Research on Division of Labor of China's Domestic Value Chain from the Perspective of Global Value Chain

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Opening up the market has played a very important role in the growth of China's economy. The accession to the WTO accelerated the integration of Chinese economy into the global economy and accelerated China's participation in global value chains (GVCs). However China has more than 30 provinces and autonomous regions and some provinces are even bigger than European countries. Most of foreign trade are concentrated the coastal areas due to geographical conditions and convenient infrastructure. However, the central and western provinces are rich in resources and serve the coastal regions with natural resource and raw materials, which will become intermediate input of export in coastal provinces. Provincial trade hierarchies and specialization enhance the inter-provincial economic linkage. In other words, inland provinces also participate global value chains via inter-provincial trade. It is important to understand how global value chains work within one China, how they affect regional economic performance within China. To answer these questions, this paper collects regional input-output tables within China. In addition, multiregional input-output model is linked with global input-output model. Based on this integrated input-output models, this paper will calculate how much regional value added is created from GVC trade. International studies show a positive correlation between participation in GVCs and GDP per capita growth rates. This paper will explore whether this works within China. According to the empirical result, the paper will investigate how policy can help regions derive benefits from their participation in global value chains.

Introduction

Both global and domestic division of labor are continuously deepening. Globalization over three centuries: Two "Unbundlings" (WTO, 2013): The first "Unbundling" was driven by the steam revolution; the second "Unbundling" was driven by the revolution ICT.

From trade in goods to trade in tasks: The rise of global value chains (WTO and IDE-JETRO, 2011)

In second unbundling, production is "sliced and diced" into separate fragments that can be spread

around the globe. Gene Grossman and Esteban Rossi-Hansberg called this new paradigm "trade in tasks". The possibility of slicing up and optimizing value chain activities among multiple companies and various geographical locations has even spawned a broader term - the "global value chain" (GVC).

From the 1930s to the 1960s, intermediate goods trade was relatively unimportant. Today, it is about two-thirds of gross world trade, so being able to decompose intermediate goods trade has become crucial in generating a complete value-added accounting of gross trade flows. (Wang et.al, 2014).

From 1987 to 2007, the trade relations between provinces have been strengthened continuously, and the average of dependence on inter-provincial trade for all provinces has increased by 20 percentage point.

In 2010, The "Made in the World" initiative was launched by the WTO to support the exchange of projects, experiences and practical approaches in measuring and analyzing trade in value added. Then more and more international organizations and researchers focus on GVC.

Methodology

Study on GVC is transferring from standard trade statistics record trade in gross terms to trade in value-added (Wang et.al, 2013). National income accounts record domestic output in value added terms but standard trade statistics record trade in gross terms. Official trade statistics are misleading in the presence of trade in intermediate goods. Need a transparent framework which helps policymakers and the public to discover GVC-related information masked by official trade data.

Need a method to fully decompose intermediate trade in term of factor content. Quantifying value-added structure and double counting of gross trade and their implications for cross country production sharing and a country's position and participation in global value-chains (GVCs).

Recently, the study on GVC is to decompose export by "value Chain" (esp. countries) to describe the participation of different countries in GVC.

The various steps to obtain finished products can be associated through the notion of a "value chain", which refers to the entire sequence of productive (i.e. value-added) activities, from the conception of a product to its manufacturing and commercialization.
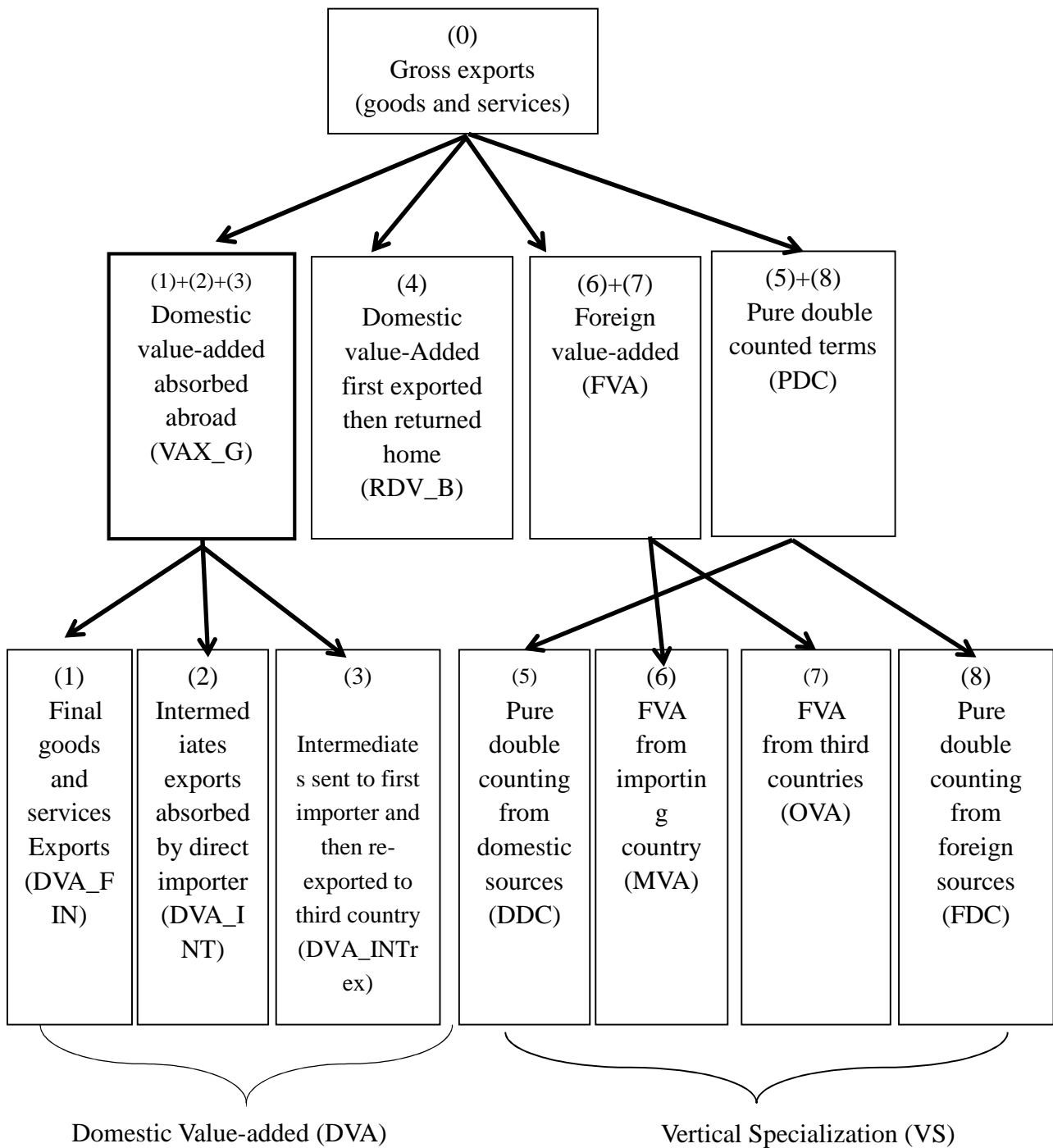
Source： Wang et.al（2013）

Fig. 1 GVC decomposition

In Wang et.al (2013), they build on the decomposition of gross bilateral intermediate trade according

to their final destination of absorption and decompose gross trade flows at any level of

disaggregation into 8 value-added and double-counted components. These 8 components can be grouped into four buckets: (1)Domestic value-added absorbed abroad (DVA); (2) Domestic value added that is initially exported but finally returned and consumed at home via imports from other countries (RDV), which is not part of a country's exports of value-added, but account for part of the country's GDP; (3) Foreign value added used in the production of exports (FVA); (4) Double counted terms due to intermediate goods being traded back and forth that cross border multiple times (PDC).

This decomposition provided detail data for analysis of global value chain and it also eliminate the double counting contents in statistics of intermediate trade transactions. This paper try to use the same methodology to decompose the China's domestic value chain. However, the paper does not consider domestic value chain and global value chain separately. The paper embedded the domestic multi-regional input-output table into world input-output table to build bridge among China's domestic value chain and global value chain.

Based on Wang et.al (2013), this paper will decompose the gross bilateral trade flows into 4 buckets:

(1) Domestic value-added absorbed abroad (VAX_G);

(2) Domestic value added that is initially exported but finally returned and consumed at home via imports from other countries (RDV). It is not part of a country's exports of value-added, but account for part of the country's GDP ;

   The total domestic value added includes Domestic value-added absorbed abroad (VAX_G) and Domestic value added that is initially exported but finally returned and consumed at home via imports from other countries (RDV), i.e. DVA = (1)+(2);

(3) Foreign value added used in the production of exports (FVA);

(4) Double counted terms due to intermediate goods being traded back and forth that cross border multiple times (PDC).

Following Hummels, Ishii, and Yi (HIY, 2001), this study use Vertical Specialization index (VS) to measure the participation of in global value-chains. VS measures the imported input content of export goods.

Vertical Specialization in global value chain (VS_GVC)

$$VS\_GVC \quad \frac{FVA \qquad D}{E}$$

FVA is "Foreign value added used in the production of international exports in each province", PDC is "Double counted terms" in the international trade.

Vertical Specialization in domestic value chain (VS_DVC)

$$VS\_DVC \quad \frac{VA \qquad D}{DE}$$

RVA is "Value added of all other provinces used in the production of domestic exports in one province", PDC is "Double counted terms" in the domestic trade.

Dependence on international export for province in terms of standard trade statistics:

$$Dep\_trade_r = \frac{\text{Total provincial r export}}{\text{GDP of Provincial r}}$$

Dependence on international export for province in terms of value chain:

$$Dep\_gvc_r = \frac{\text{Total provincial r VA embedded in national(province r + other provinces) export}}{\text{GDP of Provincial r}}$$

Data

This research will collect and prepare the Input-Output table of China's thirty provinces (including autonomous regions), construct domestic inter-provincial Input-Output data base. A global Input-Output model with embedded Chinese interprovincial Input-Output module will be constructed based upon above base in combination also with WIDO which can analyze China's domestic value chain from the perspective of global value chain.

Setting the existing international IO table as the total control of China's MRIO: Adjusting MRIO according to WIOD. Reconciling MRIO and WIOD with the programming model (Cross Entropy model)

Main Result

This paper will begin with case study of GVC decomposition for Guangdong's export of electrical, electronic and instrumental goods to the United States.
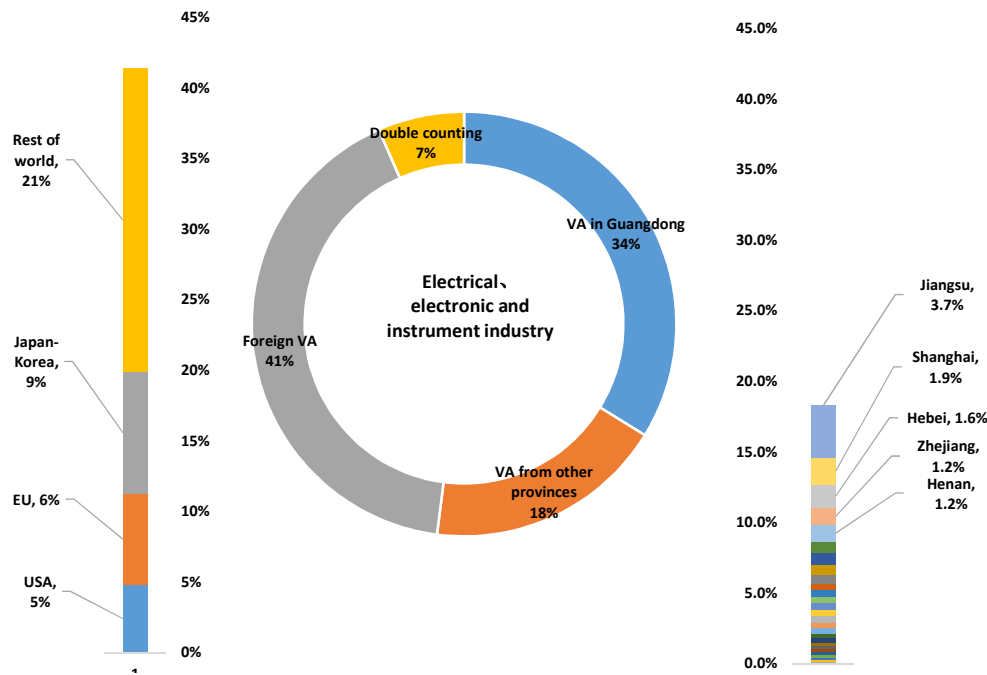
Fig. 2 GVC decomposition for Guangdong electrical & electronic exports to the US

Figure 2 shows the result of GVC decomposition of Guangdong's electrical & electronic exports to the US. There are three parts in this figure. Firstly, the middle parts the main content of decomposition, and the export of Guangdong's electrical & electronic goods is divided into four components: local value added (in Guangdong), Foreign value added (international value added) value added from other provinces (domestic value added excl. Guangdong) and double counting. From GVC decomposition point of view, the largest component in Guangdong's export is foreign value added, accounting for 41% of total exports; the second largest component is value added in Guangdong itself, accounting for 34% of total exports; Domestic other provinces can get indirectly acquired 18% of value added from Guangdong's export; the remaining 7% is double counting. According to the calculation, Guangdong's vertical specialization index in electrical & electronic industry (export to the US) reached 48%.

Secondly, the left part of Figure 1 shows the detail of the international value added in Guangdong's export. The EU countries, Japan, Korea and the United States accounted for half of total Guangdong's export and other countries and regions get the remaining half. Japan and South Korea get 9% of value added in the total Guangdong's exports. EU and USA get 6% and 5% of value added in the total Guangdong's exports respectively. The Japan & South Korea's benefit is larger than EU and USA because there exist more intermediate trade between China and Japan & South

Korea.

Finally, the right part in Figure 1 shows the detail of domestic other provinces' value added in Guangdong's export. More than 1/3 of the domestic value added is obtained by the Yangtze River Delta region. As for each province, the largest beneficiary is Jiangsu, which accounts for 1/5 of all domestic other provinces' value added.

The participation of each province in global value chain

The participation in GVC of coastal provinces are significantly higher than that of the inland provinces.

The participation in GVC of the three economic circles (Jing Jin Ji Area, Yangtze River Delta, Pearl River Delta) is higher than that of other regions

The participation in GVC of provinces near the coastal area is higher than that of province far away from the coastal area.

The participation of each province in domestic value chain

The participation of most of eastern coastal provinces in DVC is higher than other provinces.

The participation of the three economic circles and their surrounding area is higher than other area.

The participation of most of northeast provinces is very high.

Dependence on export from the perspective of trade and value chain

On the one hand, the dependence on export from perspective of trade may overestimate the degree of real dependence for some regions (mainly in eastern coastal area) because export includes local value added, as well as foreign value added and double counting.

On the other hand, the dependence on export from perspective of trade may underestimate the degree of real dependence for some regions (mainly in western area) because it does not include indirect dependence (via export of other provincial exports)

Conclusions

The paper builds an input-output model, which embedded a China's multi-provincial input-output model. The study investigates the participation of domestic provinces in global value chains of domestic value chain. Based on the calculation, the following conclusions can be

drawn.

(1) The three economic circles (Jing Jin Ji Area, Yangtze River Delta, Pearl River Delta) have significant spillover effects on the surrounding areas.

(2) The VS index and per capita show inverse U relationship.

(3) Market size, capital density (intensity), infrastructure and the openness have positive effect on the participation in domestic value chain.

(4) The dependence on export for each province from perspective of value chain can reflect the real condition, comparing to the traditional calculation method.

(5) The spillover effect of provincial international export is positively correlated with its DVC participation.

(6) From the perspective source of market and type of demand, different regions show different pattern of driving forces.