

Measurement Issues Arising from the Growth of Globalization

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New Research in this Report

- **Study motivation: 2007 Business Week article by Michael Mandel alleges that “offshoring” or growth in imports from low-wage countries resulting in**
 - Systematic biases in import prices → Systematic biases in output and productivity statistics
 - Understatement of true effects of trade on U.S. economy and workers
- **Funding from Bureau of Economic Analysis and Sloan Foundation supported new studies by academics and researchers in BLS, BEA and Census that examined**
 - What is the precise nature of the price measurement problem highlighted in the Mandel article?
 - Is there concrete evidence of biases to key economic statistics?
 - What are solutions?
- **Selected other issues also examined:**
 - Data gaps in tracking use of imports in economy
 - Data gaps in measuring services offshoring & labor market impacts from offshoring

Importance of Import (and Export) Prices in Computing Key Domestic Statistics

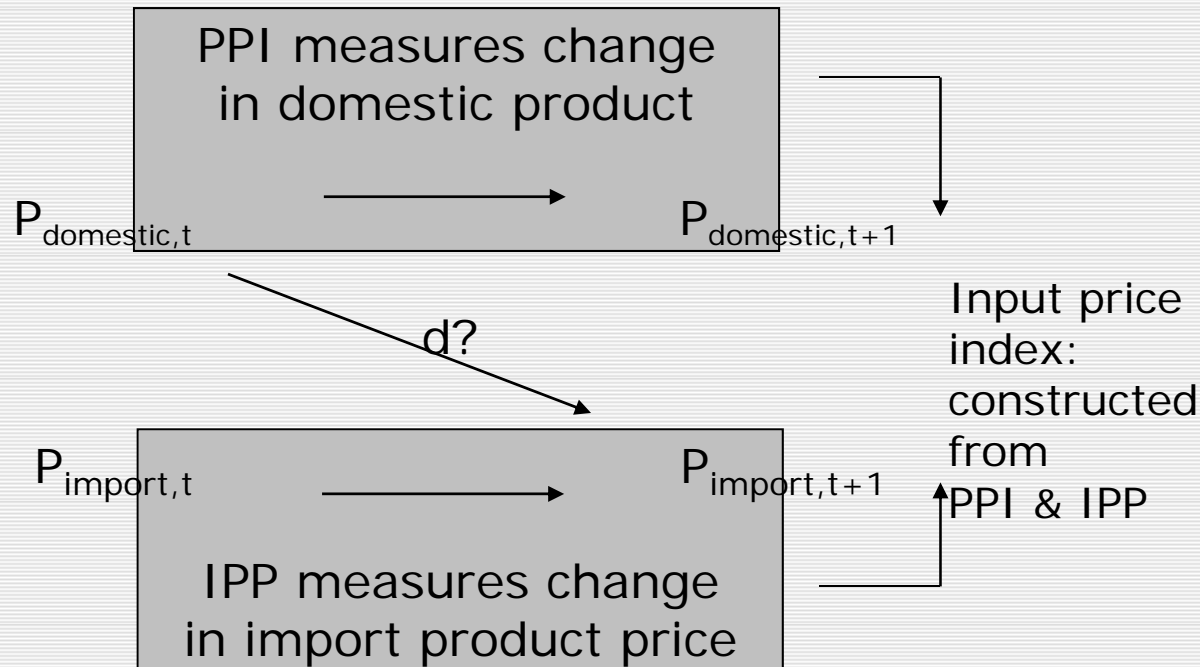
- **Used in computing real GDP growth**
 - GDP growth – computed from expenditure side
$$\text{GDP} = C + I + G + (X - M)$$
 - All domestic expenditures, imports and exports must be deflated
 - Magnitude of import and export values reached 25-30% GDP in recent years
- **Used in computing real value added growth in industry statistics**
 - Deflated inputs—*including imported intermediates*—must be netted out from deflated shipments
 - BEA constructs input price deflators from import price indexes and the PPI
- **If growth of real imports understated (because of biased import price indexes)**
 - GDP and industry value added growth rates overstated
 - Industry and aggregate productivity growth measures overstated

Nature of the Problem: Bias in Import Price Indexes

- **Rapid shift in sourcing of consumer products and intermediate inputs used by businesses, especially in last decade.**
- **Hypothetically, price declines from low-cost foreign supplier could be captured in import & input price indexes if:**
 - Foreign supplier enters U.S. market with price comparable to domestic suppliers—expansion of foreign market share reflects price drops *after* entry
 - Foreign supplier picked up in import price sample soon after entry
- **More likely, price declines missed:**
 - Foreign supplier enters with lower price—even if integrated immediately into import price sample, price change missing
 - Quality-adjusted price of foreign supplier temporarily lower—period of disequilibrium during which it gains market share as it becomes known, its reliability established, & purchasers' contracts with domestic supplier expire
 - Problem analogous to “outlet substitution bias” in CPI ((Reinsdorf 1993, Diewert 1998, Hausman 2003)

(Alterman; Diewert & Nakamura; Houseman, Kurz, Lengermann & Mandel; Reinsdorf & Yuskavage)

Input Price Index Construction



- BLS constructs price indexes for imports through IPP program and domestically produced goods through the PPI
- BEA aggregates IPP and PPI via Fischer index-number formula to form intermediate input price indexes

Characterizing the Bias to the Input Price Index

- Bias to input price index at elemental level (Diewert and Nakamura, 2010)

$$B = (1 + i)sd$$

Where i is the rate of price increase, s is share captured by new, low-cost supplier, and d is percent discount of the low-cost supplier (foreign) relative to the high-cost (domestic) supplier

- Characterization of bias to input price from offshoring or other types of shifts in sourcing identical to that of bias to CPI from outlet substitution (Diewert 1998)

Indirect Evidence of Biases: Conditions for Biases Exist

- **Growth import penetration (s in Diewert-Nakamura formula)**
 - Imports amounted to 17.6% of GDP in 2008, up 5 percentage points from a decade previously
 - Import share of materials intermediates in manufacturing increased from 17% to 25%, 1997 to 2007
 - Import share of all intermediates for all private sector industries increased from 8% to 10%, 1998 to 2006
- **Growth of imported intermediates reflected in large contributions of imports to gross output growth, labor productivity growth in manufacturing**

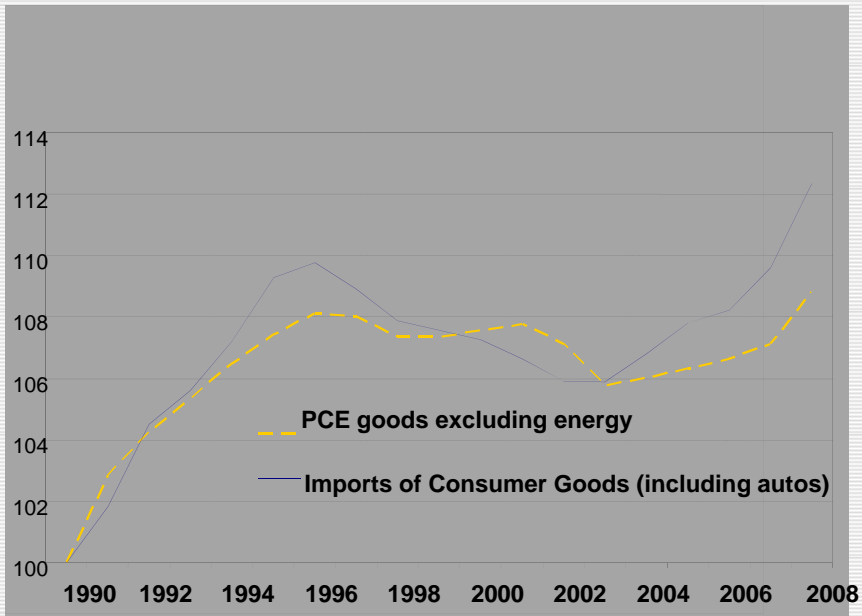
(Eldridge & Harper; Houseman, Kurz, Lengermann & Mandel; Strassner, Yuskavage & Lee)

Indirect Evidence of Biases: Conditions for Biases Exist

- Growth of imports for final consumption and intermediates dominated by growth from China and other emerging (low-wage) economies
- Evidence of large “discounts” (d in Diewert-Nakamura formula) associated with sourcing from emerging economies
 - Klier & Rubenstein on offshoring auto parts to Mexico (19%)
 - Byrne, Kovak & Michaels on semiconductors (avg. discount 40% in China v. US)
 - Variety of evidence from other case studies and from direct comparisons of advanced v. developing country prices using import data
 - Evidence of large discounts consistent with evidence of over-valuation of dollar vis-à-vis Chinese and other Asian currencies

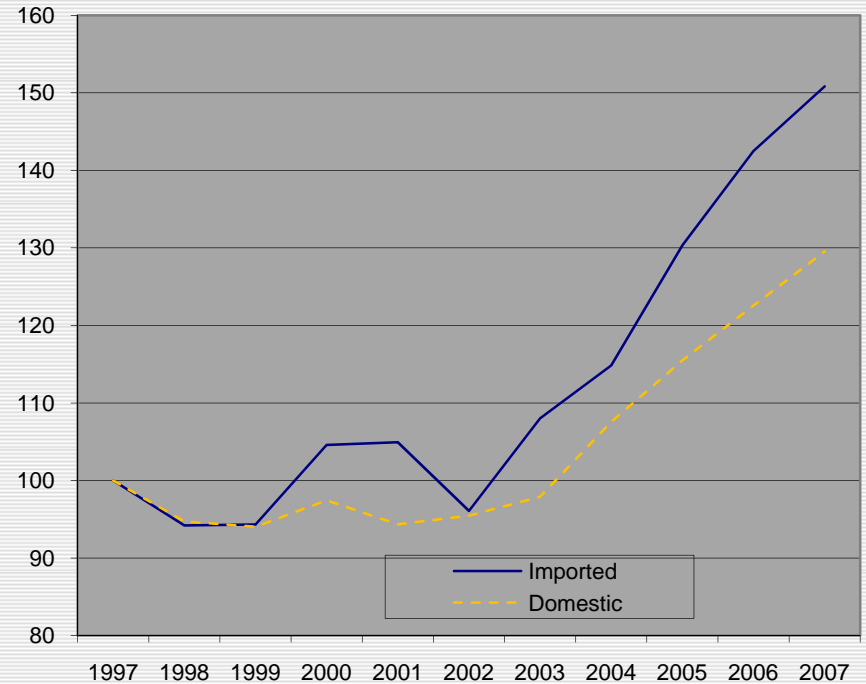
Evidence of Biases: Unexpected Patterns in Price Indexes

Price indexes for Consumer Good Imports & for Personal Consumption Expenditure Goods, ex Energy



Source: Reinsdorf and Yuskavage, 2010

Material Intermediates Price Deflators for Manufacturing



Source: Houseman, Kurz, Lengermann and Mandel, 2010

- If growth import share driven by lower foreign prices and if lower prices captured in indexes, then import price indexes should be rising more slowly than domestic price indexes.
- But import price indexes rising faster than domestic in 2000s—coincident with rise of imports from China.

Simulations of Biases for Industry

- **Simulations suggest possibly significant biases to output and productivity measures in manufacturing and other goods producing industries from growth of imported materials intermediates**
 - Annual average growth real value-added in manufacturing may have been overstated by 0.2 to 0.5 percentage points, 1997-2007
 - Represents 7-18% of growth; excluding computers, represents 20-50% of growth.
- (Houseman, Kurz, Lengermann, & Mandel, 2010)
- **Biases to economic statistics in other sectors and to aggregate economy not estimated.**

Solution: Input Price Index

- **BLS proposing construction of an input price index**
 - Purchasers would be surveyed on input costs: purchasers should be able to accurately report price changes, even when they switch suppliers (Alterman 2010)
- **Benefits of an Input Price Index**
 - Proposed index would directly address biases in industry statistics arising from ALL shifts in sourcing: domestic to domestic, domestic to foreign, foreign to domestic, foreign to foreign
 - Current input price index constructed using output (PPI) prices: only accurate if mix of outputs same as mix of inputs—unlikely
 - Circumvents import comparability assumption by directly measuring purchasers' input prices

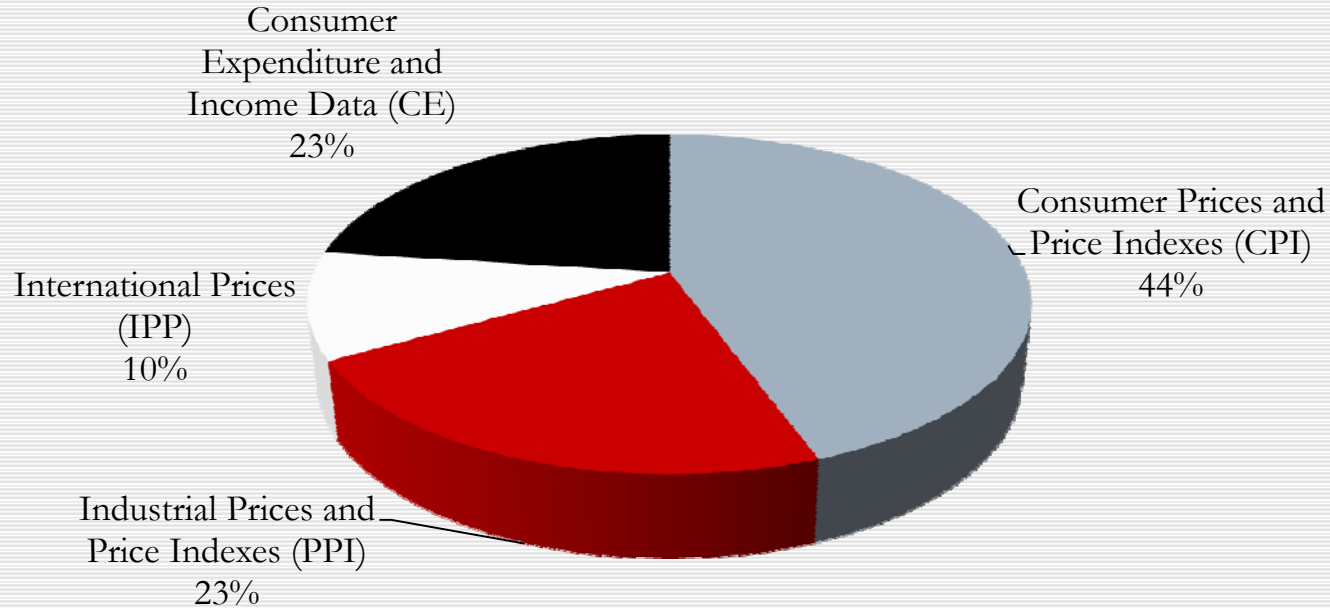
Concerns about Input Price Index

- **Feasibility & cost of launching new index in current budget environment**
 - Pilot needed to determine feasibility: \$1.6 million/year for 2-3 years
 - Any full implementation of input price index several years away
- **Shift in sourcing of input may coincide with some change in characteristics of input itself**
 - Capturing price drops may prove difficult
 - But, solution is still to collect information from purchaser to adjust price differences for possible differences in input quality
- **Would not directly address biases in GDP**
 - Research needed on whether and how information from input price index & correction to industry statistics could be used to adjust GDP

Other International Prices Issues

- **No data on import or export prices for business services collected currently**
 - Most rapidly expanding category of trade—includes IT services, engineering services, call center services
 - Serious data gap—could cause significant inaccuracies in economic statistics as business services trade expands
- **Adequacy of adjustment of import and export prices for changes in quality, particularly in area of ICT goods and services**
 - Global integration of production of ICT goods & rapid growth ICT services trade make this a high priority
 - Inconsistent quality adjustment of domestic, import and export prices can result in significant biases
- **2010 AEA *Report on the State of Available Data for the Study of International Trade and Foreign Direct Investment* also emphasizes potential biases and data gaps in international prices and need for increased funding of international prices programs.**

BLS Office of Price and Living Conditions Budget



- **International Prices Program within OPLC**
 - Relatively small program—\$19 m budget—no increase since 2003
- **Challenge: balancing need for improved international prices data against other needs in a tight budget environment**

Tracking Import Use in Economy: Conference Research Findings

- Conference research finds substantial differences in use of imported inputs among specific industries between direct measures and imputed estimates using “import comparability assumption”
 - Strassner, Yuskavage, and Lee used MNC data to develop alternative measures of imported intermediate materials and found:
 - ▣ For manufacturing, MNC data indicated imported materials consistently higher than estimates using import comparability assumption
 - ▣ Notable differences in estimated import shares of intermediate commodities among specific manufacturing industries

Tracking Import Use in Economy: Conference Research Findings, cont.

- Feensta and Jensen compared original Feenstra & Hanson measure of offshoring using import comparability assumption to “firm level I-O” estimates developed from linked firm-level production and import data from the Linked/Longitudinal Firm Trade Transaction Database [LFTTD]
 - ▣ For those industry groups and specific intermediate commodities with high import values, the alternative method produced different import share estimates
 - ▣ Could not determine how much of these differences due to conceptual issues with the two methodologies
- Winkler and Milberg used direct measures of imported inputs from German data to compare estimates of services and materials offshoring to those using import comparability assumption.
 - ▣ Direct measure of services and materials off-shoring differs significantly from proxy measure using import comparability assumption

Other Measurement Issue:

Services Offshoring and Impacts on Workers

- To address services offshoring policy concerns, micro-level (firm) data needed
 - Analyses based on industry level input-output data may be inaccurate because of import comparability assumptions
 - Offshoring decisions are firm specific and NAPA study identified substantial variations in services offshoring among firms within selected industries
- Data on services sector activities limited
- Kletzer notes services offshoring introduces a different employment issue -- occupational shifts, not just total employment changes
 - BLS lacks longitudinal data on occupations needed to analyze occupational shifts over time
- Solution: Collect longitudinal data on employment by occupation
 - Abraham and Spletzer estimate additional resources for developing these data could range from \$3.5-\$7.7 million
 - Longitudinal occupational data have uses beyond assessing impact of services offshoring

A first step: Address Data Limitations with more Efficient Use of Existing Micro-level Data

- Fiscal restraints mandate effective use of existing available data among all federal statistical agencies
- Micro-level data critical for assessing a number of economic issues, particularly outsourcing activities and services offshoring
- Improved data sharing and access to micro-level data requires amending Confidential Information Protection and Statistical Efficiency Act CIPSEA

Summary of Report Recommendations

- Pilot test input price index proposed by BLS
- Improve measurement of product quality changes in import and export price indexes—especially for high-tech goods & services
- Collect more detailed data on domestic and traded services and collect prices for business services imports and exports
- Collect longitudinal data on employment by occupation through a modification of the Occupation Employment Statistics (OES) program survey
- Improve data-sharing, especial of microlevel data, among statistical agencies and with outside researchers—modify CIPSEA to facilitate data sharing among statistical agencies