Evaluating Estimates of Materials Offshoring from U.S. Manufacturing

Robert C. Feenstra
University of California, Davis and NBER

J. Bradford Jensen
Georgetown University and NBER
Overview

• “Import Comparability” Assumption
  
  – When materials offshoring is measured by estimating imported intermediate inputs, it is assumed that an industry’s imports of each input, relative to its total demand, is the same as the economy-wide imports relative to total demand

• Examine two alternative approaches:
  
  – Feenstra and Hanson for Intermediates
  
  – Firm-level microdata
The offshoring measure described in Feenstra and Hanson (1996, 1999) is defined for any industry $k$ purchasing inputs $j$ as:

$$\sum_j (\text{industry } k \text{ purchases of good } j) \left( \frac{\text{imports of good } j}{\text{total domestic consumption of } j} \right)$$

$$= \frac{\sum_j (\text{industry } k \text{ purchases of good } j)}{\sum_j (\text{industry } k \text{ purchases of good } j)}$$

More precisely, for each of the industry classifications (SIC or NAICS), there will be multiple 10-digit Harmonized System (HS) imported products.

$$\sum_j (\text{industry } k \text{ purchases of good } j) \left( \frac{\text{sum over imports } i \in I_j}{\text{total domestic consumption } i \in I_j} \right)$$

$$= \frac{\sum_j (\text{industry } k \text{ purchases of good } j)}{\sum_j (\text{industry } k \text{ purchases of good } j)}$$
Feenstra and Hanson for Intermediates

• We restrict attention to HS goods with corresponding end-use codes that are indeed *intermediate inputs*, as defined by their corresponding end-use classifications:

\[ \bar{I}_j \equiv \{ \text{HS goods i within the industry j that are also intermediate inputs} \} \]

\[
\sum_j (\text{industry k purchases of good j}) \left( \frac{\text{sum over imports i } \in \bar{I}_j}{\text{total domestic consumption i } \in \bar{I}_j} \right)
\]

\[
\sum_j (\text{industry k purchases of good j})
\]
### Feenstra and Hanson for Intermediates

<table>
<thead>
<tr>
<th>Year</th>
<th>Narrow Measure</th>
<th>Broad Measure</th>
<th>Broad minus Narrow Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>0.047</td>
<td>0.071</td>
<td>0.024</td>
</tr>
<tr>
<td>1990</td>
<td>0.067</td>
<td>0.123</td>
<td>0.055</td>
</tr>
<tr>
<td>2000</td>
<td>0.103</td>
<td>0.228</td>
<td>0.124</td>
</tr>
<tr>
<td>2006</td>
<td>0.129</td>
<td>0.282</td>
<td>0.152</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>With Investment Goods Included</th>
<th>Without Investment Goods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Narrow Measure</td>
<td>Broad Measure</td>
</tr>
<tr>
<td>1980</td>
<td>0.032</td>
<td>0.066</td>
</tr>
<tr>
<td>1990</td>
<td>0.054</td>
<td>0.121</td>
</tr>
<tr>
<td>2000</td>
<td>0.091</td>
<td>0.197</td>
</tr>
<tr>
<td>2006</td>
<td>0.119</td>
<td>0.270</td>
</tr>
</tbody>
</table>
Microdata Approach

LFTTD – FirmID, HS10  
CMF – FirmID, NAICS

Construct firm level input-output table then aggregate to manufacturing sector

IO commodities 3xx

IO com. 1xx

IO com. 3xx

CMF Mat Trl -- Commodity
Microdata Approach

LFTTD – FirmID, HS10

Construct firm level input-output table then aggregate to manufacturing sector

CMF – FirmID, NAICS

CMF Mat Trl -- Commodity

85% value

IO commodities 3xx

75% value

IO com. 1xx

IO com. 3xx
Microdata Approach

Construct firm level input-output table then aggregate to manufacturing sector

Single-unit firms and single industry multi-unit firms – all imported inputs allocated to single industry
Microdata Approach

Construct firm level input-output table then aggregate to manufacturing sector

IO commodities 3xx

Multi-industry multi-unit firms which reported imports for which no material trailer record was found – imports allocated across industries based on industry’s share of firm’s shipments
Microdata Approach

LFTTD – FirmID, HS10

IO commodities 3xx

CMF – FirmID, NAICS

Multi-unit firms which reported imports for which material trailer record was found – imports allocated to industries that reported using the imported input (about 50% of value allocated this way)
Microdata Approach

LFTTD – FirmID, HS10

CMF – FirmID, NAICS

Exclude non-manufacturing estabs

Exclude HS codes classified as “final goods”

Construct firm level input-output table then aggregate to manufacturing sector

IO com. 1xx

IO com. 3xx

Wholesale/Retail/Final

CMF Mat Trl – Commodity
Unweighted distribution of share differences
Value-weighted distribution of share differences
Table 4

IO Commodity IO Industry Cells with Largest Share Differences

<table>
<thead>
<tr>
<th>3-digit IO Commodity Group</th>
<th>3-digit IO Industry Group</th>
<th>Alt. Share</th>
<th>BEA Share</th>
<th>Share Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>337 Furniture and Related Products</td>
<td>337 Furniture and Related Products</td>
<td>0.50</td>
<td>0.01</td>
<td>0.50</td>
</tr>
<tr>
<td>324 Petroleum and Coal Products</td>
<td>324 Petroleum and Coal Products</td>
<td>0.82</td>
<td>0.34</td>
<td>0.48</td>
</tr>
<tr>
<td>315 Apparel</td>
<td>316 Leather and Allied Products</td>
<td>0.46</td>
<td>0.00</td>
<td>0.46</td>
</tr>
<tr>
<td>326 Plastics and Rubber Products</td>
<td>326 Plastics and Rubber Products</td>
<td>0.56</td>
<td>0.18</td>
<td>0.38</td>
</tr>
<tr>
<td>323 Printing and Related Support Activities</td>
<td>334 Computer and Electronic Products</td>
<td>0.38</td>
<td>0.01</td>
<td>0.37</td>
</tr>
<tr>
<td>316 Leather and Allied Products</td>
<td>316 Leather and Allied Products</td>
<td>0.61</td>
<td>0.26</td>
<td>0.35</td>
</tr>
<tr>
<td>325 Chemicals</td>
<td>325 Chemicals</td>
<td>0.73</td>
<td>0.46</td>
<td>0.28</td>
</tr>
<tr>
<td>335 Electrical Equipment and Components</td>
<td>335 Electrical Equipment and Components</td>
<td>0.40</td>
<td>0.20</td>
<td>0.20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3-digit IO Commodity Group</th>
<th>3-digit IO Industry Group</th>
<th>Alt. Share</th>
<th>BEA Share</th>
<th>Share Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>337 Furniture and Related Products</td>
<td>321 Wood Products</td>
<td>0.06</td>
<td>0.98</td>
<td>-0.92</td>
</tr>
<tr>
<td>114 Fishing, Hunting, and Trapping</td>
<td>311 Food</td>
<td>0.18</td>
<td>1.00</td>
<td>-0.82</td>
</tr>
<tr>
<td>323 Printing and Related Support Activities</td>
<td>323 Printing and Related Support Activities</td>
<td>0.12</td>
<td>0.73</td>
<td>-0.62</td>
</tr>
<tr>
<td>311 Food</td>
<td>312 Beverage and Tobacco Products</td>
<td>0.00</td>
<td>0.36</td>
<td>-0.36</td>
</tr>
<tr>
<td>324 Petroleum and Coal Products</td>
<td>325 Chemicals</td>
<td>0.13</td>
<td>0.46</td>
<td>-0.32</td>
</tr>
<tr>
<td>316 Leather and Allied Products</td>
<td>314 Textile Products</td>
<td>0.00</td>
<td>0.22</td>
<td>-0.22</td>
</tr>
<tr>
<td>316 Leather and Allied Products</td>
<td>323 Printing and Related Support Activities</td>
<td>0.00</td>
<td>0.22</td>
<td>-0.22</td>
</tr>
</tbody>
</table>

Note: This table lists the 3-digit IO Commodity IO Industry cells with the largest share differences (both positive and negative). The table lists 8 of the top 10 positive differences and 7 of the top 10 negative differences. The remaining cells were suppressed to prevent disclosure.
Conclusions

• This stuff is hard…

• And messy….
  – How to think about firms with manufacturing operations importing products coded to their industry
    • Are these “final goods” or “intermediate inputs”?
  – How to think about firms importing products they don’t report using
    • Are these “final goods” or “intermediate inputs”? 

• Need to better understand the role of large, multi-activity firms
  – Role of manufacturing and wholesale/retail operations
Thank you