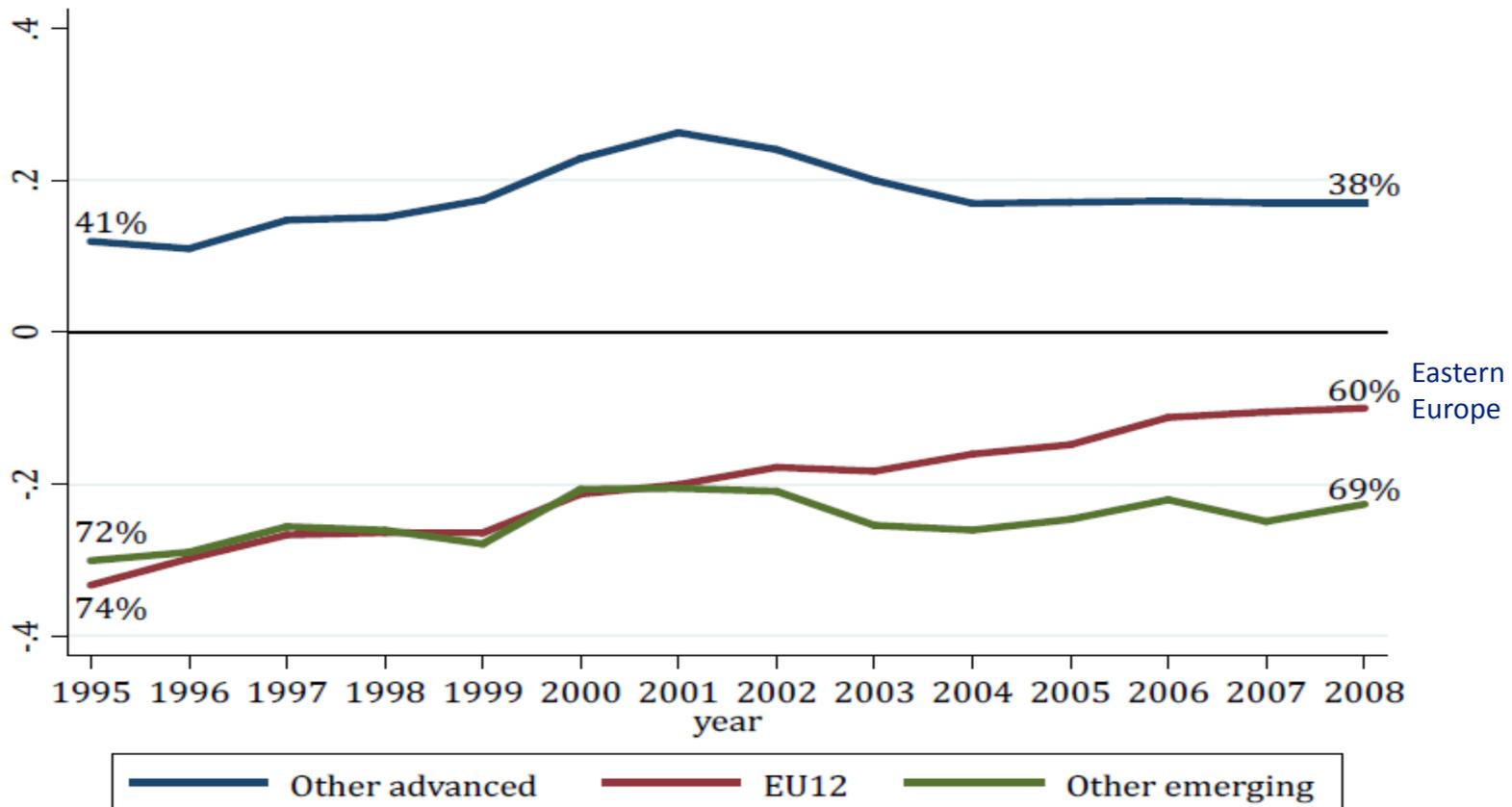
	Durable Goods	Apparel and Textiles
Observed growth rate gap	2.0	1.5
Total of effects other than country substitution bias in the MPI	0.7	0.6
Declining tariffs	0.1	0.1
Geometric mean formula for elementary aggregates of the CPI	0.4	0.3
Differences in quality adjustment and sample updating for computers	0.2	NA
Use hedonic indexes in CPI for apparel	NA	0.2
Growth rate gap attributable to offshoring and country substitution	1.3	0.9

Source: Reinsdorf & Yuskavage (revised from 2009)

Price Level Relative to Western Europe of Imports by Region, from Inklaar (2013)

Inklaar (2013) looked at country substitution bias on a worldwide basis by comparing unit values for imports from different countries.

Figure 2, Median price difference relative to EU15 imports and percentage of products that have lower prices than EU15 imports, by country grouping, 1995-2008 (EU15=western Europe)



Inklaar's Upper Bound Estimates of Bias

Table 2, Offshoring bias across product groups and country groups, 1995-2008 (measured as agr of matched model MPI – agr of unit value MPI)

<i>Type of product</i>	<i>Differentiated</i>		<i>Reference-priced</i>		<i>Exchange-traded</i>	
	<i>Conservative</i>	<i>Liberal</i>	<i>Conservative</i>	<i>Liberal</i>	<i>Conservative</i>	<i>Liberal</i>
Overall	0.33	0.29	-0.01	0.03	-0.06	-0.06
EU15	0.51	0.44	0.02	0.08	-0.04	-0.04
Other advanced	0.53	0.51	0.07	0.09	0.02	0.03
EU12	0.26	0.15	-0.06	0.05	-0.06	-0.06
Other emerging	-0.08	0.04	-0.04	-0.15	-0.18	-0.18

Note: The table shows the weighted average difference between the price change for a 'different products' and 'perfect substitutes' price index over the period 1995 to 2008. The 'different products' price index is defined in equation (2) and the 'perfect substitutes' index is defined in equation (3). The price changes for each product are multiplied by the two-period average share of that product in country imports and summed across product groups. The product groups are

Developing a Buyer's Price Index at BLS

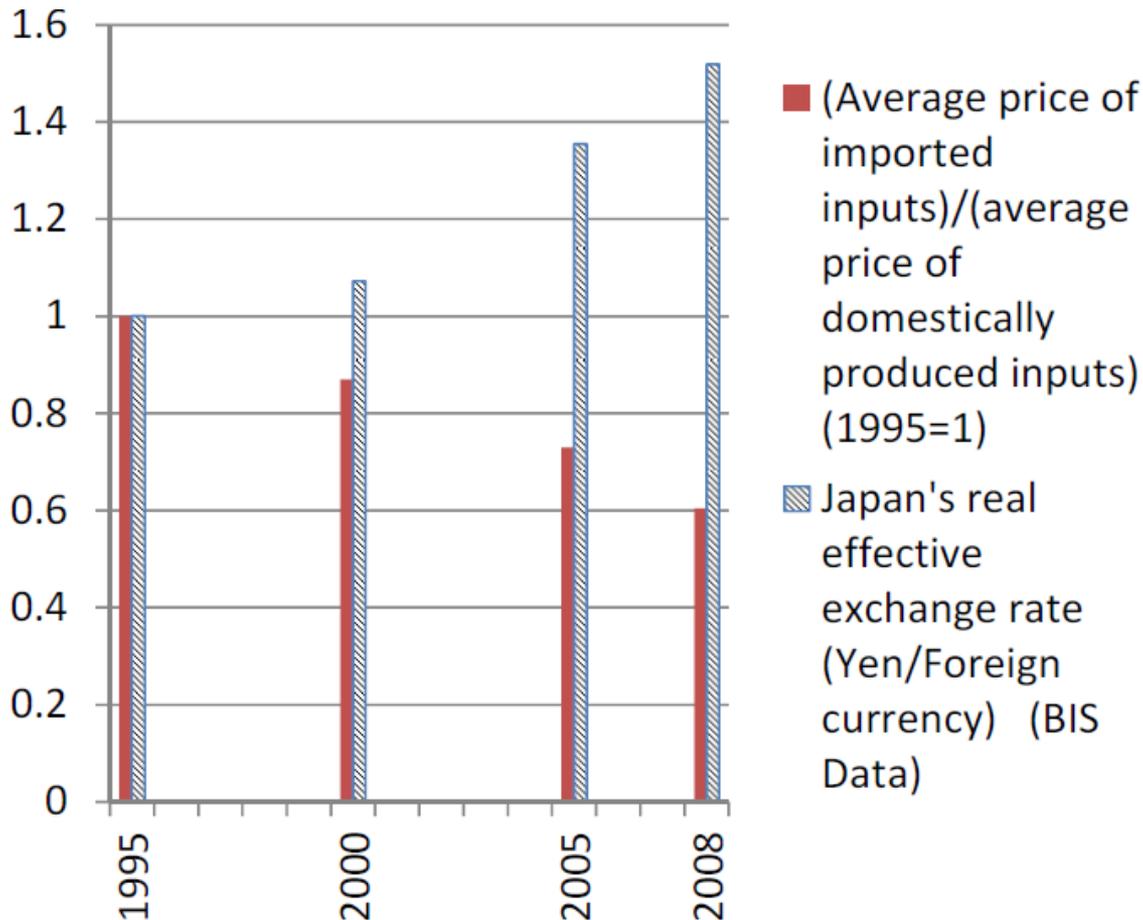
- To solve offshoring bias problem, Alterman (2009) proposed a buyer's price index for intermediate inputs that would be able to follow an item's price when its production moves offshore.
- Alterman (2013) reports on BLS research on index's feasibility.
- BLS surveyed attendees at convention of the Institute for Supply Management (who are the buyers).
- They could provide the needed data and would like BLS to produce the buyer price indexes for detailed products.
- Sample would cover inputs used in manufacturing.
- Indexes would be published for 6 digit NAICS codes with purchases over \$3 billion.

Papers on Unit Value Indexes and on Models of Price Dispersion

- Diewert & Nakamura (2013) discussed innovative ways to collect price data and the use of unit values that combine prices of highly detailed products from different suppliers.
- For semiconductor wafers, China's price 17% below that Taiwan for same products (Byrne, Kovak, Michaels, so Kovak and Michaels (2013) develop a model of price dispersion.
- In model, leader initially gouges its locked-in customer base.
- Original customers start to exit, new customers buy from follower; leader cuts price to compete: Dispersion dissipates.
- Bridgman (2013) develops another model of price dispersion in which specific trade costs keep quality-adjusted prices from equalizing and intermittently-traded products (omitted from matched models index) have more volatile prices.

Destination and Price of Imports in Japan

Fukao & Arai (2013) analyze data on use and price of imports in Japan.
 Relative price of imports fell even though yen was falling.



Import Comparability Assumption

- Japan has data on industries' uses of imported commodities.
- Use of imports by industries not uniform; “import comparability” assumption not a good description of reality.
- For example, electrical machinery industry uses imported integrated circuits and semiconductors, but the auto and precision machinery industries source these inputs locally.
- Estimates based on the import comparability assumption understate real growth in intermediate inputs for industries that source offshore, but overstate real growth in intermediate inputs for industries that source locally.

A Paper that finds that Effects are Small

- Howells, Russell, Samuels & Strassner (2013) try an alternative way of assigning imports to intermediate or final uses.
- Also estimate a *country substitution bias adjustment* for price indexes as difference between an import price index that treats a 6-digit HS codes from different countries as different goods and an import index where unit values are used to pool the countries supplying a 6-digit HS code.
- Find no effect on real VA growth of IT producing industries, or any industry in the pre-2006 period.
- In 2006-11 these adjustments lower the contribution to real VA growth of IT-using and non-IT industries by 0.09 percent/year.

Hedonic Price Indexes for Imports

- Indirect evidence suggests upward bias could be present in some kinds of import price indexes, such as high tech goods, durable and investment goods, and apparel.
- Hedonic models not estimated using data sets on imports because characteristics data has been thought to be sparse.
- Kim and Reinsdorf (2013) used internet searches on make and model number to fill in missing characteristics information for televisions in 2000-2010 and cameras in 2000-2006.
- For televisions, China's share grew from negligible to over 40 percent; for cameras China grew from 15 to over 40 percent.
- TV screens got bigger and changed from CRT to flat.

Effects of new technology and new supplying countries prices

- We construct matched models indexes to simulate official MPI.
- Hedonic model specification with quadratic in screen size implies growth rate for hedonic indexes for TVs 1.5 to 2.5 percentage points *lower* than the matched model index.
- Adding country dummies to model to quality-adjust out country effects raises hedonic index's growth rate by 1.3 percent per year.
- But multiplying coefficients on the country dummies by change in country mix implies an effect of just 0.4 percent per year.
- Difference between approaches to estimating country effects may be because low-cost countries specialize in lower quality designs.
- For cameras, split between new technology and new source countries sensitive to specification but overall growth rate gap is 6 percent per year.

Conclusion

- Movement of production to low-cost offshore locations from the US or from higher cost source countries seems to have resulted in unmeasured price declines, which would lead to low estimates of growth of imports and intermediate inputs.
- Buyer's price index may allow us to measure these effects.
- Entry of new varieties due to evolving technology can also cause changes in quality-adjusted prices of imports and exports.
- Behavior of trade price data (see Nakamura and Steinsson, 2012) and greater use of matched models may make the IPP indexes less likely to measure these changes than the CPI or the PPI.

Questions for the Committee

- What is best research strategy for tackling these problems?
- Should BEA try to develop a set of bias adjustments or alternative price indexes for imports?
- Would symmetric adjustments or alternative indexes have to be developed for exports at same time as for imports?