STATISTICS

Discussion of "Capital Flows in Global Value Chains" by Xiang Ding

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Overview of paper

- Analysis of global value chains traditionally focuses on use of global suppliers to transform of **intermediate inputs** to create output.
- This paper notes that the production process also uses **capital inputs** that come from global suppliers.
- Expands the traditional analysis of global value chains to include capital inputs (treating them analogously to intermediate inputs).
  - Finds that gains from trade are much larger than traditional measures
  - Additional gains from trade are larger in more capital intensive countries
- My discussion will focus on measurement issues rather than on trade issues

My main comments

- This is a good, exciting paper that I think will make an important contribution.
- The paper is still very much a work in progress.
- I think the paper would benefit from better connecting with the productivity literature, which has developed useful solutions to several of the measurement challenges addressed by the paper.
- The productivity literature points to several additional datasets that could usefully be incorporated into the paper.
- In drawing the analogy between capital inputs and intermediate inputs, I recommend being careful with terminology and better developing some of the concepts.

Measuring capital services – background

- Founders of national accounts (Stone, Kuznets, and others) in the 1930s & ’40s understood that capital goods, like intermediate goods and services, are **consumed** in production and that capital provides **services**.
  - However, practical measures of capital services for heterogeneous capital goods were not yet available.

- In the 1960s & 70s, economists studying growth accounting and productivity developed methods for measuring and aggregating **capital services**
  - Jorgenson (1963), Capital theory and investment behavior, *AER*
  - Jorgenson and Griliches (1967), Explanation of productivity change, *REStud*
  - Hulten (1973), Divisia index numbers, *Ema*
  - Diewert (1976), Exact and superlative index numbers, *JEm*
  - Hulten (1978), Growth accounting and intermediate inputs, *REStud*

Measuring capital services – background (cont'd)

- By the 1980s, these methods were being implemented in projects that studied multifactor (or "total factor") productivity for the total economy and component industries. For example, see:
  - Bureau of Labor Statistics (1983), *Trends in Multifactor Productivity, 1948–81*
  - Jorgenson, Gollop, and Fraumeni (1987), *Productivity and U.S. Economic Growth*

- These programs aggregated capital services for multiple types of capital assets with intermediate inputs and labor services.

- By 2001 an international handbook was available:
  - OECD (2001), *Measuring Productivity: Measurement of Aggregate and Industry-Level Productivity Growth*

- The *System of National Accounts 2008* added a chapter on capital services (ch. 20)

Measuring capital flows

- Ding's paper uses data from
  - World input-output database—shows output of capital goods, but not investment in detailed capital assets by using industry
  - U.S. BEA capital flows table for 1997

- As part of its fixed asset accounts, BEA publishes annual estimates of investment in detailed capital assets by using industry for the U.S.:
  - See the table for nonresidential detailed estimates – investment at https://apps.bea.gov/national/FA2004/Details/Index.htm
  - Not as many asset types and industries as the 1997 capital flows table, but much more current data
  - The quality of BEA's estimates has recently improved due to collection of increased detail on asset type during economic census years in Census Bureau's annual capital expenditures survey.

Measuring capital flows – internationally

- Capital flow tables (that is, investment in detailed types of capital assets by using industries) are not included in the *2008 SNA*, so most countries have not developed them.

- Several countries have, however, developed such estimates as part of multifactor productivity accounts. Estimates for some other countries have been developed by university researchers.

- Check out the KLEMS project (organized by Jorgenson, Timmer, and van Ark), which has data for the EU, U.S., China, India, Canada, and several other countries.
  - See http://www.worldklems.net/data.htm

Capital assets are not intermediate inputs

- The SNA does not treat capital assets as intermediate inputs because:
  - They are owned by the enterprise and used for multiple years
  - They have value and must be recorded on balance sheets
  - For recording income from production, there is no direct measure of rental service or income flow. Consequently, for practical purposes it is simpler to include the income from capital assets as part of operating surplus.

- The theory and practice of measuring capital services are well developed in the productivity literature. I'd recommend using those methods.

- I'd like to see better development of the timing differences between capital flows and assets at the time they are used. How should the flow be measured?
  - The observable flow when the asset was purchased? An imputed flow at the time it is being used? The expected flow when the asset will be replaced?

Thank you!