Exports, income and regional inequality in China: value chain analyses
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CHAPTER 6

Summary and Conclusions

6.1 Introduction

The research in this thesis focused on the role of exports in the Chinese economy. Three of the most typical characteristics of China’s exports were: the large scale of processing exports; the important role of Foreign Invested Enterprises (FIEs) in exports; and the seriously unbalanced distribution of export activities across different domestic regions. Each of these characteristics was expected to generate a substantial income effect. First, because the production of processing exports depended largely on imported materials, China’s exports were expected to induce relatively little domestic value added (DVA). Second, because a large part of the DVA earned by FIEs was foreign-owned, China’s exports were expected to contribute even less to national income (NI) than to GDP. Third, exports are generally beneficial for a region’s development. However, because China’s exports were unevenly distributed, they were expected to increase regional income inequality. Taking these three typical characteristics of China’s exports into account, this thesis thoroughly investigated the income effects of exports in China from a value chain perspective.

In doing so, the thesis attempted to contribute both methodologically and empirically. In particular, it offered new insights into several empirical questions about the income effects of China’s exports. It investigated the role of exports on national income growth (Chapter 3) and regional income inequality (Chapter 5), and the role of structural changes on income effect of exports (Chapter 2). Chapter 4 developed and constructed new interregional input-output (IO) tables for China. At the regional level, they explicitly distinguish the production of processing exports from ordinary production. The new IO tables were used to address the roles of processing exports and ordinary exports to regional economic growth. Not taking processing trade into full account at the regional level seriously biased the results.

Section 6.2 summarizes the main findings. Section 6.3 clarifies the limitations of
this thesis and provides some ideas for future research.

6.2 Summary of the main findings

An important characteristic of China’s exports was its strong dependence on assembly and processing activities. By fully taking this feature into account, Chapter 2 estimated China’s annual Vertical Specialization (VS) shares from 2000 to 2012 based on special IO tables that explicitly distinguish processing export production from other production, at the national level. The VS share measures the average import content per dollar of exports. China’s VS share increased from 2000 to 2004, after which it continuously decreased. To explore why it declined, Chapter 2 introduced a new structural decomposition approach. The decomposition allowed us to quantify how much different production types and substitution among different inputs contributed to the VS share change. We decomposed the declines in China’s VS share between 2002 and 2007 and between 2007 and 2012 into the effects of 14 components.

Chapter 2 found that the substitution of imported intermediates with domestically produced intermediates was the main driver for China’s declining VS share. This substitution effect was observed for: the production of processing exports; the production of ordinary exports; and the production of FIEs to meet domestic demand. These findings suggested an upgrade of China’s role in the global production network. The results implied that improving the quality and competitiveness of domestic intermediates may be an efficient way to upgrade a country’s role in the network of global value chains (GVCs). One option to achieve this might be to direct more research and development and foreign direct investments (FDI) flows to high-technology industries.

Another interesting finding was that the export structure increased China’s VS share in the period 2002 to 2007 but decreased it from 2007 to 2012. Processing exports were highly dependent on imports and their share in total exports declined in both periods. Because of this strong import dependence, one would therefore have expected that the decreases in the shares of processing exports would have decreased the VS share, which would have been an indication of China no longer being the ‘world’s
factory’. But, this was not what happened in the period 2002-2007. Because the effect of the changes in the commodity composition of the exports overpowered the effect of declining processing export shares, the VS share increased substantially. In the first period, China changed to exporting more capital-intensive products, which had higher VS shares. This indicates that adjusting the commodity composition of the exports may be an effective way to move up the position in global production networks.

The second typical characteristic of China’s exports was the high involvement of FIEs. The value added of these firms contains profits, which the FIEs can repatriate. In that case, an increase in DVA would not directly enhance the living standards in China. The decreasing VS share found in Chapter 2 suggested that the domestic value-added (DVA) in a unit of exports had increased over time. However, how had the national income (NI) embodied in a unit of exports changed? Chapter 3 investigated the extent to which China’s exporting activities contributed to its Gross National Income (GNI), which is a better indicator for the average living standards than DVA. On the basis of ownership, the value added was decomposed into two parts: national income and foreign income.

Chapter 3 demonstrated that the NI content in exports differed substantially from the DVA content in exports. From 2002 to 2007, DVA embodied in a unit of exports showed a clear rise, but the NI embodied in a unit of exports only increased a little. These results seriously question the traditional perception that a higher DVA share in exports indicates more gains from globalization.

Also the dynamics of national income and DVA showed different patterns before and after the 2008 financial crisis. The DVA in exports considerably increased in both periods. From 2002 to 2007, however, this increase only led to a small increase in the NI in exports, whilst the increase of DVA in exports from 2007 to 2012 translated into considerably larger increase in the NI in exports. Further structural decompositions indicated that changes in the share of capital income in value added was the main reason for these different patterns. The capital income share showed a remarkable increase before the crisis but a substantial drop thereafter. Because the foreign-owned income was mainly sourced from capital income, an increasing capital income share (before the crisis) declined the ratio of the NI content of the exports to the DVA content of the exports, and a decreasing share (after the crisis) raised the ratio.
The third typical feature of China’s exports was the seriously unequal distribution of both processing exports and ordinary exports across domestic regions. To sketch a more accurate picture of regional involvement in trade and globalization, it was important to distinguish the two types of production also at the regional level. To this end, Chapter 4 constructed new interregional input-output (IRIO) tables for China, which explicitly distinguished the production of processing exports from other production. The new tables were named IRIOP tables (with P to indicate the distinction of processing exports). They contain 17 sectors, include eight regions, and were constructed for 2002, 2007, and 2012. For their construction, different data sources were used, such as the existing IO tables for China, international trade statistics, and the Regional Economic Accounts (REA). We solved the main inconsistencies between the data sources by adapting the data from one source so as to match the data from another data source that was felt to be more reliable. After that the tables were constructed block by block using a semi-survey method, based on a combination of survey data, proportionality assumptions, and RAS procedures. Chapter 4 detailed how the information from the different data sources were harmonized and reconciled and how the tables were constructed step by step.

As an illustration of the use of the new IRIOP tables, we investigated whether the separation of production of processing exports from ordinary production mattered for studying the contribution of exports to regional value added. Both the regional value added effect of national exports and the national value added effect of regional exports were found to be significantly overestimated if processing exports were not properly included in the models. Moreover, the effect of exports by the coastal regions on income of the inland regions was also seriously overestimated. All these findings indicate that separating processing exports at the regional level matters.

Based on the new IRIOP tables, Chapter 5 quantified the contributions of both processing exports and ordinary exports to the labor income inequality across China’s eight regions from a value chain perspective.1 To this end, we proposed a value chain–based accounting framework. The framework fully accounted for a region’s indirect exports, which arose through the provision of materials, components and services to

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1 Following the IRIOP tables, China mainland was divided into eight regions: North East; North Municipality; North Coast; East Coast; South Coast; Central Region; North West; and South West.
export production activities in other regions.

The chapter started with a description of Chinese temporal changes in regional inequality. We observed a significant income inequality across regions in terms of labor income per capita, which increased rapidly from 2000 to 2003, remained steady until 2006, and then decreased continuously, suggesting regional income convergence in recent years.

Empirically, it was found that exports explained about 70% of China’s regional labor income inequality in 2012. In other words, without the labor income generated by exports, China’s regional labor income inequality would have been only 30% of the actual inequality level in 2012. Processing exports contributed little, despite the unequal distribution of their value chains over the regions. Rather, ordinary exports were found as the main contributor to China’s regional inequality. Looking at the changes in the period 2002-2012, the substantial decline of regional inequality was not due to changes in exporting activity. Even though value chains for processing exports and for ordinary exports became distributed more evenly among regions, the growth in exports still had inequality-increasing effects. The main reasons for the declining regional inequality were: the increased levels of domestic final demands; and the changed value chain configurations of ordinary production—which became more domestically fragmented, with the inland regions increasingly involved. In this regard, China’s recent policy of stimulating domestic demand would effectively decrease China’s regional inequality.

6.3 Limitations and further research

This thesis documented that the three typical characteristics of China’s of exports should be fully taken into account when analyzing the role of exports for a country’s economic growth. In the end, we would like to discuss some limitations of this thesis, which are—at the same time—indications for future work built upon this research.

Chapter 2 explored the dynamics of China’s VS share and what were the determinants of the dynamics. For this, single country IO tables were used. We investigated the dependence of China’s export production on foreign value added and
assumed that all imports were produced by foreign production factors. However, this is not true since imports could be produced with materials produced in China. One direction for future research could be to use the international IO tables to clearly separate the Chinese DVA from the foreign value added in the exports (see Koopman et al., 2014). A non-trivial extension would be to decompose the changes in this “new VS share”. Besides, the analysis in chapter 2 is at the national level, which implies that what happens within a country (that is, at the regional level) is not covered. Therefore, another direction for future research could be to use the IRIOP tables constructed in Chapter 4 to investigate the heterogeneity of the VS shares in regional exports, their changes over time and the determinants of these changes. These investigations will provide significant policy implications for China’s further upgrading in global production networks and for China’s regional development.

Chapter 3 provided new perspectives on the benefits of international trade by focusing on the implications of trade for national income. A single country IO table was adopted to calculate the NI content in exports. It was assumed that all imports that were used as intermediate inputs in China were produced abroad only with foreign-owned capital. This assumption is not realistic given the large amounts of outward FDI from China. To relax this assumption, an international IO model could be adopted. The value added vector in each country should in that case be explicitly divided into the income accruing to China and the income accruing to other countries. Such a framework can not only provide more accurate results on NI embodied in exports, but can also be used to quantify China’s trade balance for “trade in national income” (i.e., Chinese NI embodied in foreign countries’ final demand minus the foreign income embodied in Chinese final demand). Recently, Bohn (2019) conducted this kind of analysis. He deconstructed the GDP of each country in WIOD into bilateral transfers of primary incomes. This resulted in a GDP-GNI matrix, which indicates the share of country i’s GDP that is part of country j’s GNI. However, the analysis in Bohn (2019) is at country level and does not give the value added to income relationships between countries at the industry level. Since the large heterogeneity of the FDI ownerships across industries, a national level approach may lead to biased results and further analysis at industry level might make sense.

Chapter 3 used an open IO model and therefore ignored the income multiplier
effect of exports. That is, the NI induced by exports will further induce extra household consumption or investments. This additional household consumption will induce another round of increases in the gross outputs of industries, in labor income, and in household consumption, and so forth. To address this concern, a semi-closed IO model could be used, in which the household consumption is endogenized via the income-consumption relationship between households and industries.

Due to data limits, the construction of the IRIOP tables in Chapter 4 was based on many assumptions. For example, to assign the initial value for the import matrix, it was assumed (both for producing processing exports and for other production) that the input structure of imported intermediates was for each region the same and identical to the national structure. Also, it was assumed that the imports by a region could only be used (for final demand or for intermediate use) in the own region, i.e. no re-exports to other regions. These assumptions can be further relaxed if additional information is available.

Moreover, Chapter 4 only investigated the effect of globalization on Chinese regional growth as an illustration of the use of IRIOP tables. However, the tables could be of particular interest to answer questions that cannot be answered by using the traditional IRIO tables. For example, how much did processing exports and ordinary exports contribute to China’s regional employment and the changes therein? How did China’s regional VS share change and what were the determinants of these changes?

Chapter 5 calculated the contribution of each final product to the overall regional inequality, adopting an accounting perspective. The method has some limitations, however. First, when inequality is attributed to exports, it is implicitly assumed that the regional labor incomes that are induced by Chinese exports would not have been earned in the absence of these exports. Also, it is assumed that wage rates have responded uniformly across regions to the increase in export-driven labor demand. Further, we ignored the migration of labor across regions that was caused by the exports. We would expect that booming exports: (i) have larger positive effects on the wage growth in coastal regions than in inland regions; and (ii) have a positive effect on the migration from the inland regions to the coastal regions. Such general equilibrium effects would influence regional inequality by impacting both total regional income and labor allocation.

Second, similar to Chapter 2, we ignored the income multiplier effects of exports.
To solve these limitations, a spatial general equilibrium model could be helpful (Redding, 2016). For example, one might start from Tomb and Zhu (2019), who built a spatial general equilibrium model of China’s interregional and international trade, and who allowed for migration across regions and sectors. They quantified the effect of China’s trade liberalization and declining migration costs on regional GDP. However, they only included two sectors: agriculture and non-agriculture, and did not separate the production of processing exports from other production. Using a combination of Tomb and Zhu (2019) and Chapter 5 of this thesis, one could investigate the effect of processing exports and ordinary exports on China’s regional inequality and take export commodity compositions, migration and income multiplier effect into full consideration.

Due to data limitations, the IO tables could only be developed for a small number of years. The analysis in this thesis focused therefore only on the periods from 2002 to 2007 and from 2007 to 2012. However, the conclusions may provide some implications also for China’s development in more recent years. First, the processing export share in China’s mechanized exports decreased continuously after 2012. At the same time, the so-called high-tech machinery industries, which have relatively high VS shares, experienced declining export shares in recent years. Also, China’s product quality increased in recent years (Henn et al., 2017; Gnidchenko, 2018), which makes the substitution of (some) imported inputs for domestically produced inputs quite likely. All three aspects suggest that the findings in Chapter 2 may also apply to China in more recent years, that is, China’s VS share is decreasing and China is upgrading its role in the global production networks. Second, from the Chinese national IO tables in 2015, it follows that the share of capital income in value added declined from 2012 to 2015 (as it did from 2007 to 2012). At the same time, the export shares of FIEs dropped in recent years. Combining with the findings in Chapter 3, these two aspects imply that NI per RMB of exports is very likely to increase after 2012. Third, the Chinese government encouraged the transfer of processing and manufacturing industries from the eastern coastal regions to the inland regions in recent years. As a result, both processing exports and ordinary exports became distributed more evenly across
regions.\textsuperscript{2} Therefore, it is expected that the income induced by exports increased more rapidly in inland regions than in coastal regions, and the value chain of exports is distributed more evenly among regions. Meanwhile, the share of domestic final demand in China’s total final products is keeping increasing in recent years. All these factors are expected to decrease China’s regional income inequality after 2012.

Last but not least, the framework developed in this thesis is not only applicable to China but also to other countries with similar export characteristics. For example, the framework constructed in Chapter 3 can be used for countries with much inward FDI, such as India, Brazil, and Mexico. It would help in investigating the gains of a country from participating global production networks. The compilation method of the IRIOP table that was developed in Chapter 4 could be adopted for countries like Mexico, for which processing trade is prevalent and unevenly distributed across domestic regions.

\textsuperscript{2} This observation is based on trade data from China’s Customs, which provides China’s firm-level trade statistics (see Brandt et al. (2017) for details). We aggregate the trade statistics to province level and obtain the provincial processing exports and ordinary exports.