Evolution of Production Network: Measuring Trade in value-added (TiVA)

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Domestic Production Network (GPN)

- Coal
- Steel
- Components
- ICT products

Primary inputs:
- Labour input
- Capital services
- Other VA component

Further intermediate supply (Goods&Svc):
- Capital goods
- Household consumption
Global production network (GPN)

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- Labour input
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Expected outcomes

- Database compilation and model development
  - Bilateral trade by end-use
  - Expanded coverage of Input output tables
  - Intercountry inter-industry model

- ‘NEW’ Indicators
  - Trade network
  - Production structure and key sectors
  - Positioning in international production network
  - Economic integration via global production network
Main data sources: I-O and Bilateral trade in goods and services

- **Analytical** Harmonized Input-Output
  - 44 countries (33 OECD countries) + some additional
  - Years: 1995, 2000, 2005
  - Industry: 37 sectors based on ISIC/NACE Rev 3 system

- **Analytical** Bilateral trade database
  - HS 6digit → ISIC Rev.3
  - HS 6digit → End Use (intermediate, HHCP, GFCF, Passenger cars, Personal computers)
  - Various adjustments: Re-exports (HKG), unallocated partners and sectors, missing links

* CIF/FOB and volume adjustments
Trade Indicators

Annual data
Detail sector information
Bilateral relationship
The world composition of traded goods remained stable in 1995-2005:
- Chemicals (10% to 11%)
- Transport equipment (12% to 11%)
- Communication equipment (8% to 10%)
- General machinery (9% to 8%)
- Textile products (8% to 6%)
- Food manufacturing (6% to 5%),

OECD ITCS Exports, May 2011
International specialisation
(increased shares 1995-2006, more than 10% share of total exports)

- Mining (ISIC 10-14) in CA, MX, BR, CL / RU /
- Textile (ISIC17-19) in IT
- Machinery (ISIC29) in CZ, FI, JP
- Comm equip. (ISIC30) in MX / FI, HU / CN, MY, PH
- Computing machinery (ISIC32) in CN, TW, KR, PH, SG, TH
- Motor vehicles (ISIC34) in US, BR / DE, FR, PL, HU, CZ / JP, KR
Export by industry and end use
Counting the dominant partner links to identify the demand and supply hubs

- **Demand hub (l)**
  - Count the partners’ export link that depends on country l’s economy at given threshold $t$
    - $\frac{\text{export (k,l)}}{\sum_l \text{export (k,l)}} > t \%$

- **Supply hub (k)**
  - Count the partners’ import link that depends on country l’s economy at given threshold $t$
    - $\frac{\text{import (k,l)}}{\sum_l \text{import (k,l)}} > t \%$
Notes: EU7 is Belgium, Germany, France, Italy, Netherlands, Spain and United Kingdom. Each arrow indicates that a partner’s share of a country’s total exports is greater than 15%.
Global share of intermediate exports (2000, 2008)

- Manufacturing parts
- Motor vehicle parts
Findings (trade indicators)

- Significant changes in industry and category components of exports in most Asian economies (China’s machinery, textile, etc).
- Asian and North American production networks have integrated. However, structure of Europe basically remains stable after the mid-1990s.
- China replaced Japanese and US positions as manufacturing hub in Asia-Pacific region. However, Japanese share of parts and components in some sectors (Electronics and motor vehicles) remains high.
Trade in value-added

Input-output model is useful data source to link international trade and domestic primary contents
Indicators
(Vertical specialization)

Import contents of exports
\[ = M (I-A)^{-1} \text{Exports/Total exports} \]

Re-exported imports
\[ = \text{Imports} (I-Gd)^{-1} e/\text{Total imports} \]

(Hummels et al 2001)

(Meng et al 2010)
Import contents of exports (ICE)
Import contents of exports (ICE) by industry group

Notes: Higher technology-intensive manufacturing group is defined as ISIC Rev.3 24, 29-35; lower technology-intensive manufacturing group is defined as ISIC Rev.3 15-23, 25-28, 36-37; services sector is ISIC Rev.3 50-95.

Sources: OECD Input-Output Database, October 2010
Intermediate imports end up in exports
Contribution of exports on GDP: Induced value-added (% of exports)

OECD I-O May 2011
Intercountry-based production fragmentation indicator

1. Induced global trade / Exports
2. *Average Propagation Link* another advanced indicates the complexity of inter-industry transactions (both domestic and foreign)
Fragmentation index (1995/2005)

(1.0 = Goods and Services exported as final expenditure)

Country decreased direct VS
Increased indirect fragmentation
APL: Domestic and inter-country length (total, 1995/2005)
Findings (inter-country model)

- Increased inter-country spillover effects => decreased domestic contribution of exports on output and GDP. In particular, final demand in developing economies induces more value-added in neighbour developed economy.

- Production chains become more complex in inter-country parts (intermediate trade + APL) due to the production propagations in foreign area.
Domestic and inter-country length (Electric Machinery, 1995/2005)

- China
- Germany
- Japan
- United States
- Austria
- Canada
Example of specific products import contents

Basic metals included in partner's exports
USA (Billion USD, 2005)

- **Machinery (29)**
- **Office machinery (30)**
- **Electronic machinery (31)**
- **Motor vehicles (34)**

For the USA in 2005:
- Basic metals included in partner's exports
- Japan, Korea, China
- Graph showing the amount of basic metals (in billions of USD) for Machinery, Office machinery, Electronic machinery, and Motor vehicles.