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World Trade Organization

Economic Research and Statistics Division

**RECENT TRADE DYNAMICS IN ASIA:
EXAMPLES FROM SPECIFIC INDUSTRIES**

Marc Auboin and Floriana Borino

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Recent trade dynamics in Asia: examples from specific industries?

Marc Auboin and Floriana Borino^a

Abstract

This paper looks at the extent to which the shift in the lower value added production to countries in the following development "tier" is actually becoming a reality. Several countries in East Asia have been upgrading production patterns and moving up the value chain, this paper looks at how this helps and offers new opportunities to less advanced countries to integrate in world trade. The paper uses a combination of techniques, from an analysis of disaggregated trade flows by country and sectors, to the calculation of trade intensity indices by country and sector, and value-added trade by sector. It finds combined evidence of forward and backward trade increasing between several neighbouring Asian economies and China, in the most labour-intensive industries in particular. Econometric analysis shows that relative unit labour costs are an explanatory factor of increased trade links. In cases, the intensification of trade links on the export side can relate to a strongly expanding local market (for example India for electronic products such as smartphones), but mostly the intensification of trade links takes place both on the import and export sides with markets which are much smaller than China (Vietnam, Bangladesh, etc.), and which experienced increased outward-processing activities as a result of China's production upgrade.

Keywords: Investment; trade policy; business cycles

JELclassification:E22;F13;F44

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I. INTRODUCTION

It is widely believed that China's massive public and private sector investments to move up the value chain, combined with its priority to invest abroad, represents opportunities for trading partners to diversify their own production and export base. China's changing trade and production patterns involves a cross-border reallocation of comparative advantage, across industries and within industries. This process represents major opportunities for trading partners' development, and a new phase of integration into global trade of "frontier countries".

The extent to which China's changing trade and production is already having a measurable effect on partner countries is limited, as the phenomenon is relatively new and data is coming with lags. However, it has been observed that some neighbouring countries have grown their textiles, garment and footwear industries significantly. Other countries may also benefit indirectly by offering the right conditions for producing goods or parts thereof, which are no longer produced by China (without Chinese investors being necessarily responsible for the production reallocation). The same processes are also taking place in other sectors, electronics and electrically products in particular. The prospects of China's production going upstream raise expectations that more countries, with incoming foreign investment and generous domestic endowment in labour, might actually integrate internationally.

This paper looks at the extent to which the shift in the lower value added production to countries in the following "tier" is actually becoming a reality. The focus is therefore not on China's upgrading, rather on opportunities for new frontiers to integrate in world trade and advance development objectives as a result. The paper uses a combination of techniques, from an analysis of disaggregated bilateral trade flows, to trade intensity, trade in value-added calculations, by country and sectors, as well as econometric analysis to highlight explanatory factors. The paper finds evidence of China intensifying its backward and forward trade links in its key industries, mostly with neighbouring Asian countries, in line with changes in unit labour costs in the most labour intensive industries.

The paper is structured as follows: Section 2 looks at some of the existing literature on the topic. Section 3 analyses recent patterns of trade flows, section 4 calculates trade intensity by sector and countries, while section 5 complemented investigations on trade flows and trade intensity by the examination of an indicator of vertical specialization, namely the foreign share in the value-added contained in partner exports. Section 6 proposes a model of bilateral trade reacting to changes in relative unit labour costs by sector, while Section 7 wraps up results and concludes the paper.

II. LITERATURE AND CONTEXT

Several papers have documented the gradual closure of the real wage-to-productivity gap in China and on-going capital investment within the manufacturing sector to "move-up" the value chain (see in particular Kee and Tang, 2016). Both the Chinese government and industry associations are aware that export-oriented strategies

built on labour intensive activity eventually have to evolve based on the successful experiences of South Korea and Japan in their development trajectory. The need to move-up the value chain does not necessarily mean that China will shift industries overnight; it may simply mean that within a particular industry China may specialize into higher-value added processes or goods, and leave some of the lower value and labour intensive tasks to other producers.

The implications for China's upgrade into GVCs are likely to be extremely important for many countries in the world. With the improvement of manufacturing and logistical processes, the private sector is able, even more so in the 2010s than twenty years ago, to reallocate particular industrial task to new locations, in line with finer division of labour and relative unit labour cost conditions.

The People's Republic of China (PRC) has become in just a few years, after the 2009 financial crisis, the world's second largest foreign direct investor, after the United States. According to the OECD, PRC's foreign direct investment abroad had reached \$230 billion, four times its 2012 level. With such a rapid trend, PRC's stock of FDI had exceeded that of Japan in 2016, equalled that of the Republic of South Korea, and getting very close to that of Germany.

This transition to more capital intensive production and higher productivity levels within a sector or increase is a well-known phenomenon in Asia, reflected across sectors. However, from a data perspective, the disaggregation of some sector is easier than others. While the electronics sector is typically fit for evolving value chains, tracking detailed changes in the production function and related patterns is difficult.

Some components or intermediate stages of production can be subject to dual use (telephones, tablets, computers...), so it is difficult to track changes in one production line across countries. Production patterns in textiles and clothing are simpler, and lead to less uncertainty in the examination of input-output tables and calculation of trade intensity indices. A prime focus of this paper will hence be on the textiles and clothing industry, using HS data, but as a main outward-oriented sector for China's and its trading partners, the electronics sector could not be ignored.

III. LOOKING AT TRADE FLOWS

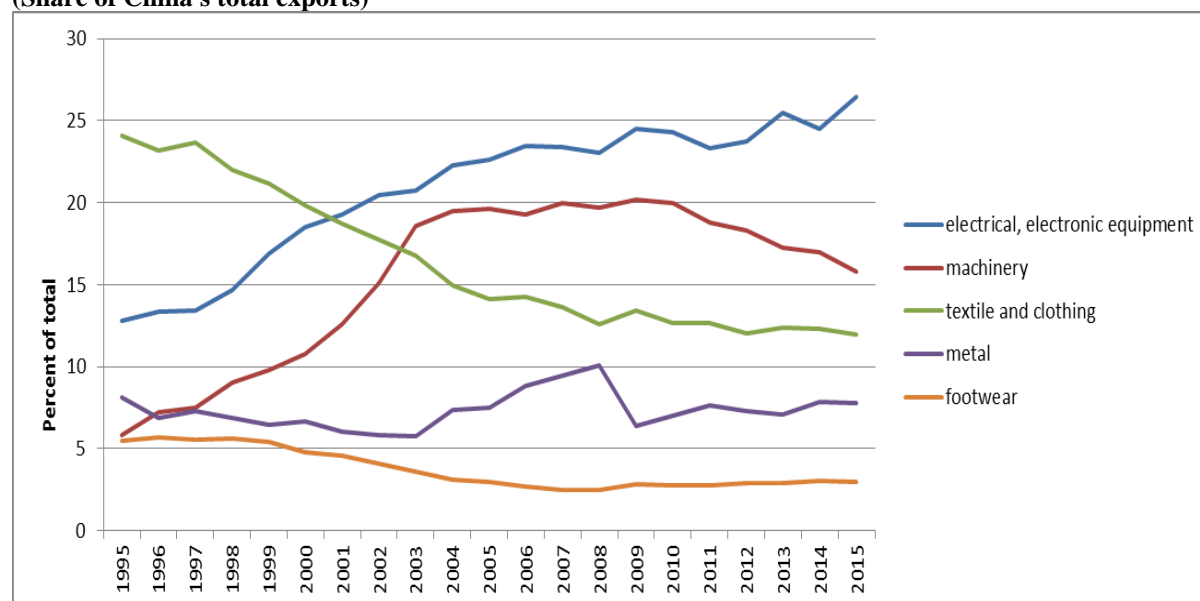
III.1 Trade flows, by main sector and trading partners

China's export and import structure has evolved in the past two decades. Three main sectors, i.e. electronics and machinery, textile and clothing, and metals, have accounted for the bulk of China's exports between 1995 and 2015. However, the relative importance of these sectors has been changing during this period.

In 1995, textile and clothing was China's first export sector, accounting for 24 percent of total exports. Electronics and machinery was second, accounting for 19 per cent of total exports. Consistent with a move towards more capital intensive goods, electronics and machinery combined increased their shares in total exports, reaching 42

per cent in 2015 (from 19 per cent in 1995), while the share of textiles and clothing halved in during this period (from 24 in 1995 to 12 per cent in 2015). The share of footwear declined similarly, from over 5 per cent in 1995 to less than 3 per cent in 2015 (Figure 3.1). Zhu and Pickles (2014) make the case that it reflected the shift of China from exports of goods based on low-wage labour and low-end technology to exports based on medium-level technology and higher quality goods under pressure of rising prices and wages. The share of final goods into China's exports has grown over the period, to reach 60% of total exports.

Figure 3.1: Key China's exports by sector, 1995-2015
(Share of China's total exports)

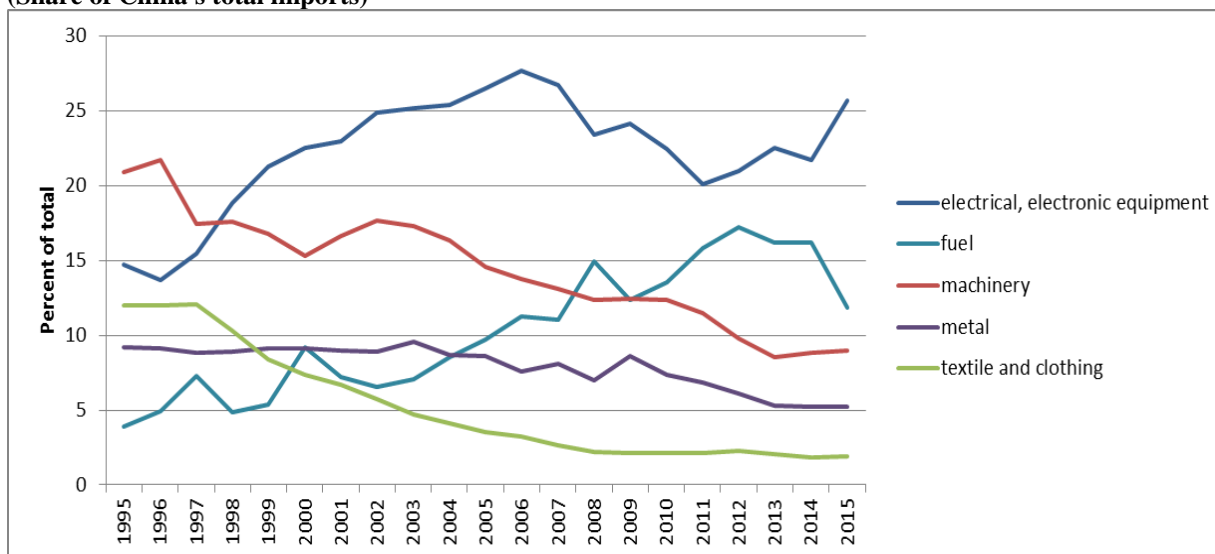


Source: UN Comtrade – Data is based on HS 2 digits categories: 85 (electrical, electronic equipment), 84 (machinery etc.), 50 to 63 (textile and clothing), 64 (footwear) and 72 to 83 (metal).

Import patterns reflect those of exports (figure 3.2). Electric-electronic products, on the one hand, and machinery, on the other, remained the two most important import sectors, with some 35 per cent altogether, and an inversion of the two sub-sectors during the period under review. Reflecting the increase in domestic processing, the share of imports of electric-electronic products increased from 15 to 25 per cent of China's total imports between 1995 and 2015, while the share of machinery decreased from 20 to 10 per cent of total imports in the same period – reflecting in part the higher share of domestic manufacturing of such machinery (Figure 3.2). China's imports are dominated by intermediate goods (around 70% of total imports).

For example, within electronics, China imports medium-high technology intermediate goods such as circuits and semiconductors, which are assembled with other inputs and finished products are re-exported (Mathai et al. 2016). In both cases, the evolution seems to be in line with the upgrade of China's production – China growing both its electronic industry, manufacturing content and value added with its own brands and machinery industry. By contrast, the share of textile and clothing in total imports decreased sharply from around 12 per cent in 1995 to 2 per cent in 2015 – faster than the fall in the share of textiles and clothing exports – suggesting a fall in the import share of exports of that sector.

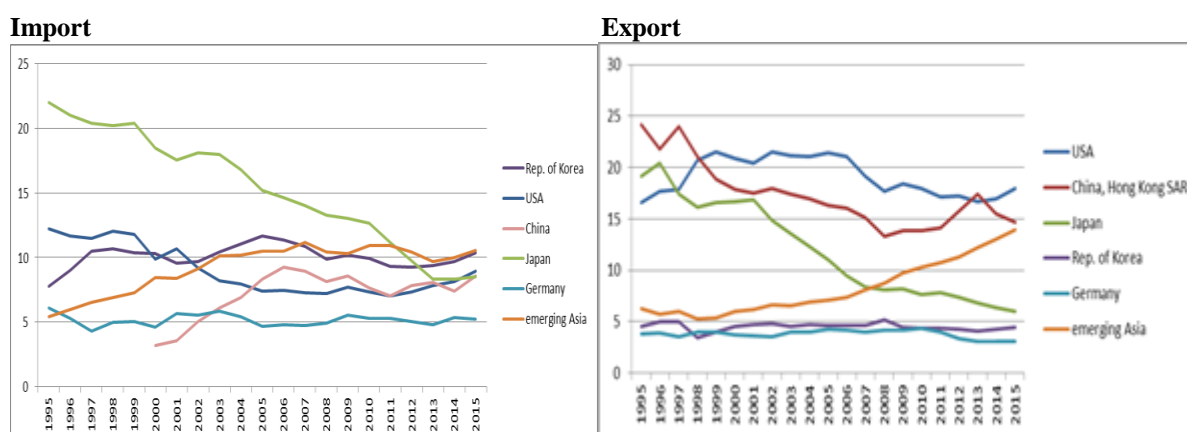
Figure 3.2: Key China's imports by sector, 1995-2015
(Share of China's total imports)



Source: UN Comtrade – Data is based on HS 2 digits categories: 85 (electrical, electronic equipment), 84 (machinery etc.), 50 to 63 (textile and clothing), 64 (footwear) and 72 to 83 (metal).

The top five destination countries of China exports remained mainly advanced Asian countries (Japan, China Hong Kong, Republic of Korea), the USA and Germany (Figure 3.3). However, China exports to Japan and China Hong Kong decreased as a share of total China exports from 19% and 25% in 1995, to 6% and 15% in 2015, respectively. Since 2005, emerging markets in Asia have increased their share in China's exports, reaching 14 per cent in 2015 (Figure 3.3). This increase was mainly driven by Viet Nam and India, which both have appeared in the top ten destinations of China's exports in 2015 (Figure 3.4).

Figure 3.3: Key China's trade partners, 1995-2015
(share of China's total)

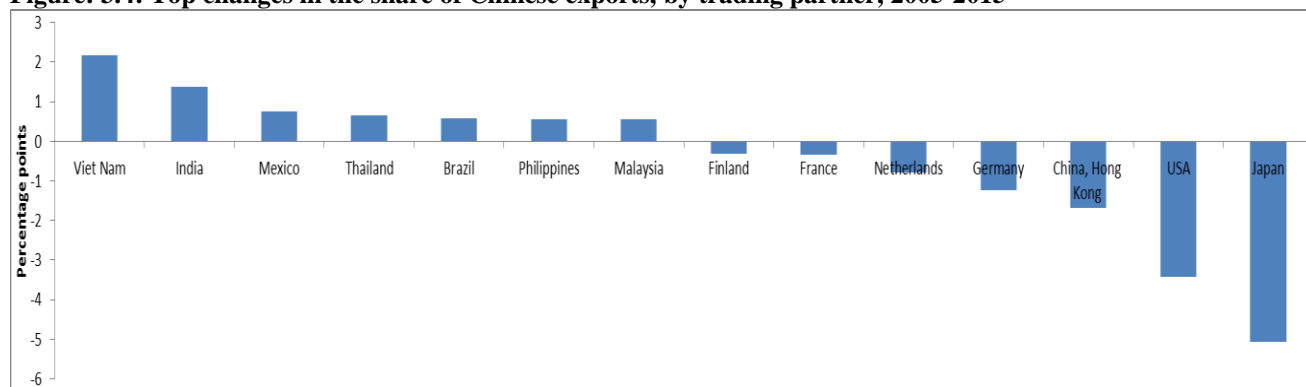


Source: UNComtrade.²

² Emerging Asia is defined, for the purpose of this graph, as developing members of the ASEAN (Indonesia, Thailand, Philippines, Malaysia, Viet Nam, Myanmar, Cambodia, Laos, excluding Brunei and Singapore), and South Asia (Bangladesh, India, Pakistan and Sri-Lanka)

China's exports to developing members of ASEAN and the sub-Indian continent (Bangladesh, India, Pakistan and Sri-Lanka) have also grown faster than the world average (an annual average increase of 17 per cent between 2005 and 2015, almost twice as much as for the world). In 2015, China's exports to these countries consisted of more than half of intermediate products.

Figure: 3.4: Top changes in the share of Chinese exports, by trading partner, 2005-2015



Source: Author's calculation based on UN Comtrade

The top five exporters to China in 2015 were the Republic of Korea, the USA, China, Japan and Germany.³ The share of China's imports from Japan decreased from 20% in 1995 to 9% in 2015. Similar to exports, emerging Asia became a more important source of imports for China, from around 5 per cent of China's imports in 1995 to 11 per cent in 2015). Malaysia and Thailand appeared among the top ten countries in Chinese imports.

III.2 The specific example of trade in textile and apparel

As indicated in the previous section, the share of textiles and clothing in China's trade has been declining in the past twenty years, but paradoxically, China's share in world's textiles and clothing exports has more than doubled (from 13 in 1995 to 38.5 percent in 2014, its peak), although it started to "plateau" in 2015⁴. In fact, a 2013 survey of leading global buyers in the sector found that 72 percent of respondents planned to decrease their share of sourcing from China over the next five years (Lopez-Acevedo and Robertson, 2016). To seize this opportunity, emerging Asia countries are competing not only on cost but also on quality, lead times and social/environmental compliance, which are increasingly important for buyers.

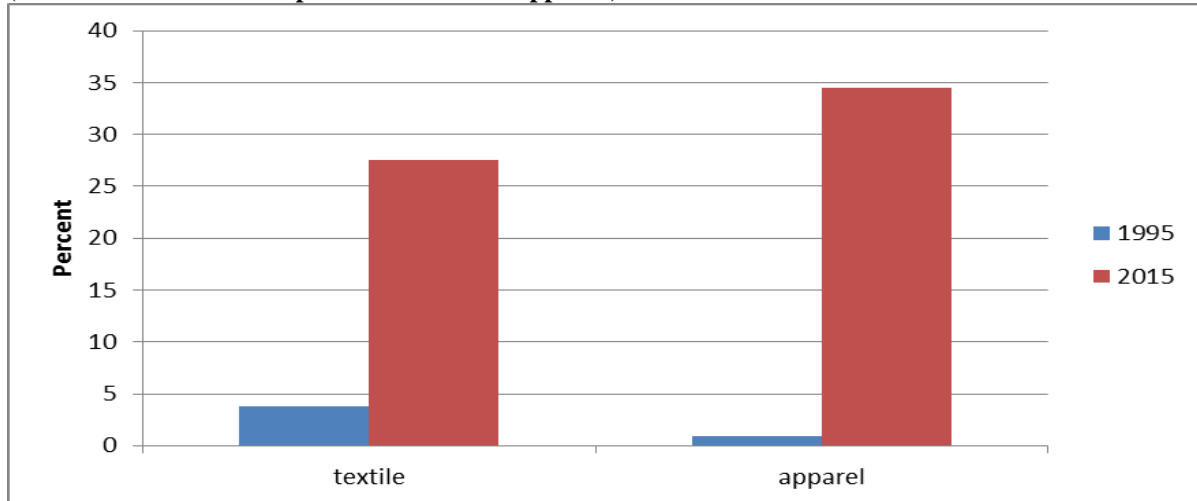
In this overall picture, the most notable development is the increase in bilateral trade links between China and developing Asian countries (both in ASEAN and in South Asia), both in textiles and apparel – and both imports and exports, although more on the import side.

³ China itself emerged as a major location of imports, but this includes the way goods that are exported to Hong Kong for light processing and then re-imported into China are recorded.

⁴ The China's share in world's textiles and clothing imports fluctuated around 4-5 per cent during this period.

China's imports of apparel from emerging Asia increased from around 1 per cent of China's total apparel imports in 1995 to 34 per cent in 2015, and in USD terms from 8 million to 2 billion in this period. Regarding textiles, China's imports from emerging Asia increased from 4 to 27 per cent (USD 0.5 to 7 billion) during the period.

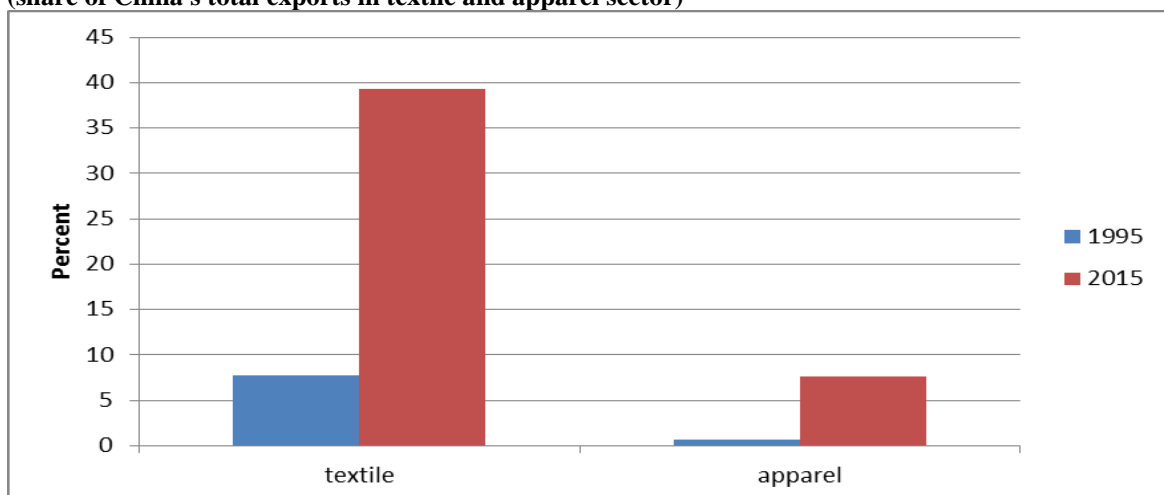
Figure 3.5 : China's import from emerging Asia in textile and apparel sector, 1995-2015 (share of China's total imports in textile and apparel)



Source: Author's calculation based on UN Comtrade

Regarding exports, the same evolution is to be noted, although to a lesser extent. China's exports to emerging Asia increased as a share of both textiles and apparel (0.6 to 8 per cent of the total, and 8 to 39 per cent of the total, respectively). In fact, China's garment exports have become clearly less directed towards the US and the EU, with less than 45% of the total, and are currently expanding mostly to other Asian countries, Africa and Australia (Van Klaveren and Tijdens, 2017).

Figure 3.6 : China's exports to emerging Asia in textile and apparel sector, 1995-2015 (share of China's total exports in textile and apparel sector)



Source: Author's calculation based on UN Comtrade

It has been argued that the substantial increase in textiles and clothing trade with emerging Asia, both on the import and export sides reflects a tightening of suppliers and buyers links across the region, relative to other buyers and suppliers' links. According to Baldwin and Lopez-Gonzalez (2015), global production networks are increasingly concentrated in and around regional blocks, so-called Factory Asia, Factory North America and Factory Europe.

At this stage, one can also observe that the increase in trade relations is higher on the import side, particularly in apparel; the increase in exports of textiles from China to developing Asia has been larger than the increase in exports of apparel. This could perhaps suggest a transformation of China's textiles into apparel, reflected in the increased of the share and value of China's exports of textiles to Asia, and the even bigger increase in imports of apparel by China, either for the domestic market or for re-selling by international or local brands into international markets.

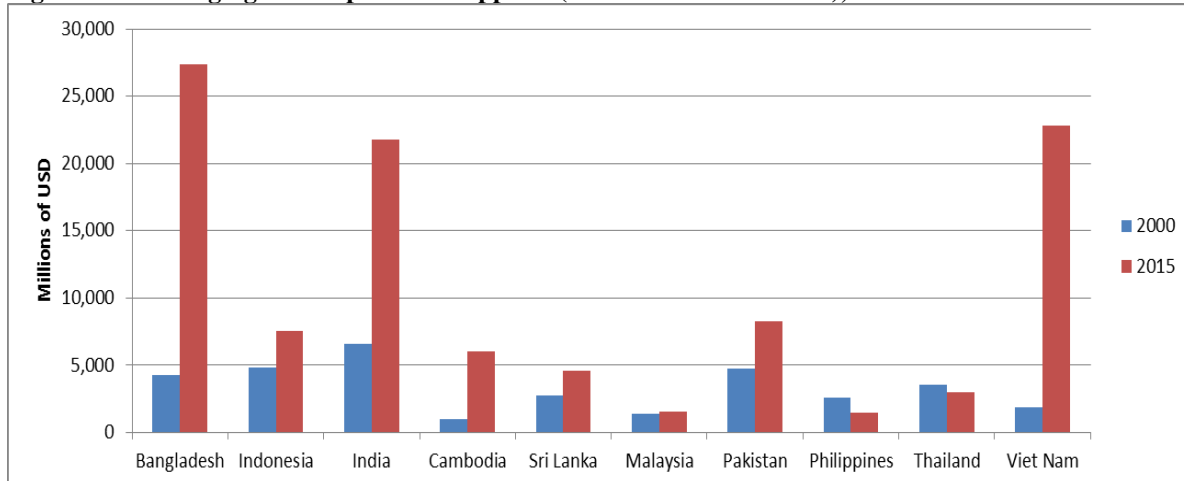
It could also reflect the increased sophistication of China's textiles exports for outward processing in Vietnam and Malaysia, and exports from these countries (Vietnam's overall exports of garments have boomed in recent years).

In this vein, it is observed that the combined share of apparel exports from emerging Asia in world's exports increased massively from around 15 per cent to 22 per cent between 2000 and 2015. The largest beneficiaries are Vietnam, Bangladesh and India both in terms of the rate of increase and world share (Figure 3.7).

In the 2015 world ranking of garment exporters, China was followed by Bangladesh, Vietnam, India and Turkey. Although the world share of exports is still rather small, the rate of increase in export values by Cambodia has also been very high (+12% per annum during this period). Increases in emerging Asian countries have been primarily at the expense of supplier countries located closer to the European and US garment markets, including Central and Eastern European (CEE) countries providing for retailers in the EU as well as Mexico, Central American and sub-Saharan countries supplying the US (Van Klaveren and Tjinders, 2017).

Despite the growth of the garment export shares of India and Vietnam in world trade, the shares of these exports in the total merchandise exports of these countries decreased. By contrast, the economies of Bangladesh and Cambodia have been growingly dependent on garment exports, such exports accounting for respectively over 80% and 65% of those countries' total merchandise exports in 2015 ((Van Klaveren and Tjinders, 2017).

Figure 3.7 : Emerging Asia exporters of apparel (in millions of US dollar), 2000-2015



Source: Author's calculation based on UN Comtrade.

Note: For Pakistan the first available year is 2003.

IV. ANALYSING TRADE INTENSITIES

One can only infer so much from absolute trade numbers, shares and growth rates.

While statistics in value terms seems to point to tightening trade relations between China and other Asian countries, our investigations in this section aimed at calculating trade intensity indices for such bilateral trade, both on the import and export sides, as well as in aggregate and by sector.

Box 1: Trade Intensity Index

A trade intensity index (T) helps determining whether the value of trade between two countries is greater or smaller than would otherwise be expected on the basis of their importance in world trade. It is defined as the share of one country's exports going to a partner divided by the share of world exports going to the partner. A Trade intensity index can be calculated from the export side (export intensity index (EII)) and from the import side (import intensity index (III)). Export and import intensity indices reflect the ratio of the share of country *i*'s trade with country *j* relative to the share of the rest of the world with country *j*. Following the work pioneered by Brown (1949) and popularised by Kojima (1964) and Drysdale (1969), the index of trade intensity are calculated as:

$$EII_{ij} = \frac{X_{ij}/X_{iw}}{M_{jw}/(M_w - M_{iw})}$$

$$III_{ij} = \frac{M_{ij}/M_{iw}}{X_{jw}/(X_w - X_{iw})}$$

Where X_{ij} and X_{iw} are the values of country i 's exports to country j and to the world respectively, M_{jw}, M_{iw}, M_w are country j , country i and world total imports. M_{ij} and M_{iw} are the values of country i 's imports from country j and from the world, while X_{jw}, X_{iw}, X_w are country j , country i and world total exports.

An index of more (less) than one indicates a bilateral trade flow that is larger (smaller) than expected, given the partner country's importance in world trade. We can think of the trade intensity index as a uniform export/imports share. In other words, the statistic tells whether a country or region trade more as a percentage to a (from a) particular destination than the world does on average. It does not suffer from any 'size' bias, so we can compare the statistic across regions, and over time when exports/imports are growing rapidly.

Tables 4.1 and 4.2 highlight results.

Table 4.1 provides results for China's total import and export intensity in bilateral trade, by main trading partner (not only Asian trading partners), for all products, in three distinct years of the past two decades (1995, 2005 and 2015). In Table 4.2, computations are disaggregated by main categories of traded products, e.g., textiles and apparel, on the one hand, and electric and electronic products and machinery, on the other.

Table 4.1: export and import intensity index for China 1995-2015

| | aggregate | | | | | |
|----------------------|------------------|------|------|------------------|------|------|
| | Export intensity | | | Import intensity | | |
| | 1995 | 2005 | 2015 | 1995 | 2005 | 2015 |
| Bangladesh | 3.6 | 2.5 | 1.8 | 0.5 | 0.1 | 0.2 |
| China, Hong Kong SAR | 5.7 | 5.3 | 3.8 | 1.7 | 0.6 | 0.2 |
| China, Macao SAR | 12.1 | 4.6 | 2.8 | 2.2 | 1.5 | 1.1 |
| France | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.4 |
| Germany | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 |
| India | 0.6 | 0.8 | 0.9 | 0.4 | 1.4 | 0.4 |
| Indonesia | 1.1 | 1.9 | 1.5 | 1.6 | 1.4 | 1.1 |
| Malaysia | 0.5 | 1.2 | 1.6 | 1.0 | 2.0 | 2.2 |
| Pakistan | | 1.8 | 2.4 | | 0.7 | 0.9 |
| Philippines | | 1.2 | 2.4 | | 4.4 | 2.7 |
| Rep. of Korea | 1.5 | 1.7 | 1.5 | 2.8 | 3.8 | 2.7 |
| Sri Lanka | | 1.5 | 1.4 | | 0.1 | 0.2 |
| Thailand | 0.8 | 0.9 | 1.2 | 1.0 | 1.8 | 1.5 |
| USA | 1.0 | 1.2 | 1.1 | 0.9 | 0.8 | 0.8 |
| Viet Nam | | 2.0 | 2.5 | | 1.1 | 1.3 |

Source: Authors calculation based on UN Comtrade. Empty cells reflect the fact that data was not available to calculate import intensity indices.

Table 4.1 confirms the increased dynamism of China's overall trade relations with several emerging Asian countries. On the export side, trade intensity indices increased through the past two decades with Malaysia, the Philippines, Pakistan, Thailand, Viet Nam and India. Increased export intensity suggests that China's exports are more intense

with these countries (in the meaning of Box 1), relative to these countries' trade with the rest of the world.

For some countries (the Philippines, Thailand and Malaysia), China's import intensity has also been growing through the past two decades or has remained at a high level of intensity.

By contrast, China's export and import intensity has been either falling or remained at a low level, such as for Bangladesh and Sri Lanka (although it could be argued that China's level of export intensity with Bangladesh remains relatively high).

China's export and import intensity with Hong-Kong, China, Macao, and Japan have also decreased, as the total value of trade between China and these countries has actually declined (see section 3.1). Hong Kong China and Macao no longer play the role of "gate" to China as much as they used to, although trade intensity indexes, while falling very substantially, remain generally high.

China's trade intensity indices with the Republic of Korea, while being stable over two decades, remained very high. China's high reliance on the US market is confirmed by the high export intensity index. By contrast, China's export and import intensity is relatively low and stable with its main European partners.

Table 4.2: export and import intensity index for China 1995-2015, selected sectors

| | apparel | | | | | | textile | | | | | |
|----------------------|------------------|------|------|------------------|------|------|------------------|------|------|------------------|------|------|
| | Export intensity | | | Import intensity | | | Export intensity | | | Import intensity | | |
| | 1995 | 2005 | 2015 | 1995 | 2005 | 2015 | 1995 | 2005 | 2015 | 1995 | 2005 | 2015 |
| Bangladesh | 0.2 | 0.2 | 0.6 | 0.1 | 0.1 | 0.8 | 1.6 | 2.8 | 1.1 | 0.3 | 0.4 | 0.8 |
| China, Hong Kong SAR | 3.5 | 1.5 | 1.1 | 1.8 | 3.6 | 0.1 | 3.6 | 2.9 | 1.9 | 1.2 | 0.7 | 0.1 |
| China, Macao SAR | 14.1 | 2.2 | 0.5 | 1.3 | 10.7 | 6.5 | 1.8 | 1.8 | 5.7 | 4.6 | 0.3 | 2.7 |
| France | 0.1 | 0.4 | 0.4 | 0.0 | 0.3 | 0.5 | 0.1 | 0.2 | 0.2 | 0.0 | 0.2 | 0.7 |
| Germany | 0.2 | 0.5 | 0.5 | 0.0 | 0.2 | 0.0 | 0.2 | 0.3 | 0.3 | 0.1 | 0.1 | 0.3 |
| India | 0.3 | 1.2 | 2.6 | 0.1 | 0.1 | 0.3 | 1.3 | 2.8 | 1.5 | 0.1 | 0.4 | 1.1 |
| Indonesia | 1.2 | 5.1 | 4.4 | 0.1 | 0.2 | 1.7 | 0.3 | 2.3 | 1.0 | 0.3 | 0.5 | 0.8 |
| Malaysia | 1.4 | 4.7 | 3.3 | 0.0 | 0.5 | 0.8 | 0.5 | 1.8 | 2.3 | 0.8 | 0.8 | 0.7 |
| Pakistan | | 8.1 | 3.4 | | 0.0 | 0.5 | | 1.7 | 2.6 | | 1.1 | 2.2 |
| Philippines | | 6.0 | 9.6 | | 0.4 | 0.8 | | 1.6 | 5.6 | | 0.5 | 2.4 |
| Rep. of Korea | 3.4 | 3.4 | 1.6 | 2.4 | 5.4 | 3.6 | 2.3 | 2.0 | 1.3 | 1.7 | 2.0 | 1.2 |
| Sri Lanka | | 0.8 | 1.0 | | 0.1 | 0.7 | | 1.2 | 1.0 | | 0.2 | 0.5 |
| Thailand | 2.5 | 0.7 | 2.4 | 0.0 | 0.4 | 2.1 | 0.8 | 0.9 | 1.1 | 0.7 | 0.9 | 0.8 |
| USA | 0.4 | 0.7 | 0.9 | 0.2 | 0.7 | 0.4 | 0.7 | 0.6 | 0.7 | 1.1 | 1.0 | 0.8 |
| Viet Nam | | 1.3 | 19.2 | | 0.3 | 1.6 | | 1.1 | 1.6 | | 0.7 | 2.7 |
| | electronics | | | | | | machinery | | | | | |
| | Export intensity | | | Import intensity | | | Export intensity | | | Import intensity | | |
| | 1995 | 2005 | 2015 | 1995 | 2005 | 2015 | 1995 | 2005 | 2015 | 1995 | 2005 | 2015 |
| Bangladesh | 8.9 | 1.9 | 2.0 | 0.0 | 0.0 | 0.5 | 21.7 | 1.2 | 1.7 | 0.0 | 0.0 | 0.5 |
| China, Hong Kong SAR | 3.9 | 3.0 | 2.2 | 1.6 | 0.3 | 0.0 | 7.4 | 5.3 | 3.7 | 1.6 | 0.3 | 0.0 |
| China, Macao SAR | 4.5 | 3.0 | 1.2 | 0.5 | 0.5 | 0.0 | 6.4 | 1.0 | 1.6 | 0.5 | 0.5 | 0.0 |
| France | 0.3 | 0.5 | 0.4 | 0.5 | 0.4 | 0.2 | 0.2 | 0.4 | 0.3 | 0.5 | 0.4 | 0.2 |
| Germany | 0.6 | 0.7 | 0.4 | 0.5 | 0.3 | 0.4 | 0.6 | 0.7 | 0.6 | 0.5 | 0.3 | 0.4 |
| India | 0.7 | 1.2 | 1.2 | 0.3 | 0.3 | 0.2 | 1.2 | 1.0 | 1.6 | 0.3 | 0.3 | 0.2 |
| Indonesia | 1.3 | 2.6 | 1.2 | 0.1 | 0.6 | 0.6 | 1.7 | 1.3 | 1.4 | 0.1 | 0.6 | 0.6 |
| Malaysia | 0.2 | 0.5 | 0.7 | 0.2 | 1.8 | 2.1 | 0.7 | 1.4 | 1.2 | 0.2 | 1.8 | 2.1 |
| Pakistan | | 1.7 | 2.6 | | 0.0 | 0.0 | | 1.7 | 2.6 | | 0.0 | 0.0 |
| Philippines | | 0.5 | 0.7 | | 3.2 | 1.4 | | 0.7 | 1.5 | | 3.2 | 1.4 |
| Rep. of Korea | 0.8 | 1.3 | 1.7 | 0.9 | 2.2 | 2.3 | 0.4 | 1.1 | 1.1 | 0.9 | 2.2 | 2.3 |
| Sri Lanka | | 1.4 | 1.6 | | 0.4 | 0.3 | | 1.1 | 1.5 | | 0.4 | 0.3 |
| Thailand | 0.3 | 0.5 | 0.8 | 0.2 | 1.3 | 1.1 | 0.8 | 0.9 | 1.2 | 0.2 | 1.3 | 1.1 |
| USA | 1.0 | 1.3 | 1.0 | 0.7 | 0.5 | 0.5 | 1.1 | 1.4 | 1.2 | 0.7 | 0.5 | 0.5 |
| Viet Nam | | 0.9 | 1.0 | | 0.5 | 1.0 | | 1.3 | 1.5 | | 0.5 | 1.0 |

Source: Author's calculation based on UN Comtrade – NB: empty cells reflect the fact that data was not available to calculate import intensity indices.

As indicated above, we calculated China's import and export intensity for four product groups: textile, apparel, electronics and electrical products, and machinery. The results are, as follows:

Textiles and apparel

In terms of product groups, China's import intensity in the apparel sector increased significantly between 2005 and 2015 with Thailand, Viet Nam, Bangladesh and Indonesia. While these countries joined the group of top ten exporters of clothing in the world, in 2015, the total value of trade between these countries and China had increased even more, leading to an increase in the China's import intensity index. According to Zhu and Pickles (2014), since 2009 more than 1.000 China apparel enterprises had set up factories or invested in local workshops in Cambodia, Viet Nam and Bangladesh, leading to an increase in China's imports of clothing from these countries. On the other hand, China's import intensity of apparel with Hong Kong, Macao and the Republic of Korea declined as these countries shifted to higher value added products.

On the export side, some of these evolutions are further marked, with an increase in apparel's export intensity to Viet Nam (from 1.3 to 19.2), reflecting the increase in outward processing and assembling of garments from China. As noted by the US Department of Commerce, "the country (Viet Nam) ranks fifth worldwide in textile and apparel exports and has a labour force in that sector of more than 2 million people, of whom 1.3 million are working directly in the industry".

Vietnam's textile and apparel industry has benefitted from increased foreign investment over the past several years. The industry's greatest advantage is its low-cost labour and relatively young and stable worker base. About 70 percent of Vietnam's textile and apparel production is via "processing trade" using imported textiles and other inputs, predominantly from China. Investment in fibre, yarn and textile manufacturing is rising, particularly for spinning and weaving, so the quantity and quality of textile production is likely to increase. Many textile and garment companies in the region have already begun to move production to Vietnam. Vietnam is becoming known for being a prime location for investors operating in the textile industry".⁵

The Philippines, and to a lesser extent Indonesia and Bangladesh, follow a similar pattern: a high starting intensity level and a further increase of this level during the period under review. For Viet Nam and the Philippines, the US is the main destination of garment exports.

In the light of the above analysis, it is therefore worthwhile to link China's increased export intensity in the textile sector with the rising import intensity in the apparel sector with Viet Nam, Thailand, the Philippines and Pakistan, supporting the idea of a relocation of labour-intensive apparel manufacturing to these countries. China exports more and more textile goods to Viet Nam, Thailand, Philippines and Pakistan,

⁵ Quote from "2016 Top Markets Report, Technical Textiles, Country Case Study, Vietnam", by the International Trade Administration, US Department of Commerce, available at www.trade.gov/topmarkets.

where labour-intensive processing or assembly of these inputs take place and finished products are then re-exported to China for final consumption or exports to other advanced economies.

Electrical, electronic products and machinery

Between 2005 and 2015, China's export intensity in machinery and electronics increased with many emerging Asian countries (Bangladesh, India, Indonesia, Pakistan, Philippines, Sri Lanka, Thailand and Viet Nam). The rise of emerging market demand for Chinese final exports is particularly strong in telephones and computers – China's two largest export products – in line with the rising income in these countries – so the increased export intensity for these specific products may reflect at least as much an outward-processing story than one of China moving up the value chains and selling products under Chinese brands that it used to export under other countries' brands. For example, one country in this case is India, which has become one of China's main export markets for smart phones, confirmed the increase export intensity in electronic products (as verified at sub-HS2 level).

For other products or semi-products, a high share of China's exports to these countries also consist of intermediate inputs. For example, Vietnam imports intermediate inputs such as electronic components and parts from China, and re-exports assembled products to the world, as confirmed by the high and increasing China's export and import intensity of electronics to Viet Nam. China's import intensity with Vietnam doubled between 2005 and 2015, as Vietnam started to diversify its exports towards labour-intensive electronics (Mathai, et al. 2016). Vietnam's main exports to China are consumer electronics, followed by agricultural products and garments (Mathai, et al. 2016). Outward processing activities in the region intensified, and are not unrelated to the increased trade intensity in the area of machinery, which China exports as part of the overall outward-processing process – machinery being part of the input to outputs exported by processing countries.

Between mid-1990s and mid-2000s China's import intensity in machinery and electronics with Korea and Malaysia increased; interestingly, during the same period, China moved from labour-intensive light manufacturing of simple consumer goods toward assembly of machinery and electronics, which implied a strong import of part and components from these advanced Asian countries.

V. Value added trade

We have complemented investigations on trade flows and trade intensity by the examination of an indicator of vertical specialization, namely the foreign share in the value-added contained in partner exports (in a second step, we calculated China's share in value-added of its partner exports).

To this aim, we have used the Asian Development Bank's (ADB) Multi-Region Input-Output Tables and the World Input-Output Database (WIOD).⁶ The ADB added six Asian countries (Bangladesh, Malaysia, the Philippines, Sri-Lanka, Thailand, and Viet Nam) to data already available from the World Input-Output Database (WIOD), which already included the following Asian countries or customs territories: the People's Republic of China (PRC); Japan; the Republic of Korea; India; Indonesia; and Taipei, China.

In line with data availability, the analysis was extended to two sectors: textiles and clothing, on the one hand, and electronic and electrical products, on the other.

Table 5.1: Foreign value-added origins in exports of selected Asian countries, textile and clothing (per cent of respective gross exports)

| Country | 2000 | 2005 | 2008 | 2011 | 2014 |
|----------------|------|------|------|------|------|
| Bangladesh | 16 | 20 | 25 | 14 | 14 |
| China | 16 | 18 | 15 | 13 | 10 |
| Chinese Taipei | 32 | 38 | 43 | 42 | 39 |
| India | 12 | 15 | 15 | 15 | 13 |
| Indonesia | 26 | 22 | 27 | 26 | 28 |
| Japan | 8 | 12 | 15 | 15 | 17 |
| Korea | 26 | 26 | 30 | 31 | 28 |
| Malaysia | 51 | 33 | 28 | 31 | 31 |
| Philippines | 17 | 21 | 27 | 20 | 19 |
| Sri Lanka | 35 | 35 | 45 | 19 | 17 |
| Thailand | 27 | 29 | 34 | 24 | 29 |
| Viet Nam | 48 | 37 | 47 | 55 | 57 |

Source: Authors' calculation based on data from "Research Institute for Global Value Chains, University of International Business and Economics, 2016, UIBE GVC Index". The data for Bangladesh, Malaysia, Philippines, Thailand, Viet Nam and Sri Lanka are based on ADB-WIOD dataset, while for the remaining countries WIOD is used. In ADB-WIOD textile and clothing is defined as sector number 4, while in WIOD it is defined as sector number 6.

Table 5.1. shows results for the foreign value-added content of exporting countries' gross exports. The findings of the previous chapter are by and large confirmed by this additional analysis. For example, the foreign value added in Vietnam's exports of textile and apparel products is the highest of the sample, close to two-thirds of exported output. This share has increased significantly since 2005. Vietnam has a growing and

⁶ Both data projects are explained at the following website: <http://www.wiod.org/otherdb>

high share of foreign value added (suggestion strong backward linkages), but its value added is not prominent in the value of other countries exports (weak forward linkages), suggesting that the country is engaged mostly at this stage in final-assembly/labour-intensive manufacturing action. Table 5.2 confirms that China is providing a growing share of the input and value-added for final goods to be exported. While not in Table 5.1 because of lack of data for latest years (the latest data being 2011), calculations for Cambodia based on Trade in Value Added (TiVA database) also reveal strong backward linkages with around 60% of its exports in textile and apparel deriving from other countries.

It can also be observed that between 2000 and 2014, the share of foreign value added in Japan and Chinese Taipei's increased, suggesting that the offshoring trend for these products has increased.

In Malaysia the share of domestic value added increased in textile and apparel exports. A similar trend seems to be observed in other middle-income or near-to-middle income countries such as Indonesia, Thailand, and the Philippines.

Table 5.2. Foreign value-added origin in exports of selected Asian countries, electronic and electrical products (per cent of respective gross exports)

| Country | 2000 | 2005 | 2008 | 2011 | 2014 |
|----------------|------|------|------|------|------|
| Bangladesh | 20 | 21 | 14 | 41 | 19 |
| China | 26 | 35 | 34 | 30 | 25 |
| Chinese Taipei | 49 | 44 | 43 | 45 | 40 |
| India | 23 | 27 | 26 | 28 | 24 |
| Indonesia | 26 | 28 | 35 | 36 | 37 |
| Japan | 11 | 15 | 19 | 18 | 23 |
| Korea | 34 | 31 | 36 | 40 | 35 |
| Malaysia | 70 | 64 | 59 | 45 | 35 |
| Philippines | 22 | 46 | 56 | 45 | 27 |
| Sri Lanka | 38 | 46 | 61 | 34 | 44 |
| Thailand | 66 | 64 | 59 | 54 | 41 |
| Viet Nam | 55 | 42 | 60 | 49 | 53 |

Source: Authors' calculation based on UIBE GVC index. The data for Bangladesh, Malaysia, Philippines, Thailand, Viet Nam and Sri Lanka are based on ADB-WIOD dataset, while for the remaining countries WIOD is used. In ADB-WIOD electronic and electrical products is defined as sector c14, while in WIOD it is defined as sector c17 and c18.

In general, "knowledge-intensive" production has higher foreign value added content than "labour-intensive" production, as sectors like electronics rely on complex imported inputs, while sectors such as textile and clothing involve lesser parts and components, or parts and components generally with lower value in the final output.

Viet Nam is an interesting case in this regards. It is specialized in labour-intensive manufacturing, both in garments and electronics. The share of foreign value added in Vietnamese exports of electronics has been increasing since 2005 as the country integrated in global supply chains. With increasing capital investment in these two sectors

locally, locally-produced value added had increased over the past decade (Mathai, et al. 2016, chapter 2). Malaysia and Thailand's domestic value added was somewhat low in 2000, at around 30 per cent, but the two countries expanded as well. Indonesia and also India showed some progress in expanding the domestic value added, especially between 2011 and 2015.

Table 5.3.Chinese value added in selected Asian countries, textile and clothing (per cent of respective gross exports)

| Country | 2000 | 2005 | 2008 | 2011 | 2014 |
|----------------|------|------|------|------|------|
| Bangladesh | 1.2 | 2.5 | 4.9 | 1.8 | 1.8 |
| Chinese Taipei | 0.9 | 2.0 | 3.3 | 3.5 | 4.0 |
| India | 0.4 | 1.8 | 1.6 | 1.7 | 1.8 |
| Indonesia | 1.2 | 2.1 | 4.3 | 4.9 | 6.9 |
| Japan | 0.4 | 0.9 | 1.2 | 1.5 | 2.1 |
| Korea | 1.9 | 2.5 | 3.5 | 3.9 | 4.0 |
| Malaysia | 5.9 | 2.6 | 2.1 | 3.9 | 3.6 |
| Philippines | 1.3 | 2.8 | 4.4 | 3.2 | 2.9 |
| Sri Lanka | 2.0 | 4.1 | 6.4 | 3.3 | 3.6 |
| Thailand | 3.8 | 4.7 | 3.0 | 3.4 | 4.3 |
| Viet Nam | 3.4 | 4.1 | 7.0 | 7.4 | 7.1 |

Source: Authors' calculation based on UIBE GVC index. The data for Bangladesh, Malaysia, Philippines, Thailand, Viet Nam and Sri Lanka are based on ADB-WIOD dataset, while for the remaining countries WIOD is used. In ADB-WIOD textile and clothing is defined as sector c4, while in WIOD it is defined as sector c6. For Bangladesh, Malaysia, Philippines, Thailand, Viet Nam and Sri Lanka the latest data point is 2015 instead of 2014.

Value added data also confirm Asia's increasing integration with China. China's value added in the textile and clothing exports of Indonesia and Viet Nam has increased sharply, from 1.2 and 3.4% in 2000 to 6.9 and 7.1% in 2014 respectively.

The same goes for electronics and electrical products (Table 5.4). China's value added has increased from 1.8% to 4.8% of Viet Nam's exports, from 1.1% to 7% of Indonesia's exports, from 6% to 9% of Thailand's exports, and from 1.1% to 6% of South Korea's exports.

Table 5.4. Chinese value added in selected Asian countries, electronic and electrical products (per cent of respective gross exports)

| Country | 2000 | 2005 | 2008 | 2011 | 2014 |
|----------------|------|------|------|------|------|
| Bangladesh | 0.6 | 0.9 | 1.3 | 3.8 | 1.7 |
| Chinese Taipei | 1.1 | 2.7 | 3.1 | 4.0 | 5.4 |
| India | 0.5 | 1.6 | 2.0 | 3.2 | 3.0 |
| Indonesia | 1.1 | 1.8 | 3.6 | 5.0 | 7.0 |
| Japan | 0.5 | 1.3 | 1.8 | 2.0 | 3.4 |
| Korea | 1.1 | 2.1 | 3.7 | 5.5 | 6.0 |
| Malaysia | 2.7 | 4.8 | 5.2 | 3.9 | 3.1 |
| Philippines | 0.4 | 1.9 | 3.5 | 2.8 | 1.1 |
| Sri Lanka | 1.2 | 4.0 | 6.4 | 4.4 | 9.1 |
| Thailand | 6.0 | 8.0 | 10.7 | 11.5 | 9.1 |
| Viet Nam | 1.8 | 2.0 | 4.8 | 4.1 | 4.8 |

Conclusions of Chapter III to V.

South and East Asian countries have strong and increasingly intensive trade relations with China. Countries recording such an evolution are Vietnam (both in terms of trade intensity and value-added trade), on all products. In the electronics sector, there has been an increase in trade intensity with Malaysia, Indonesia, Thailand, and to a lesser extent Korea and Japan at the higher end of the product spectrum (see below). In the textiles and clothing sector, Vietnam is the country having recorded the strongest increase in trade intensity and value added from China, although Pakistan comes close in textiles. The combined evidence seems to point towards higher China's value-added in most Asian countries exports of electronics – sourcing a lot, while trade intensity figures indicates that China also sells finished electronics to large foreign markets such as India, for example, and not only supply chain relations.

In general China's value added share of exports of other major electronics exporters has only increased (Republic of Korea, Chinese Taipei, Japan) but overall remains small as a share of total exported value. On the other hand, China's foreign value-added in its own exports of textiles and clothing, and to a lesser extent electronics has been declining, China doing more locally of its own products, now some under its own brands. China's two largest export products, computers and cellular telephones, are manufactured with growing Chinese content, but significant parts from the Republic of Korea and Chinese Taipei.

When looking at all countries for which data has been processed, the patterns of foreign value added tends to follow several up-and-down stages, as countries (and new products) develop: at the early stage of value-chain integration, the foreign value increases as imported inputs account for a high share of total value in outward processing operation; in a second stage, at an intermediary level of development, the foreign value falls as local brands develop and local production expands. This phase seems to be compatible with an increase in trade intensity as trade in parts continue to grow, as

gravity matters in sourcing parts and selling the output. In other words, the supply chain tightens as new local brands get closer to customers. At a higher level of development or for more sophisticated producers, intermediary producers may continue to provide mid-level input for new categories of products designed and sold by more developed countries (optics, new generation of machinery, micro-chips, etc).

VI. Unit Labour costs, gravity, trade intensity

The story emerging from this and other papers brings forward the assumption that China, like other countries closing their wage-to-productivity gap in labour intensive activity, is shifting its production function (with a changing mix of capital and labour) while not necessarily changing the nature of products manufactured: China continues to produce textiles and clothing, as reflected by its higher share of world trade, but a lower share in China's total trade, and produces more machinery and electronics products than in the past.

In this process, it has developed its own brands, particularly in capital intensive products (electronics, transport, energy generating industries), while outsourcing by investing in outward-processing activities in less capital intensive ones (textiles and clothing). Unit labour costs must be a determinant in this process. The outsourcing process seems, as evidenced in the previous sector, to take place mostly regionally – by contrast to early supply chains producing mainly for European or US consumers. Following this, we designed a model specification associating these elements with proper country and time fixed effects, which absorb respectively time invariant country effects and country invariant year effects.

We modelled China exports with 12 Asian countries, by sector, as a function of GDP of the trading partner, geographical distance and the difference in unit labour cost between the exporting country (China) and importing countries (its individual Asian trading partner). Regressions cover annual data for the past 21 years, in the period 1995 to 2015 (included).

The estimated equation, after log-linearization, is the following:

$$\log(X_{CHNjkt}) = a_0 + a_1 * \log(GDP_{CHNt}) + a_2 * \log(GDP_{jt}) + a_3 * \log(dist_{CHNj}) + a_4 * \log(Dulc_{CHNjt}) + x_j + x_t + \varepsilon_{ijt}$$

Where:

X_{CHNjkt} stands for trade between China and country j at time t in sector k;

a_0 is the intercept;

GDP_{CHNt} is the Gross Domestic Product of China at time t;

GDP_{jt} is the Gross Domestic Product of country j at time t;

$dist_{CHNj}$ represents the geographical distance between the capital of China and country j;

$Dulc_{CHNjt}$ represents the difference (subtraction) in the changes of unit labour costs of China and importing country j at time t ;
 x_j and x_t are country and time fixed effects;

Data sources comprise the UN COMTRADE, for bilateral trade, the CEPII, for distance and GDP, and the Economic Intelligence Unit, for unit labour costs.

According to standard "gravity" theory (Anderson, 1979), the effect of the domestic and foreign country's size, as measured by GDP, on exports, is expected to be positive; geographical distance being generally a proxy for transport costs is expected to be negatively correlated to exports. We also tested how China's exports to neighbouring Asian countries were sensitive to changes in relative unit labour costs (ULC), which is typically one major indicator of competitiveness.

Unit labour costs (more than absolute labour costs) play an important role in labour intensive industries, and its changes, for a country willing to move-up the value-chain, may lead to relocation of labour intensive tasks, preferably to neighbouring countries if gravity applies. This may eventually lead to increasing exports by the exporting country of intermediates if country where production is relocated is mainly doing export processing. It has been observed in Section III that the trade intensity between China and Vietnam, both on the import and export side, has increased in sectors such as textiles and clothing, and electronics.

Actually, Figure 3.5 indicates that China, which was recording very few imports from the rest of Asia in 1995 in textiles and clothing, had become of significant importer of these products from this destination – the share of clothing imports having actually increased faster than that of textiles.

Figures 3.6 shows that on the export side, textiles exports from China to the rest of Asia increased substantially, leading to a presumption that at least part of this increase could be exports of textiles inputs for outward production, to be imported in the form of clothing after processing. In this case, the exports from China would be positively correlated to the increase in China's unit labour costs relative to its neighbours. In other words, the exports of inputs – translating increased outward processing – would increase in positive correlation with the gap between China's labour costs and its neighbours'.

The regression results confirm the above expectations.

Changes in unit labour costs play an important role in China's bilateral exports, particularly in textiles and clothing. In electronics, the role of relative unit labour costs is not significant for China's exports. The size of trading partners is an important and positive factor, with high coefficient (more than unit). As expected, distance is negatively correlated to Chinese exports.

Table 6.1: Panel Regression Estimated Results

| VARIABLES | (1) Textile & apparel | (2) electronics | (3) Textile | (4) apparel |
|---------------|-----------------------------|----------------------|----------------------|----------------------|
| lgdp_CHN | 0.207** (0.100) | 0.988*** (0.0837) | 0.119 (0.104) | 0.261** (0.129) |
| lgdp_imp | 1.893*** (0.153) | 1.028*** (0.128) | 1.765*** (0.159) | 2.347*** (0.197) |
| Ldist | -0.958** (0.470) | -6.053*** (0.392) | -0.381 (0.488) | -1.589*** (0.604) |
| Lulc | 0.0914** (0.0430) | -0.00926 (0.0358) | 0.143*** (0.0446) | 0.0903 (0.0552) |
| Constant | -32.15*** (5.681) | 6.706 (4.733) | -31.44*** (5.896) | -41.44*** (7.296) |
| Observations | 252 | 252 | 252 | 252 |
| Number of imp | 12 | 12 | 12 | 12 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Analysing the trade flows in textile and apparel separately shows that the changes in unit labour cost have a positive and statistically significant effect on the exports of textiles, but not on the exports of apparel. This may reflect the fact that textile is an intermediate exported by China coming as an input for outward processing. It may be more sensitive to relative unit labour changes. It may also be that the increase in the gap in unit labour cost between China and other Asian countries is positively related to Chinese exports of intermediates textiles, as a consequence of China relocation of production.

VII. Conclusion

This paper used a variety of economic tests (trade flows and intensity analysis, value added and econometric analysis) to show that the shift in the lower value added production from China to countries in the following development "tier" has actually become a reality – for quite a time according to the datasets used. China's production upgrading has offered opportunities for new frontier countries to further integrate in world trade and advance development objectives as well. The paper finds evidence of China intensifying backward and forward trade links in the most labour intensive industries, notably with neighbouring Asian economies. Unit labour cost and gravity have been major determinants. Gravity does not only apply for distance, but also for GDP. It has been observed in the paper that the intensification of trade links on the export side could relate to a strongly expanding local market (for example India for electronic products such as smartphones, which is also consistent with gravity). The intensification of trade links both on both the import and export sides with Vietnam and Bangladesh reflect in part increased supply chain chains and investment links.

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