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LA COMPÉTITIVITÉ COÛTS ET HORS-COÛTS DE LA CHINE ET SES ENJEUX POUR LE COMMERCE INTERNATIONAL

CHINA'S COST- AND NON-COST COMPETITIVENESS AND ITS IMPACTS ON WORLD EXPORT

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Abstract

This thesis studies the cost- and non-cost competitiveness of China and its impacts on the rest of the world between 1970 and 2012. At outset, Chinese commercial performance was gradually enhanced by its cost-competitiveness. Since 1990s, China has lost the cost advantage, especially compared with Thailand and India. Furthermore, Chinese non-cost advantage, based on structural change of export, has relied on the rise of imported inputs. It implies that firstly the dependence of Chinese exports on other countries has increased and, secondly, Chinese exports have progressively induced more exports of the rest of the world than before. Asian countries have been the largest beneficiaries of Chinese export expansion.

Résumé

La thèse étudie la compétitivité-coûts et hors-coûts de la chine et ses impacts sur le reste du monde entre 1970 et 2012. Au début, la performance commerciale de la Chine s'appuyait sur la compétitivité-coûts. Depuis les années 1990, son avantage-coûts a diminué, surtout comparée à la Thaïlande et à l'Inde. Par ailleurs, son avantage hors-coûts, mesuré par le changement structurel, a été accompagné par une augmentation de la contribution des inputs importés à l'exportation.. Ceci indique premièrement que la dépendance chinoise vis-à-vis du reste du monde a augmenté et, deuxièmement, que l'exportation chinoise a entrainé plus d'exportation du reste du monde qu'auparavant. Parmi ces exportateurs, les pays asiatiques sont toujours les plus grand bénéficiaires de cette expansion des exportations chinoises.

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General introduction

Chinese export growth is generally considered as one of the main cause of global imbalances. Facing the subprime crisis of 2008, the world including the USA and Europe, recorded a brief stagnation. Yet China recovered quickly at the end of 2009 and has overtaken Germany to become the world's largest exporter of goods. In this context, our main questions are “What are the explaining factors of the rise of Chinese exports?” and “What has been the impacts of China’s rising exports on world trade?”

Many researchers have studied this issue. Some economists note that China has enhanced its exports through reducing production costs. The exchange rate has also had a major impact. (Thorbecke and Zhang 2008, He and Zhang 2009, Guo 2009). By contrast, others believe that the impacts of production costs were limited. it was the structural reform which conducted Chinese burgeoning trade surplus (Li cui 2007, Xing 2008).

According to the study of trade data, China has succeeded to transform the structure of its exports. It has become more specialized in sophisticated sectors between 1970 and 2012. However, this assessment based on export statistics leads sometimes to wrong conclusions. If measured by domestic value added or net export (export minus import), the growth of China’s sophisticated exports appears more modest.

Hummels, Ishii, Yi (HIY 1999) propose the concept of vertical specialization and a methodology based on input-output tables, which permit to evaluate the imported inputs’ content of export and to differentiate the domestic and foreign value added in exports.

Many researchers use HIY’s proposition and find that the foreign value added of Chinese exports has increased between 1995 and 2002. Besides, China’s imported inputs embodied in a unit of high-skilled export were higher than in low-skilled exports (Chen 2001, 2008, Koopman 2008). Thus, China’s export growth and the structural change have relied more on the imports from other countries than before. In addition, China’s export growth has induced more exports of the rest of the world than before.

Indeed, China’s trade expansion has also reduced other countries’ exports. This exclusion effect is obvious for the countries with similar export structure, while the effect is lesss clear for the countries with trade complementarities. Many economists find that the impact of Chinese rising exports on other countries varies across markets, sectors and periods.

A key- question is how to measure its impacts?

This thesis aims at analyzing China's cost and non-cost competitiveness to identify the causes of the rise of Chinese exports. Furthermore, we will set up the regional input-output tables that allow us to measure China's impacts on world export.

The thesis has three chapters. In the first chapter, we compare the cost competitiveness of the whole economy ("total economy") and of the manufacturing sector ("manufacturing") of China with those of 19 other countries, including 5 European industrialized countries, 11 Asian countries, the United States, Mexico and Brazil. This comparison shows clearly the performance of China. We firstly present the methodology and the data to measure the cost competitiveness. It will be measured by the unit labor cost, which decomposes the cost competitiveness into two principal elements: labor compensation and labor productivity. The former has a positive effect on the cost (higher compensation, higher cost) and the later has a negative impact. Furthermore, as the exchange rate affects a country's real wage level, it is evidently associated to the cost competitiveness analysis.

Then we compare the relative unit labor cost and its components of China with those of the other countries and we analyse their relationships. We can therefore understand the sources of China's cost advantages. Finally, we analyze the impact of cost competitiveness on the export performance for each country during the 1970-2012 periods. The indirect measurement of non-cost competitiveness will be also used in this chapter.

In Chapter 2, we study the non-cost competitiveness and the changes of specialization. Section 2 will shad lights on China's structural changes of export on the basis of trade data, by stage of production, technology level and sector.

Section 3 will analyze China's structural changes on the basis of input-output tables. The existing literature mostly uses the 2002 input-output table. We extend the period to 2005 and 2007. We compute the foreign value added (also named the vertical specialization or imported inputs) in china's production for the export in 135 sectors, which is the most disaggregated level among recent researches. Besides, we match the sector classification of Chinese bureau of statistics with the OECD classification. We reconstruct the 135 sectors' input-output table into a 48 sectors' table and we compare our findings with OECD's results to confirm the robustness of our analysis. Then we combine the input-output tables with trade data and we interpret the results.

Section 4 will provide empirical studies to confirm our conclusions. A large number of researchers argue that the dependence of Chinese exports on imported inputs has increased but it has not been clearly proved. Thus, we build a macroeconomic equation to show the linear correlation between Chinese exports and foreign content. We obtain an additional result on the change in foreign dependence.

Chapter 3 focuses on Chinese impacts on world export. In section 2, we use bilateral trade data to build an econometric estimation of the relationships between China and 12 other representative countries. Whether China has a crowding-out effect or a promotion effect on the given countries will be showed as the results of panel estimation.

Section 3 establishes the regional input-output tables during the 1995-2012 periods in order to evaluate Chinese promotion effect. There is a little research using this method. Firstly, the data, especially Chinese data, are hard to collect and to adjust. Secondly, the assumptions of this method still need to be further verified. However, the regional input-output table could illustrate directly the impact of Chinese rising exports on the exports of each country. We investigate Chinese impacts by country and by sector in section 4.

Chapter I

Measuring Cost Competitiveness of Chinese Export: International Comparison

ABSTRACT

This chapter is centered on the causes of Chinese export catch-up. We estimate the cost and non-cost competitiveness of China and of 18 other countries between 1970 and 2012 in three steps: firstly by providing an overview of the method to analyze the competitiveness, secondly by identifying the factors that affect it, at last we carry out empirical studies. At the beginning, Chinese commercial performance was gradually enhanced with a sharp decline of labor cost. Lower labor remuneration, depreciated currency and improved productivity were the main favorable factors. However, its wages have increased since 1990s, thus China lost the cost advantages, especially compared with Thailand and India. Its exports have started to rely more on non-cost competitiveness factors. According to the econometric results, both cost and non-cost competitiveness have significant impacts on trade performance. Emerging countries always benefited from the cost advantages but lost from non-cost handicap. Developed economies were mainly disadvantageous in cost but also handicapped in non-cost aspect, except Germany and Japan.

JEL Classification: F14, F16, J30, L60, O47

Keywords: unit labor cost, trade coverage ratio (export import ratio)

1. Introduction

Chinese export growth is generally considered as a major cause of global imbalance, with 18% per year rise from 1979 to 2007. Even though the subprime crisis in 2008 provoked a brief stagnation, China recovered quickly at the end of 2009 and has then overtaken Germany to become the world's largest exporter of goods, while the USA and Europe recorded a slowdown during this period.

Given the increasing importance of Chinese exports, many researchers have studied the underlying reasons of their success. Thorbecke and Zhang (2008) have done empirical studies to assess the impact of exchange rate on Chinese manufacturing export. They found econometric evidence that China has profited from currency undervaluation and that an appreciation would substantially reduce its exports of labor-intensive products. Besides, He and Zhang (2009) noted that Chinese government plays a constructive role in trade development. It carried out diverse favorable policies and strategies, for instance, diminishing SOE[1] share, raising the proportion of Foreign Invested Enterprises and establishing Special Economic Zones in order to improve productivity and cut the cost of production. Guo (2009) showed that the growth of Total Factor Productivity in China was faster than in OECD countries.

Differently, Li cui (2007) thought that the effects of exchange rate and production costs were limited; by contrast, it was the structural reform that drove Chinese burgeoning trade surplus. Shifts from low value added products toward higher value chain and more sophisticated products allow Chinese exports to be more adaptable to the variety of international demands. Xing (2008) viewed China as a platform not only for traditional goods but also for High-Tech products. Benefiting from Foreign Direct Investments and growing externalities, China has made remarkable progress in technology and nowadays it has become the largest exporter of ICT[2] products.

However, there have been very few studies that compare the output, employment and cost levels among different countries. This research focuses on this kind of comparison, providing twofold advantages: Firstly, every factor of competitiveness (according to macroeconomic fundamental calculation) has been taken into account, which permits to avoid the one-sided result and inaccurate statement, since each one has an impact on country's performance no matter whether it's striking or not. Secondly, the

[1] State owned Enterprise. According to the industrial enterprise survey constructed and released by China's National Economic Bureau, since 1999 till 2008, the share of SOEs has declined from 37% to less than 5% in terms of numbers, and from 68% to 44% in terms of assets for the industrial sector.

[2] Information and Communication Technology, including computer, mobile phone, bio-tech product, aerospace equipment and so on, corresponding the code 75,76,77 of SITC rev.3 classification.

international comparison across country shows clearly the increasing performance of China's trade. In this chapter, we use the usual method to analyze the cost competitiveness by Unit Labor Cost (ULC). The next section presents the methodology and data of the measurement of cost competitiveness. We decompose cost competitiveness into two elements: labor compensation and labor productivity. The former has a positive effect on cost (higher compensation, higher cost) and the later has a negative impact. Furthermore, as exchange rate affects a country's real salary level, it is evidently associated to the cost competitiveness. In section 3 and section 4, we compare the variations of these components for the total economy and the manufacturing sector in 19 countries. These 19 countries are:

US, 5 European industrialized countries, including France, Germany, Italy, Spain and United Kingdom; 11 Asian countries, including China, Japan, South Korea, Taiwan, Singapore, India, Thailand, Indonesia, Malaysia, Philippines and Vietnam; plus Mexico and Brazil. The analyses for Brazil was not possible to implement fully[3], thus this country will be excluded in the manufacturing's estimation. However, we still illustrate in figure the result of Brazil for total economy in order to show its abnormal evolution.

Section 5 analyzes the impact of cost competitiveness on export performance for each country. Finally, Section 6 provides conclusions and directions for future research.

2. Methodology and Data

2.1 Methodology

The cost competitiveness can be measured by "cost per unit of output", which is also named "Unit Total Cost (*UTC*)". It is calculated by dividing the cost by the output (real GDP). The formula is written as follows:

$$UTC = W_iN_i/P_0Q + P_kK/P_0Q + P_{ci}CI/P_0Q \qquad (1)$$

Where P_0 denotes the price of the basis year *0*, Q denotes the volume of production over time. In this chapter we use as a basis *1990* for total economy and *1997* for manufacturing, P_0Q denotes the real value of production that eliminates the inflation's impact. W_i denotes the average labor compensation per person engaged. N_i denotes the number of person engaged. W_iN_i is total labor remuneration including wage and non-wage labor cost. P_kK is the cost of capital consumption. $P_{ci}CI$ represents the cost of

[3] The exchange rate and the relative unit labor cost in US dollar of Brazil was abnormal.

intermediate inputs. As illustrated in the formula, the unit total cost (*UTC*) comprises unit labor cost, unit capital cost and unit intermediate inputs' cost.

Indeed, this study only assesses the labor cost for three reasons: first is the availability of statistics. We can find out the data on capital and intermediate inputs' costs for the developed countries, whereas the data of developing countries (including China) are not available. Secondly, since there is no data to be used directly, we must calculate the cost ourselves. The labor cost depends on labor compensation, which is easily measured. Other two costs are very hard to be estimated because they are relevant to several factors. Even though we succeed in doing this, they also can't imply correctly the competitiveness' evolution. For instance, the cost of intermediate inputs is under the influence of policies of import protection. The cost may increase with favorable policies of supporting import but it doesn't mean that the country becomes less competitive. Thirdly, although labor cost accounts for only 30% of the cost of production and cannot represent a country's total cost competitiveness, it has a glaring influence to explain the variations of cost competitiveness. As there is no way of measuring unit total cost exactly, unit labor cost (*ULC*) is still a good candidate for competitiveness study.

$$ULC_t=\frac{W_iN_i/e_i}{VA_i/PPP_{i90}}=\frac{W_i/e_i}{(VA_i/N_i)/PPP_{i90}} \qquad (2a)$$

$$ULC_m=\frac{W_iN_i/e_i}{VA_i/PPP_{i97}}=\frac{W_i/e_i}{(VA_i/N_i)/PPP_{i97}} \qquad (2b)$$

Equation (2a) presents the method of labor cost calculation for total economy. An increase of the unit labor cost indicates that more labor cost should be paid to produce a unit of output, or that the same amount of labor cost can produce less output. To begin with, each factor should be converted to a common currency. We utilize official exchange rate of country *i* (e_i) for converting its labor compensation at national currency to that at US dollars. VA_i is the real value added based on 1990 constant price. Geary Khamis Purchasing Power Parity converts it to US dollars at year of 1990 (PPP_{i90}). Equation (2b) presents the method of labor cost calculation for manufacturing by using the Purchasing Power Parity at year of 1997 (PPP_{i97}).

The formula could be rewritten as a ratio of labor compensation per capita to productivity per capita (VA_i/N_i). Their division, the ULC, is a relative term. It means whether a nation owns competitiveness depends on the level of its frame of reference. For instance in 1970s, Japan was more cost-advantageous than Germany, but less than UK. UK was more competitive than Japan but less than China. If all the countries are taken into account, the task tends to be complicated and burdensome.

In order to simplify the comparison, we introduce an index of Relative Unit Labor Cost (RULC). There are two ways of calculation. The first easier way is estimating the Relative Unit Labor Cost compared with US in the formula as:

$$RULC_i=ULC_i/ULC_{us} \quad (3)$$

Where $RULC_{us}=100$. The relative labor compensation and the relative labor productivity could also be estimated by this way. This method allows evaluating the relative level of cost competitiveness. Yet the US relative level of unit labor cost cannot be showed when it is equal to 100.

The second method is calculating the RULC compared with the trade partners instead of US, expressed formally as:

$$\alpha_k^i=\frac{EXP_{i\to k}+IMP_{i\leftarrow k}}{\sum_{k=1}^{n}(EXP_{i\to k})+\sum_{k=1}^{n}(IMP_{i\leftarrow k})} \quad (4)$$

$$RW_i=\frac{W_i}{\sum_{k=1}^{n-1}(\alpha_k^i W_k)} \quad (5)$$

$$RP_i=\frac{VA_i/N_i}{\sum_{k=1}^{n-1}(\alpha_k^i VA_k/N_k)} \quad (6)$$

$$RULC_i=\frac{ULC_i}{\sum_{k=1}^{n-1}(\alpha_k^i ULC_k)} \quad (7)$$

Where α_k^i is the trade weights of country *k* in country *i*'s commercial market with *i*, $k=1.2.3…n$; $\sum_{k=1}^{n}(\alpha_k^i)=1$[4]; RW_i denotes the Relative Labor Compensation per capita in US dollars of country *i*; RP_i is Relative Labor Productivity in US dollars of this country.

As presented above, a county's levels of cost competitiveness and interrelated factors are compared with nearly all its principal trade partners, rather than only with one economy. In Equation (4), we calculate the trade weights of each partner *k* in country *i*'s market, dividing commercial transaction between *i* and *k* by the total trades among all the countries. *n* is the number of economies concerned in this paper, hence *n=19*. The problem is that we limit the whole world in 19 countries, thus the calculated results maybe deviate from the true level. Fortunately, these 19 countries' trade value (export plus import) makes up about 65% of that in the world; the deviation is therefore not significant.

[4] $\sum_{k=1}^{n}(\alpha_k^i)=\sum_{k=1}^{n}\{(EXP_{i\to k}+IMP_{i\leftarrow k})/[\sum_{k=1}^{n}(EXP_{i\to k})+\sum_{k=1}^{n}(IMP_{i\leftarrow k})]\}=[\sum_{k=1}^{n}(EXP_{i\to k})+\sum_{k=1}^{n}(IMP_{i\leftarrow k})]/[\sum_{k=1}^{n}(EXP_{i\to k})+\sum_{k=1}^{n}(IMP_{i\leftarrow k})]=1$

Now the relative labor compensation (*RW*) and will be estimated as a rate of its labor compensation (*W*) to the weighted sum of its partners' labor compensation, in other words, to the average level of other *n-1* economies in Equation (5). The relative labor productivity (*RP*) and the final index relative Unit Labor Cost (*RULC*) of country *i* will be obtained in the same way when looking at Equation (6) and Equation (7).

It is important to note that even though the unit labor cost (ULC) is a ratio of labor compensation to productivity, the relative unit labor cost (RULC) doesn't equal the Relative labor compensation divided by the Relative productivity.

$$ULC_i = \frac{W_i}{VA_i/N_i}$$

$$RULC_i \neq \frac{RW_i}{RP_i} \tag{8}$$

$$RULC_i = \frac{W_i}{VA_i/N_i} / \left(\frac{\alpha_1 W_1}{VA_1/N_1} + \frac{\alpha_2 W_2}{VA_2/N_2} + \ldots + \frac{\alpha_{n-1} W_{n-1}}{VA_{n-1}/N_{n-1}} \right) \tag{9}$$

$$\frac{RW_i}{RP_i} = \frac{W_i}{VA_i/N_i} / \left(\frac{\alpha_1 W_1 + \alpha_2 W_2 + \cdots + \alpha_{n-1} W_{n-1}}{\alpha_1 VA_1/N_1 + \alpha_2 VA_2/N_2 + \cdots + \alpha_{n-1} VA_{n-1}/N_{n-1}} \right) \tag{10}$$

Equation (7) could be rewritten as Equation (9). Combining Equation (5) and Equation (6) could obtain Equation (10). When comparing it with Equation (9), we find that the numerator is the same but the denominators are not equal, which proves Equation (8).

In summary, there are four elements that affect a country's cost competitiveness: labor compensation, labor productivity, exchange rate and the weights of trade. In the next section will discuss them and also their relative index compared with trade partners.

2.2 Data

According to the formula of unit labor cost estimation, there are three elements that affect a country's cost competitiveness: labor compensation, labor productivity and exchange rate, which are the main objects discussed at follows.

2.2.1 Labor compensation

To analyze the cost competitiveness, we now turn to the labor compensation dataset. We firstly introduce the different measurements of labor cost. Appendix 1 displays the detailed items of total labor cost, adopted by the 11th International Conference of Labor Statistics (ICLS) in October 1966 and used by ILO nowadays. Based on it born two measures:

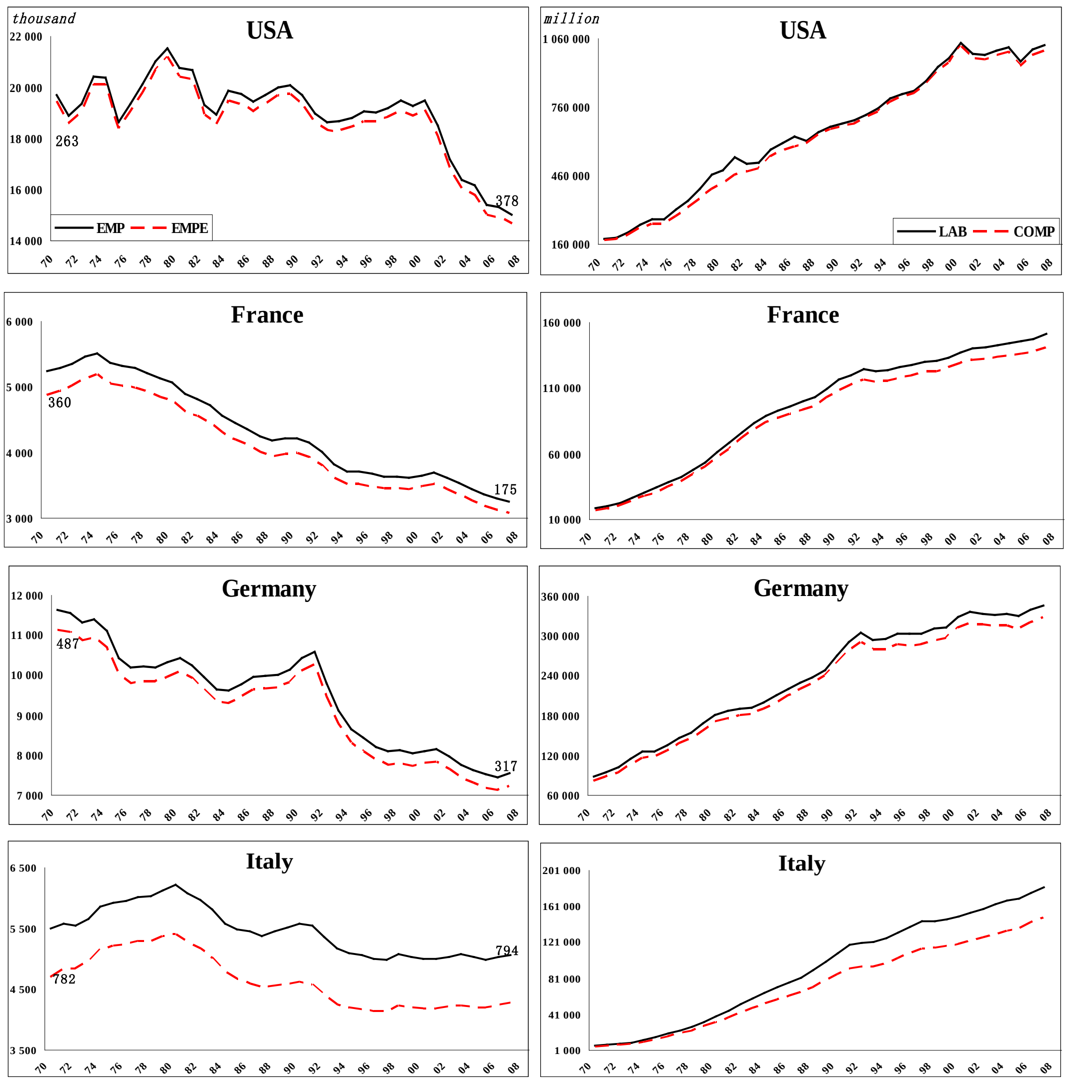
(1) Compensation of employee (COMP) is considered as a proxy for total labor costs, which refers only to employees.
(2) Labor Compensation (LAB) is another measure closely related to labor cost but not entirely correspond to ILO definition in Appendix 1. It does not include the items of employee training (VII), recruitment cost (IX), plant facilities and services, such as food payment (IV), medical care (VI-4) and welfare services (VIII). However, the costs not included account for around 1 to 2 per cent of total hourly labor cost, thus LAB is still good enough to give a picture of overall labor cost competitiveness. Furthermore, it refers to persons engaged.

These two measures both contain wage and non-wage compensation costs, paid directly and indirectly. For OECD countries, the data for these two measurements are both available, while for Asian and other regions' developing countries, only the statistics of employee compensation are available. As the employers, own-account workers, and unpaid family workers do not receive wages, the total labor compensation in mostly developing countries is extremely difficult to estimate exactly. Thus it is derived from multiplying the average wage per person by the number of employees, and if possible adding the total imputed wage of employment of non-employees, including employers, own-account workers, and unpaid family workers. For well comparing them, we should firstly learn the relationship between employee and person engaged:

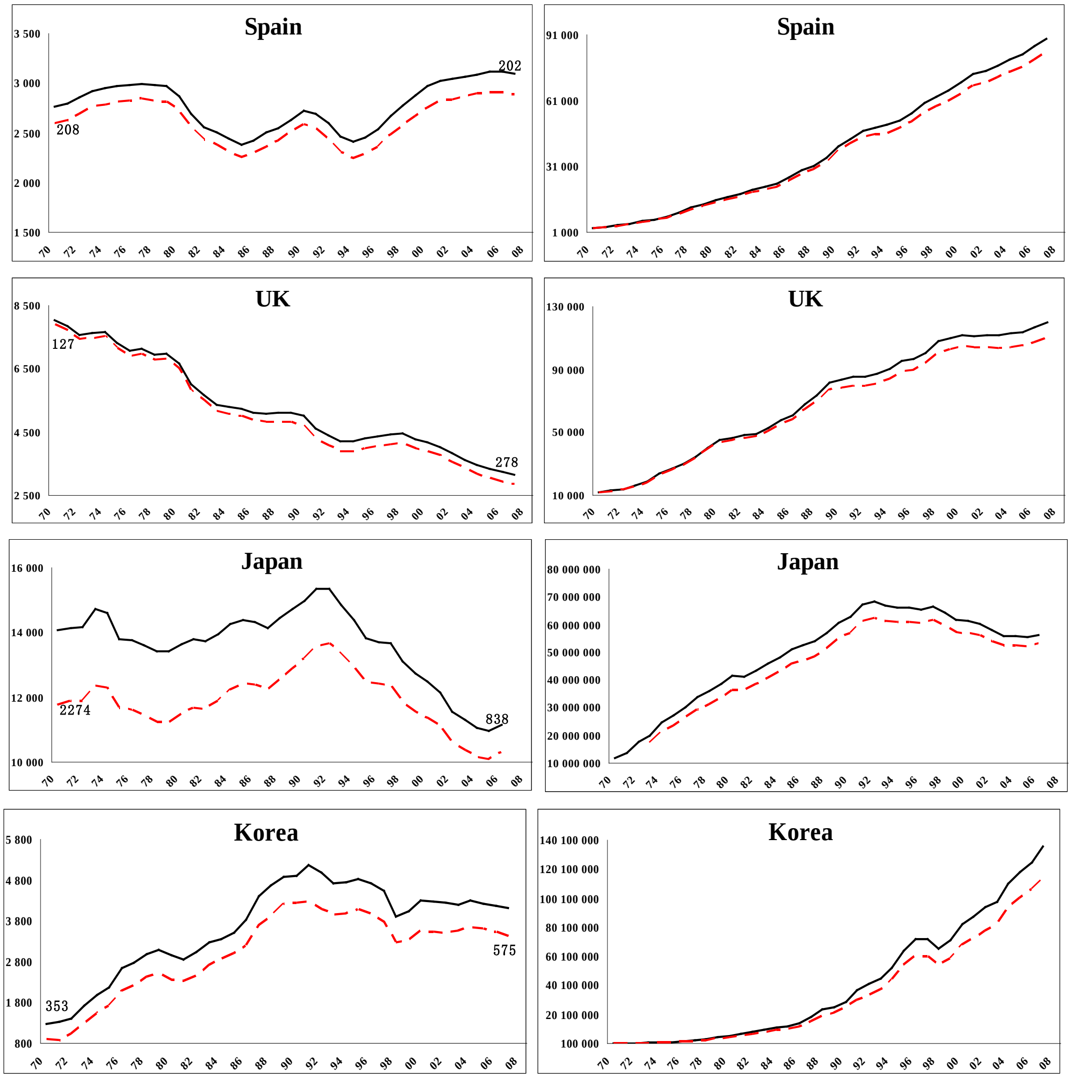
(1) Employee (EMPE) is the person working for others and earning salary in response. The number of employee is estimated according to the statistics of wage and salary.
(2) Person engaged (EMP) consists of all the workers, no matter whether they are paid or not. It equals the sum of employee and self-employed, who is always the worker in private household or the unpaid family worker.

In Figure 1-1, the red line shows employee's number (EMPE) and compensation of employee (COMP); the black line represents number of person engaged (EMP) and labor compensation (LAB) of developed countries' manufacturing from 1970 to 2006. Unfortunately, after 2006 neither the comparison of developed countries nor that of other developing economies' performance in this regard can be illustrated because of the data availability. The latest data of EU Klems are collected until 2006. For nearly all the countries mentioned, labor compensation in manufacturing continued to increase, except for Japan, whose index have declined since 1997-1998 crisis. The gap between line of EMP and EMPE is the number of self-employed. The larger this gap is, the more self-employed a country has. The left side of Figure 1-1 reveals that in Japan and Italy have absolutely more non-wage workers[5]. As for others, the number gradually decreased in France, Germany and Spain; but rose in United State, United Kingdom and South Korea. In the right side, because the Labor compensation concerns more workers than Compensation of employee, the former's line is often higher than that of the later. Still, Japan and Italy have larger gap between two lines since they have more self-employed as discussed above.

Figure1-1 comparison of person engaged (EMP) with employee (EMPE); Labor compensation (LAB) with compensation of employee (COMP) in manufacturing in national currency



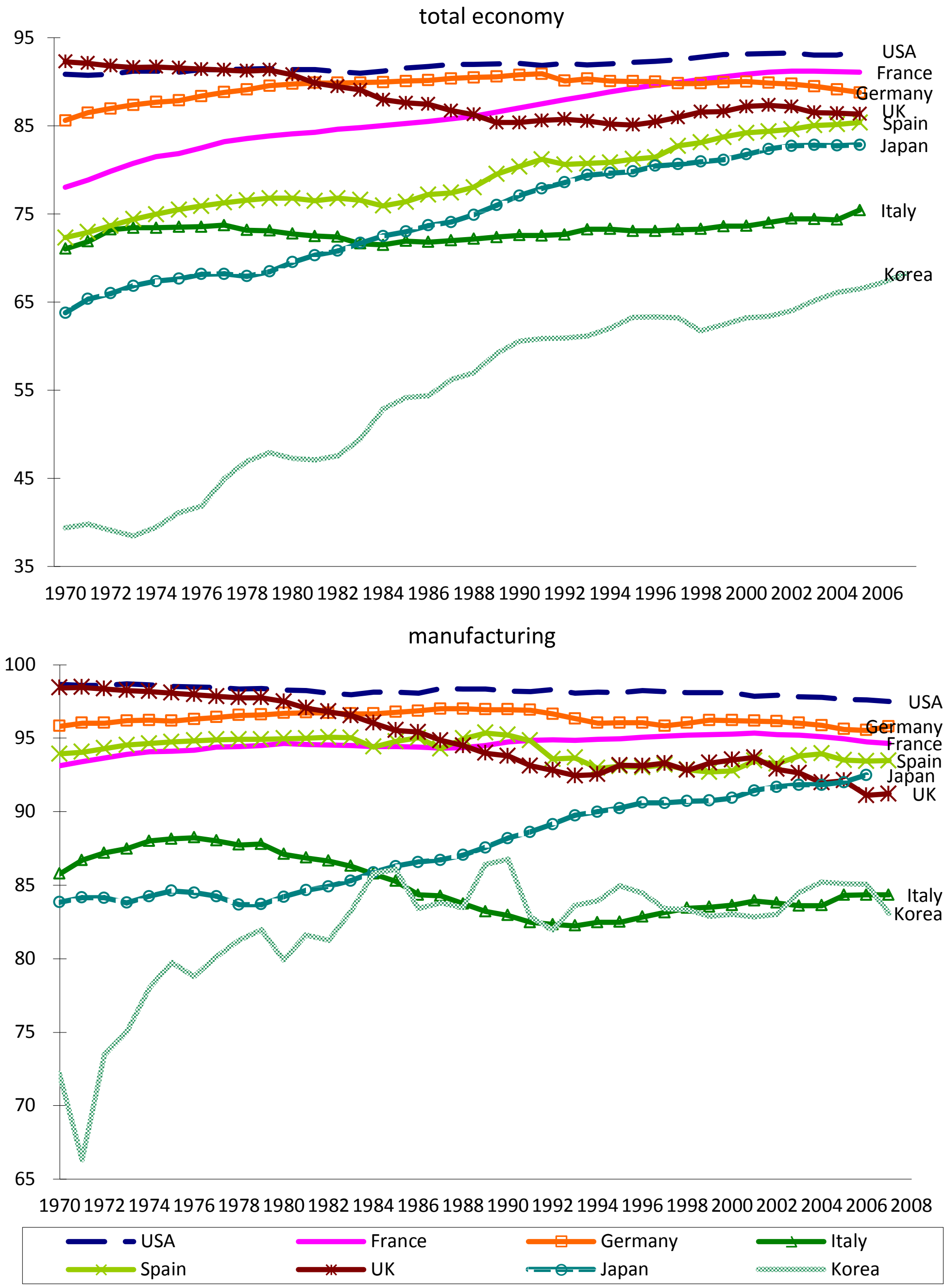
[5] 838 thousands for Japan in 2008 and 794 thousands for Italy



Source: EU Klems, author's own calculation

There is another index namely dependent employment ratio (EMPE/EMP) described in Figure 1-2. A smaller ratio stands for a larger share of self-employment. In this figure, Korea and Italy had the largest share for total economy and manufacturing industry.

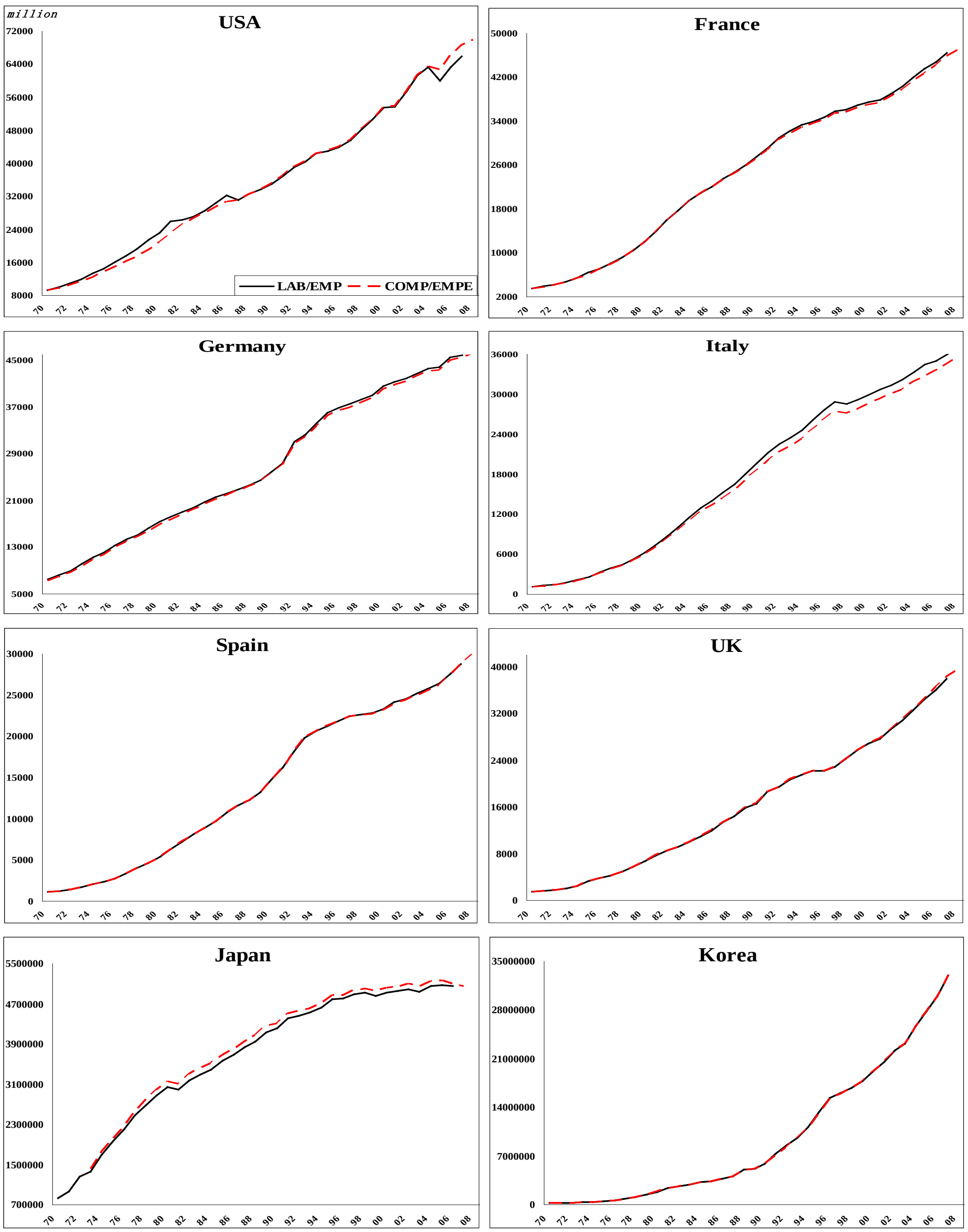
Figure1-2 Dependent employment ratio



Source: EU Klems, author's own calculation

Figure1-3 illustrates that LAB/EMP and COMP/EMPE in manufacturing are almost equivalent, except in Japan and Italy. It can't be sure that which is bigger as they possessed reverse instances.

Figure 1-3 comparison of LAB/EMP with COMP/EMPE in manufacturing in national currency



Source: EU Klems, author's own calculation

Gollin (2002) proposed three approaches of adjustment for income shares, in other words, for unit labor compensation. One of them is (other two approaches interpreted below[6]):

*WN/PQ=[(COMP/EMPE)*EMP]/VA* *(11)*

Equation (11) is the stated form of Equation (1). It supposes self-employed earn the same as employee, but if their wages are quite different, estimation tends to be bias. The next part computes labor productivity based on all the persons engaged (EMP), thus this paper prefers using LAB/EMP rather than COMP/EMPE for large industrialized countries. On contrary, for developing countries, we utilize COMP/EMPE when the data of LAB/EMP are not available.

EU KLEMS[7] database, covering all the European countries is firstly employed for labor compensation. It provides the data of LAB, COMP, EMP and EMPE. We have already utilized it for the comparison above. GGDC and OECD also use this database[8]. GGDC collects the EMP data and utilizes them for productivity estimation. The data between GGDC and EU KLEMS are generally the same but during certain years GGDC adjusted the sample for its calculation. In order to confirm the correspondence of the sample of labor compensation and labor productivity, we use EMP data from GGDC rather than EU KLEMS for large industrialized countries.

However, as EU KLEMS does not yet publish statistics of labor compensation after 2007, we combine it with OECD database assuming that the growth rates of labor compensation after 2007 were the same between OECD statistics and EU KLEMS.

It is always very hard to study the emerging countries' level of compensation and there exists somewhat inconveniences for some countries. The Key Indicators of the Labor Market (KILM[9]) is a multi-functional research tool constructed by International Labor Organization (ILO) which contains all the developing countries' data needed in this paper. However, these datasets concern the annual compensation of total labor force. For obtaining compensation per capita, we utilize index of 'number of person engaged'

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[6] Other two approaches take the amount of Operating Surplus of Private Unincorporated Enterprises (OSPUE) into account. First adjustment is (COMP+OSPUE)/(GDP-indirect taxes); Second is (COMP)/(GDP-indirect taxes-OSPUE). Bruno Jetin (2010) provided another method based on these two approaches, noting (adjustment1+adjustment2)/2. Compared with them, Equation (11) compiles the fraction of self-employed people, instead of guessing at how to divide up OSPUE between labor and capital.

[7] EU KLEMS data: http://www.euklems.net/

[8] OECD : http://stats.oecd.org/WBOS/Index.aspx?QueryName=427&QueryType=View&Lang=en

[9] KILM could be downloaded directly in : http://www.ilo.org/empelm/what/lang--en/WCMS_114240 Meanwhile, it's complemented by ILO LABORSTA: http://laborsta.ilo.org/

in the 10-sector Database released by Groningen Growth and Development Centre (GGDC[10]) of University of Groningen. When the data from ILO are absent, we refer to the bureau of statistics of each country.

Now we meet questions: are these databases compatible with each other? Why do we use so many sources of statistics? EU KLEMS calculates exactly the labor inputs from 1970 to 2007, which is the most detailed among them. GGDC and OECD utilize directly EU KLEMS data but extend research to all over the world, hence there's no problem for the combination.

Indeed, GGDC emphasizes the study of labor productivity rather than that of labor compensation. OECD provides the labor cost data per employee, while EU KLEMS analyzes the labor remuneration per employee and per person engaged as well. After comparison in previous part showed in Appendix 1, the data of person engaged are more closed to the definition of labor cost than the data of employee. Therefore EU KLEMS is still needed and can be complemented by OECD data. As for ILO KILM, it involves also the European countries but lacks several years. We compare the data of developed countries from EU KLEMS and that from ILO. They are fortunately compatible. Generally speaking, we have to employ various sources of statistics and that doesn't appear any problems of compatibility.

With regard to particular country, the data of German person engaged prior to 1991 pertain to the average of the former East and West Germany's data, and then to the unified Germany[11]. That leads a rupture in the figure in 1991. We thus utilize the EU KLEMS data concerning the person engaged and obtain the index of Germany_klems. In next section of result, the estimations using GGDC data and EU KLEMS are showed respectively in the figure by the line of Germany_ggdc and the line of Germany_klems.

The data for the United States after 1987 are in accordance with North American Industry Classification System (NAICS 97), whereas before this year they adapt to ISIC definition like other countries. Indeed, Bureau of Labor Statistics (BLS) launches an International Labor Comparison (ILC[12]) program by evaluating American data also in this way. We do not use BLS database but we compare our results with it and confirm their robustness. The datasets used for each country are showed in following table.

[10] GGDC: University of Groningen specialized in productivity calculating. Statistics can be downloaded in site: http://www.ggdc.net/databases/index.htm

[11] In 1990 United Germany was born with the reunification of East Germany/GDR (German Democratic Republic) and West Germany/FRG (Federal Republic Germany).

[12] BLS Data obtainable in http://www.bls.gov/fls/

It should be noted that for China, only the average wage of person engaged in Urban Units are taken into account. Indeed, the workers in rural unit and the migrant workers occupied a large share of China's work force. They earn much less than employees in urban units, thus the measurement of labor cost in this section are overestimated.

sector	country	year	index	Dataset
total economy	US	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012
	France	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012
	Germany_klems	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and EU KLEMS for number of person engaged over 1970-2008 then OECD adjustment
	Germany_ggdc	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012 of Germany
	Italy	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012
	Spain	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012
	UK	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012
	Japan	1970-2011	labor compensations per person engaged	EU KLEMS for 1970-2006,adjusted by OECD growth rate for labor compensation over 2007-2012 and GGDC for number of person engaged over 1970-2012
	Korea	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012
	Taiwan	1980-2013	average earnings per employee	National Statistics of Republic Of China (Taiwan)

	Indonesia	1970-2013	average wages per employee	ILO KILM for 1999-2010, adjusted by ILO LABORSTA and KILM manufacturing for 1970-1998 and 2011-2013
	Malaysia	1981-2012	average salaries and wages per employee	Office of chief statistician Malaysia, department of statistics Malaysia adjusted by ILO LABORSTA
	Philippines	1995-2014	average wages per employee	National Statistics office of Philippines (during 2001-2011 the same statistics as ILO KILM)
	Singapore	1986-2014	average wages per employee	Yearbook of Statistics Singapore (during 1999-2011 the same statistics as ILO KILM)
	Thailand	1970-2014	average wages per employee	National Statistics office of Thailand and ILO LABORSTA(during 1999-2011 the same statistics as ILO KILM)
	Vietnam	2002-2010	average wages per employee	ILO KILM
	India	1999-2010	average wages per employee	ILO KILM, Excluding the three states of Arunachal Pradesh, Mizoram, and Sikkim and Union Territory of Lakshadweep
	Mexico	1990-2011	average wages per employee	ILO KILM 8th edition for 1999-2011, adjusted by ILO KILM 6th edition
	Brazil	1994-2011	average wages per employee	ILO KILM 8th edition for 2003-2011, adjusted by ILO KILM 6th edition for 1994-2002
	China	1970-2013	Average Wage per Person engaged in Urban Units	National Bureau of Statistics of China
manufacturing	US	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012
	France	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012
	Germany	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and EU KLEMS for number of person engaged over 1970-2008 then OECD adjustment
	West Germany	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged of West Germany
	Italy	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012

Spain	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012
UK	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012
Japan	1970-2011	labor compensations per person engaged	EU KLEMS for 1970-2006,adjusted by OECD growth rate for labor compensation over 2007-2012 and GGDC for number of person engaged over 1970-2012
Korea	1970-2012	labor compensations per person engaged	EU KLEMS for 1970-2007,adjusted by OECD growth rate for labor compensation over 2008-2012 and GGDC for number of person engaged over 1970-2012
Taiwan	1973-2013	average earnings per employee	National Statistics of Republic Of China (Taiwan)
Indonesia	1970-2014	average wages per employee	ILO LABORSTA,OECD working paper and tradingeconomics data
Malaysia	1981-2013	average salaries and wages per employee	ILO LABORSTA for 1981-1998, adjusted by ILO KILM for 1999-2011 and by Office of chief statistician Malaysia, department of statistics Malaysia for 2012-2013
Philippines	1995-2014	average wages per employee	ILO LABORSTA and tradingeconomics
Singapore	1986-2013	average wages per employee	ILO LABORSTA and tradingeconomics
Thailand	1970-2013	average wages per employee	ILO LABORSTA and National Statistics office of Thailand
India	1970-2010	average wages per employee	ILO LABORSTA
Mexico	1980-2009	average wages per employee	ILO KILM 6th edition
Brazil	1992-2007	average wages per employee	ILO KILM 6th edition, also illustrates the data of 1985-1986
China	1978-2013	Average Wage per Person engaged in Urban Units	National Bureau of Statistics of China

2.2.2 Labor productivity

Labor productivity per capita over the period of 1970-2012 is compiled by GGDC following the study under International Comparisons of Output and Productivity (ICOP) project. It assesses the real value added at 1990[13] constant price and purchasing power parity (PPP) for total economy.

We use PPP for productivity conversion rather than nominal exchange rate. There are mainly two PPP techniques called expenditure PPP approach and production (or industry-specific) PPP approach. The expenditure PPP[14], often used by OECD and World Bank, is widely known through International Comparison Project (ICP) by United Nations. It applies the final expenditure information for calculating without any sectoral perspectives. On contrary, ICOP project by GGDC provides an industry-specific PPP based on producer output data, which is more relevant to this study than the former.

In China, the prices in the big cities are relatively high. In order to better reflect the impact of lower prices in rural areas, ICP made a downward adjustment on PPP; As for ICOP, it employs information from production census, input-output table and national accounts concerning overall areas in China, so that it obtained PPP much lower than that by ICP. For instance, the PPP in 1990 US dollars calculated by Maddison of GGDC in Total Economy Database is pretty lower than that obtained by ICP/World Bank. As a result, Maddison's GDP level in dollars is about 40% higher than that of World Bank. He therefore reduced GDP level by 22.6% and heightened PPP value. Unfortunately, ICP provides no PPP data for manufacturing and we can't point out how much different between PPP ICP and PPP ICOP like what has done for total economy. We only know that Chinese PPP applied in this paper was undervalued and its productivity was correspondingly overvalued. As China's labor compensation was also overestimated in last part, it is hard to say whether the final index unit labor cost is overestimated or underestimated.

GGDC manufacturing database	
US	Value Added at constant 1995 prices
France	Value Added at constant 1995 prices
West Germany	Value Added at constant 1991 prices
Italy	Value Added at constant 1995 prices
Spain	Value Added at constant 1995 prices
UK	Value Added at constant 1995 prices
Japan	Value Added at constant 2000 prices
Korea	Value Added at constant 1995 prices
Taiwan	Value Added at constant 2001 prices

[13] 1990 for total economy and 1997 for manufacturing have been chosen due to the big availability of countries' and goods' information when calculating PPP.

[14] In expenditure PPP approach, PPP relative to US dollars is defined as the number of currency units required, in domestic market, to buy the same goods and services that 1 dollar can buy in USA.

Indonesia	Value Added at constant 2000 prices
Malaysia	Value Added at constant 1987 prices
Philippines	Value Added at constant 1985 prices
Singapore	Value Added at constant 2000 prices
Thailand	Value Added at constant 1988prices
India	Value Added at constant 1993-1994 prices
Mexico	Value Added at constant 1993 prices
China	Value Added at constant 2000 prices

The Groningen Growth and Development Centre (GGDC) of University of Groningen also provides the real value added of manufacturing industry at constant price from 1950. As showed in the table above, the constant price utilized is different among the countries. This section aims at comparing each country's cost competitiveness in level thus the real value added at different years' constant price cannot be used directly.

ILO KILM 5th edition published the labor productivity of manufacturing at US dollar using 1997 constant price and purchasing power parity. Yet the data are available from 1980. As both GGDC and ILO KILM database utilize the constant price and PPP, the growth rate of the labor productivity that avoids the price effect should be the same. Besides, the Bureau of Labor Statistics (BLS) in the United States department of labor estimated the labor productivity of manufacturing as well. We calculate the growth rate of labor productivity relative to 1996 by using these three databases. After comparison, the results of GGDC and ILO KILM after 1980 are exactly the same. That of BLS is a little different from the former but the difference is not large at all. Therefore, we estimate the labor productivity referring to ILO KILM. When the data are not available, the adjustment with the growth rate from GGDC will be applied.

It should be noted that the German data from GGDC is that of the West Germany. BLS also uses the trend of West Germany Value added before 1991 but with adjustment. Indeed, the productivity of West Germany was much higher than that of Germany, thus the adjusted Germany estimation is better than that using West Germany directly. The calculation based on ILO KILM will be adjusted by BLS instead of GGDC. The difference between the estimation of adjusted Germany and West Germany will be showed in next section.

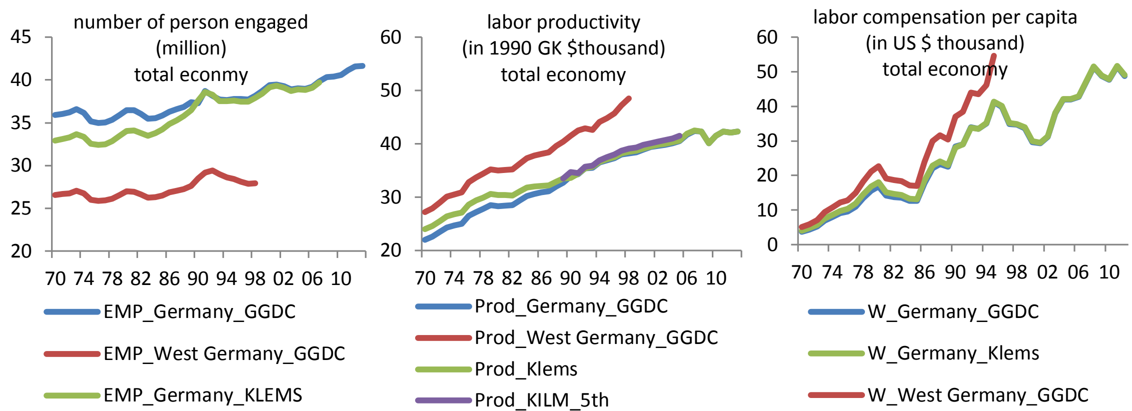
Still, the developing countries' calculation meets the data problems. ILO KILM does not provide the data of all the developing countries mentioned in this paper. Thus for Singapore, Malaysia and the Philippines, we utilized directly the 1996 PPP index and the real value added derived from GGDC. As their valued added are measured at constant price of different years and converted to US dollar at 1996 PPP, the comparison of the level may be subjected to the bias. Consequently, the estimation of Malaysian productivity is mainly based on Malaysia Productivity report over time rather than GGDC database. We cannot find the Vietnam data of manufacturing and the calculation of this industry is removed.

sector	Country	year	index	dataset
total economy	All	1970-2012	labor productivity per person engaged	total economy database of Groningen Growth and Development Centre (GGDC), University of Groningen
	Germany_klems	1970-2012	labor productivity per person engaged	GGDC for value added at 1990 constant price and PPP over 1970-2013 and EU KLEMS for number of person engaged over 1970-2008 then adjusted by GGDC for 2009-2013
	Germany_ggdc	1970-2012	labor productivity per person engaged	GGDC for value added at 1990 constant price and PPP over 1970-2013 and GGDC for number of person engaged over 1970-2013
manufacturing	all, excluding Germany, Malaysia, Vietnam	1970-2012	labor productivity per person engaged	ILO KILM, adjusted the 10-sector database of Groningen Growth and Development Centre (GGDC) of University of Groningen.
	France	1970-2012	labor productivity per person engaged	Data also derive from ILO KILM but adjusted by GGDC and BLS International comparison
	West Germany +Germany	1970-2012	labor productivity per person engaged	As GGDC provides only West Germany data and ILO KILM 5th published Germany data after 1989, We adjusted KILM data of Germany by GGDC West Germany data before 1991.
	Malaysia	1975-2013	labor productivity per employee	Productivity report published by Malaysia Productivity Corporation , adjusted by 10-sector database of GGDC

Solution to the problems of Germany's data

As discussed above, these databases are compatible with each other and the calculation based on them is robust. Yet the study of Germany encounters a particular data problem.

In 1990, United Germany was born with the reunification of East Germany/GDR (German Democratic Republic) and West Germany/FRG (Federal Republic Germany). Thus during 1970-1990, there are always two sorts of data collections. One is the data of West Germany. Another is the data of united Germany adjusted by West Germany. The databases of GGDC and EU KLEMS both use the data of united Germany adjusted by West Germany. However, their ways of adjustment are obviously different because they published diverse data.



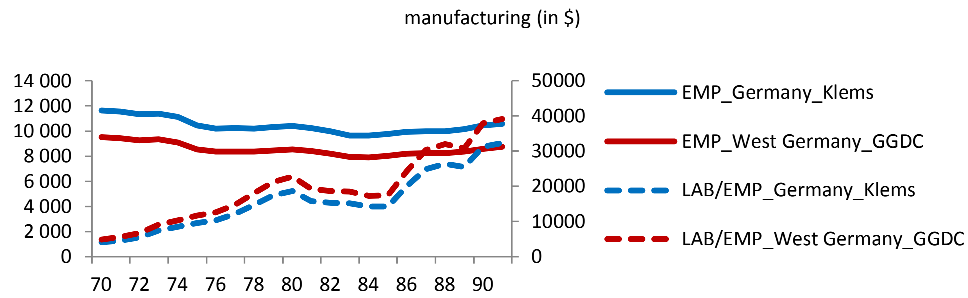
According to Equation(2a) and Equation (2b),

$$ULC=\frac{Labor\ compensation\ per\ capita}{Labor\ productivity}=\frac{LAB/EMP}{VA/EMP}=\frac{LAB}{VA}$$

For total economy, the number of German workers calculated by GGDC (blue line) was higher than that caculated by KLEMS (green line) over 1970-1990. The persons engaged in Germany were more than that in West Germany. Thus German labor productivity (VA/EMP) from GGDC was lower than that from KLEMS. The labor productivity of Germany was lower than that of West Germany. The labor compensation per capita (LAB/EMP) from GGDC was also lower than that from KLEMS.

The final index of unit labor cost (ULC) is equal to annual labor compensation (LAB) divided by the value added at constant price and PPP (VA). The data of workers' number is not used. Therefore, the results of ULC using the data from GGDC are the same as the results using the data from KLEMS.

However, the data of LAB derive from KLEMS and the data of VA are calculated by GGDC. As KLEMS took fewer workers into account than GGDC, the LAB may be underestimated and ULC may be undervalued as well.



For manufacturing, the data of German labor productivity derive from ILO KILM. As ILO KILM did not publish the data before 1989, we adjust the labor productivity over 1970-1990 by the data of West Germany from GGDC.

As same as in total economy, manufacturing labor compensation per capita of West Germany (red line) was higher than that of Germany (blue line). Because the number of person engaged in manufacturing of West Germany was lower than that of Germany. The labor productivity that we adjust by West Germany is higher than Germany in reality. Finally, the index of ULC of manufacturing may be underestimated.

2.2.3 Exchange rate and Trade weights

The data of nominal exchange rate are derived from CEPII CHELEM-CIN. Figure 1-4a and Figure 1-4b illustrate the evolution of official exchange rate against US dollar of industrialized economies and developing countries. We choose 1999 as benchmark year, when the euro came into existence and the European Union countries have the same nominal exchange rate. An increase of the line signifies a depreciation of national currency and the decline means appreciation.

From 1970 to 1980, Germany, France, Japan, Taiwan, Singapore, Malaysia and China appreciated. UK, Italy and Korea depreciated generally. As for the rest, including Spain, India, Thailand, Indonesia, Philippines, Vietnam and Mexico, the exchange rate was not revealed a significant change. In the following five years, 1980-1985, all the countries' currency in the figure depreciated. All the countries benefited from the price competitiveness.

The decade of 1985-1995 shows a different picture between developed countries and developing one. The currency of all the developed countries has appreciated, while that of China and other developing countries depreciated in reverse. The developed countries here comprise European Union countries and the New Industrialized Economies (NIE) like Korea, Taiwan and Singapore. The developing countries here are the rest economies including China, India, Mexico and ASEAN countries. It should be noted that the exchange rate of Thailand did not change much. The appreciation of developing countries was much more significant during the first five years (1985-1990) than the next five years. Korean currency appreciated before 1990 and depreciated after then. Over this period, China and other developing countries profited much from the price competitiveness and the international segment of production, improved the trade performance and were burgeoning till nowadays.

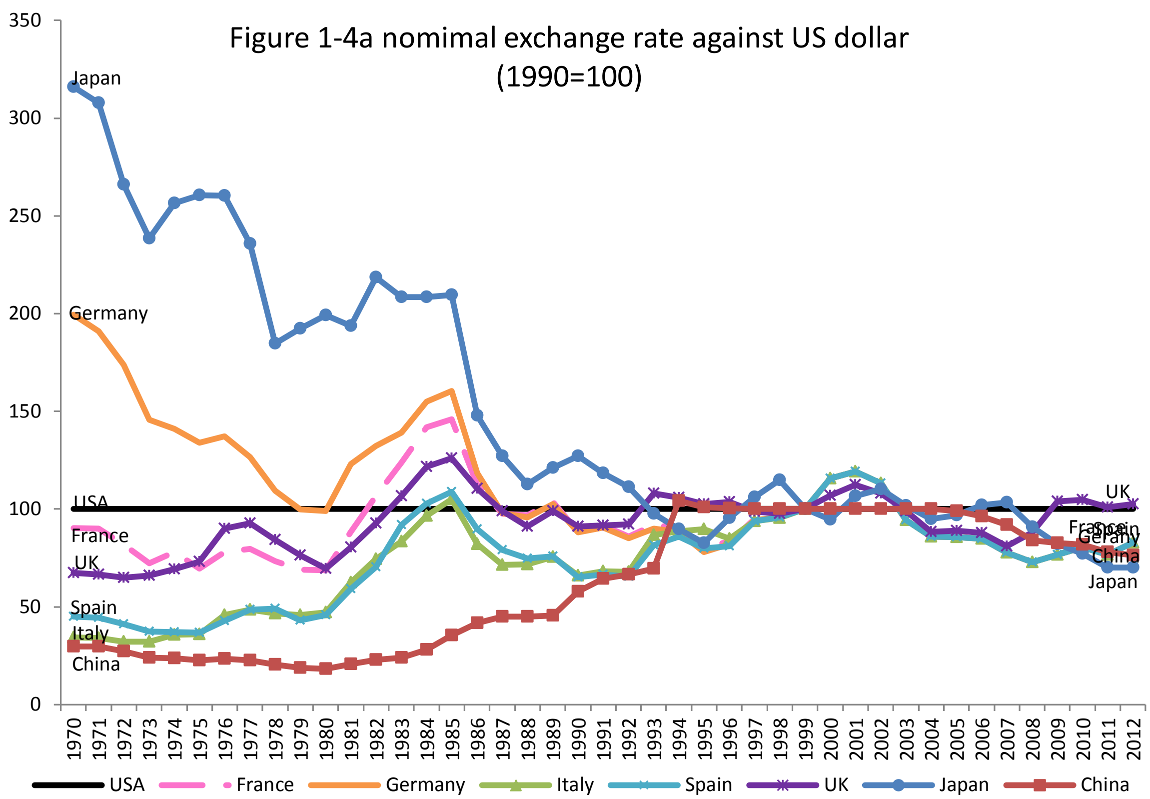


Figure 1-4a nomimal exchange rate against US dollar (1990=100)

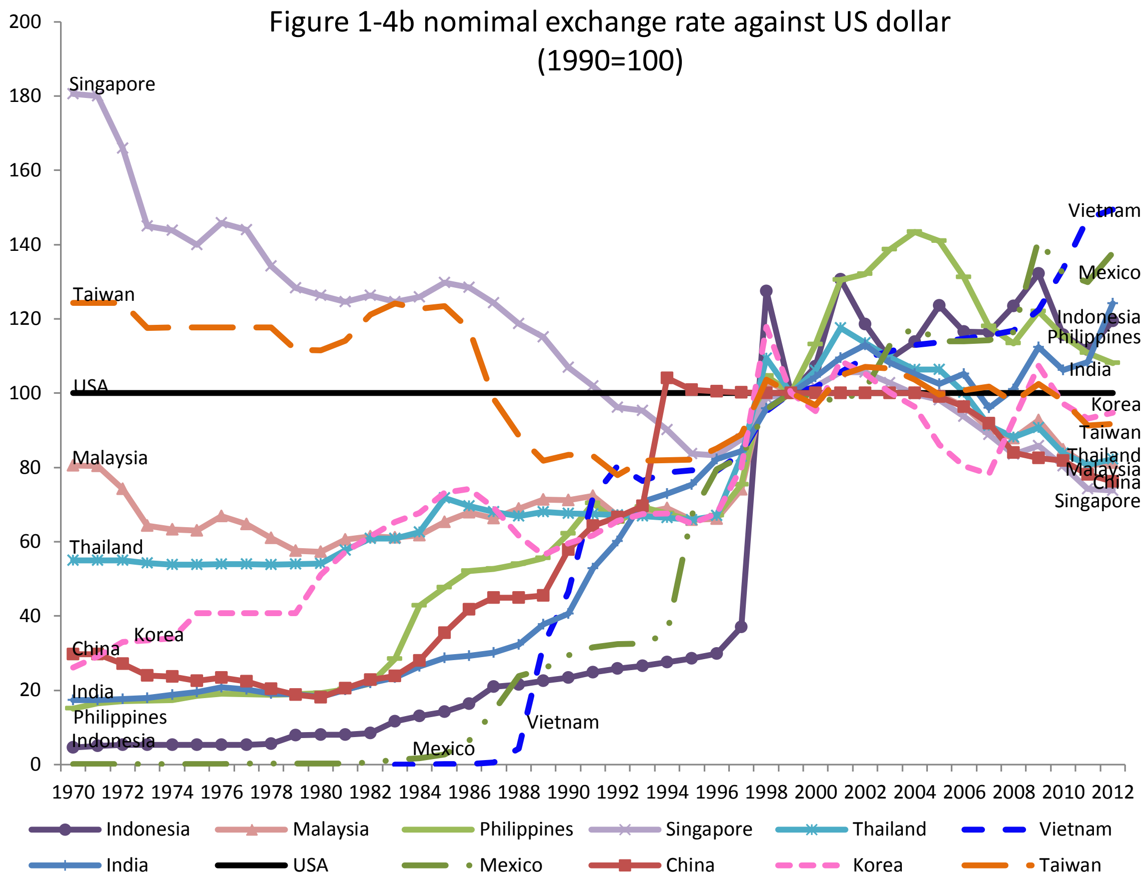


Figure 1-4b nominal exchange rate against US dollar (1990=100)

During the next decade from 1995 to 2005, China's exchange rate against dollar did not vary much. The exchange rate of other countries increased (depreciation) firstly and then decreased (appreciation), except the year between 1998 and 1999 when the currency of Korea, Indonesia, Philippines and India appreciated.

Since 2005, China's national currency has begun to appreciate in succession, while other countries' currency varied principally like a wave, i.e. depreciation, then appreciation then re-depreciation every two years. Japan and Vietnam are the exception. Japan has continued appreciating as China since 2007. On contrast, Vietnam has continued depreciating over time. Compared with the countries excluding Japan, China has lost the price competitiveness since 2005.

We also use CHELEM-CIN database to calculate each country's trade weights in raison of its large statistic availability. For manufacturing industry, CHELEM has its own classification, but in order to conform to other articles, we employ ISIC rev.3 classification described in detail in Appendix 2.

3 International comparison of Cost Competitiveness for total economy

3.1 China versus major industrialized countries

On resume, China wins more cost advantage than major industrialized countries, including US, European Union and Japan. It should be noted that although this section compares China with the major industrialized countries, the relative index of Labor compensation, productivity and unit labor cost are calculated relative to all the trade partners including emerging countries. We also study the cost competitiveness of Brazil but found an abnormal evolution, thus we remove Brazil from the international comparison.

As the data of each country are not available for all the years over 1970-2013, we only take the available country data into account for trade weights' study. For instance, the data of Japanese labor compensation are available during 1970-2011 and that of other countries are available until 2012. When calculating the trade weights of 2012 according to the Equation (4), we eliminate Japan for the sum of export and import $\sum_{k=1}^{n}(EXP_{i\to k})+\sum_{k=1}^{n}(IMP_{i\leftarrow k})$.

3.1.1 China has much lower level of relative labor compensation

Figure 1-5 shows the relative labor compensation per person engaged[15] of total economy across China and developed countries compared with their trade partners. Figure 1-6 shows the relative labor compensation compared with US [16], which avoid the trade weight's effect. We learned from their comparison that there were mainly two types of relationships between exchange rate and real labor compensation:

[15] $RW_i=\frac{W_i}{\sum_{k=1}^{n-1}(\alpha_k^i W_k)}$

[16] $RW_i=\frac{W_i}{W_{us}}$

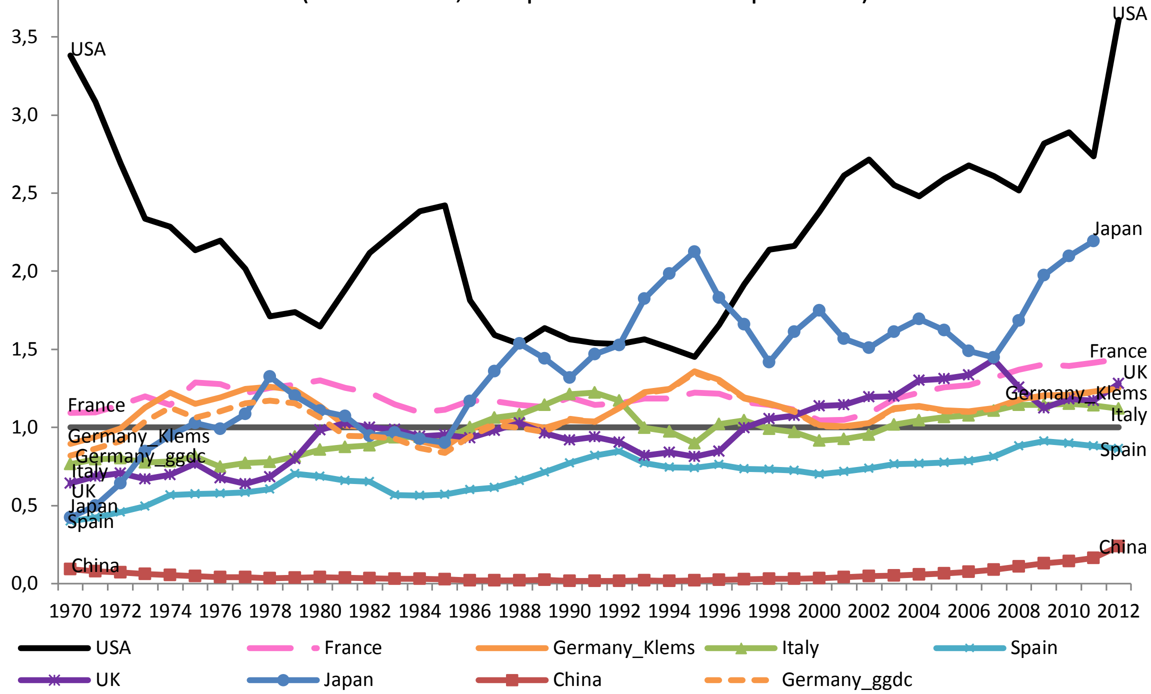


Figure1-5 Relative labor compensation of Total economy (in US dollar, compared with trade partners)

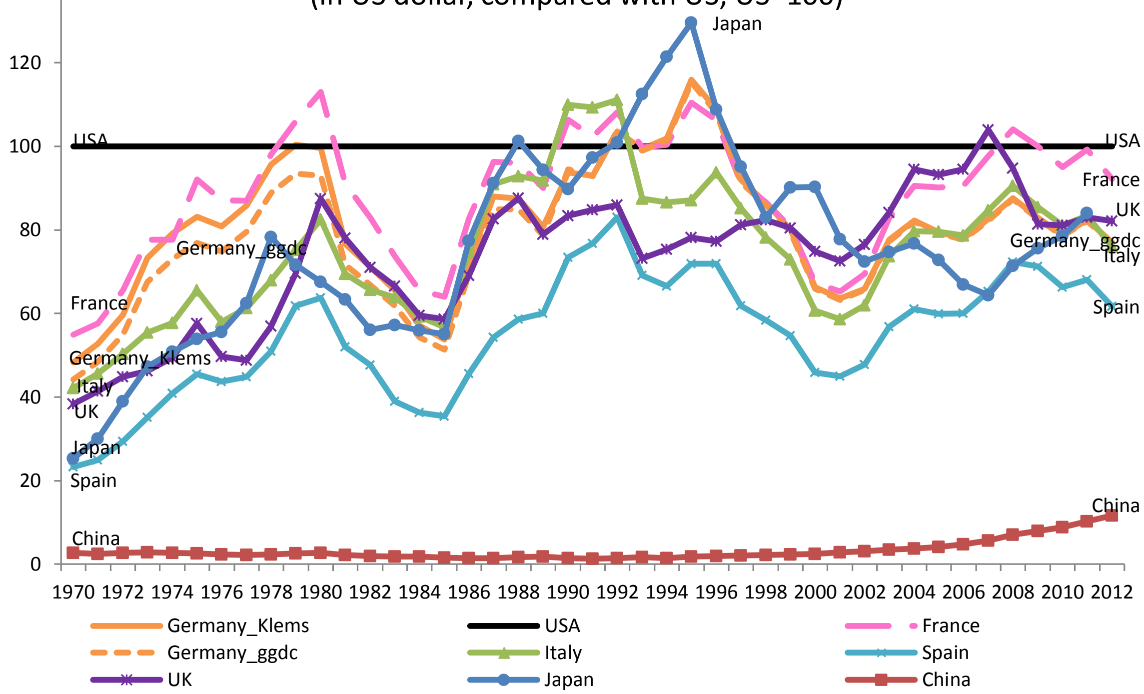


Figure 1-6 Relative Labour compensation of Total economy (in US dollar, compared with US, US=100)

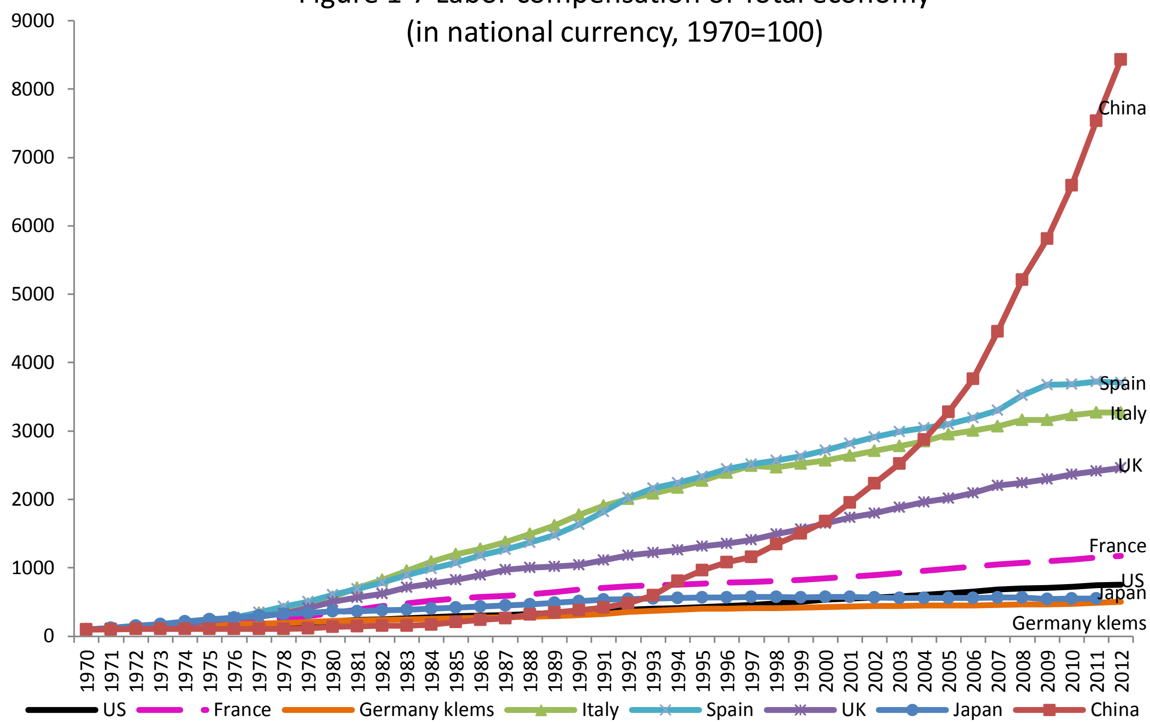


Figure 1-7 Labor compensation of Total economy (in national currency, 1970=100)

Firstly, exchange rate affects relative labor cost significantly. In Japan, unit labor compensation increased during period of yen appreciation[17]. As yen's exchange rate continued to appreciate (Figure 1-4), its relative compensation rose steeply from about 42% in 1970 to 219% in 2011 relative to its trade partners (Figure 1-5). One important raison is Japanese salary system characterized by seniority-based payment and rigidity of nominal wages.

(1) Seniority-based payment, as showed in Figure 1-6, was on the one hand favorable for Japanese emergence but on the other hand, limited its growth. At the outset of 1970s, low salary for young workers allowed Japan to win low labor costs and accelerate capital accumulation. However, when the workers were getting older, their compensation was absolutely moving up. From 1988, Japanese relative compensation became equal to US level and Japan lost its cost-advantage relative to other major industrialized countries. Indeed, Japan's relative cost advantage diminished over 1988-1990. After then it re-increased and returned disadvantageous from 1992 to 1997 relative to US.

(2) In terms of rigidity of nominal wages showed in Figure 1-7, it made labor compensation at national currency going up in a regular manner and affected chiefly by exchange rate. Although Japan suffered heavier and heavier labor

[17] Period of appreciation of the yen: 1970-1973, 1976-78, 1985-88,1990-95,1998-2000,2007-2012

> costs, there is no leeway to diminish wages, especially for mid-to-senior age group protected by enterprise regulations. In this context, Japanese compensation continued ascending gradually and arrived to peak in 1995, when the young workers in 1970s became to be mid senior. Raison for the reversal in 1995 is that rigidity was downward from 1990s. Face economic stagnation in that time, firms are likely to reduce total remuneration or offer a lower wage to young workers by negotiation with union. Therefore, compensation in national currency slowed down its speed of increase and stagnated in 1995. When considering factor of exchange rate and looking at Figure 1-6, Japanese relative compensation level arrived at peak in 1995 and just after two years, it has returned to the level of 1988.

Besides, remunerations of United Kingdom and Italy are also influenced by exchange rate. During the years of appreciation, 1985-1992 and 2001-2007, their labor costs' level was both upward.

The second type is: there is not significant relationship between exchange rate and relative labor costs, such as in France, Germany, Spain and China.

The model WS-PS provided by Layard-Nickell-Jackman (1991) views the fixation of salary as a result of coordinating between unions and firms. From this idea derive two kinds of wage-setting institution:

One is corporate wage-setting, which centralizes salary bargain in national union organizations and employer associations, such as France, Germany and Spain. These countries always have powerful labor unions, efficient collective bargaining and restrictive Employment Protection Legislations (EPL). So that the shocks including exchange rate could not clearly affect their real compensation.

Another is decentralized or company-based wage setting, like United-State and United-Kingdom. These economies have weaker regulation and labor protection[18]. The US enterprises own jobs and can replace workers for any business or other (non-discriminatory) reasons. As for UK, Blanchard and Wolfers pointed out its employment protection level has been much lower than that of other European countries. As a result, these two countries' compensation level is relatively fluctuant with shocks around the world.

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[18] Richard B. Freeman (2008) compared labor institution across advanced countries. For Percentage of collective bargaining in 2000: France 90%, Italy and Spain 80%, Germany 68%, while UK 30%, US 14%, Japan 15%. EPL in 2004 is: Spain 3.1, France 2.9, Germany 2.5 and Italy 2.4, while UK 1.1, US 0.7, Japan 1.8. Index of labor institution is higher in European countries.

Italy is categorized by OECD in 1980s as company-based wage setting. Despite of wage setting through centralized Scala Mobile and higher index of Institution, its constructed employment protection index has markedly turned down from 4 to 2.4 over 1970-2005. Therefore, its remuneration level is still affected by exchange rate as given above.

Japanese wage is determined by age, so it's hard to say to which kind of wage-setting it belongs. On one side, firms cannot cut down the salary of long-term workers as will. On the other side, it's able to offer a low wage to young employees without any limits.

In China, wages are determined by national grid, which belongs more or less to the former type of wage-setting. Thus in China, there's no correlation between them. It's incredible that Chinese relative compensation level relative to US remained extremely low and did not vary (from 2.68% in 1970 to 2.83% in 2001) no matter how evolves the exchange rate. Over the decade of appreciation 1970-1980, its real remuneration at US dollar increased from 225$ per person engaged to 502$. However, because the US labor compensation also increased over time, Chinese relative labor compensation to US only increased by 0.1% from 2.68% to 2.78%. The impact of exchange rate was not significant. As for its relative compensation to the trade partners, it still remained low and did not vary, except for the period before the open reform of 1978 when the level declined.

In 1980, Chinese currency began to depreciate; yet the relative compensation level maintained initial value without any change. Especially during the period of strong depreciation 1990-1994, the wages and salaries per person worked still increased from 442$ to 520$ per year. Its relative index to US maintained (rose a little) from 1.48% to 1.51%. Why? At outset of 1970s, China has been a poor country dealing with the Cultural Revolution[19] that led a harmful recession and reductive compensation. In 1978, China began market reform and situation changed. Wages and salaries were determined by authority central system in line with variety of different occupation, sector, industry and region. Over 1980s, Chinese authority launched a series of reforms incorporating salary fixation with change of Consumer Price Index (CPI). It means raising salary face inflation or depreciation of "Yuan", so that the compensation level remained stable and China kept its cost advantage over time. In 1998, the share of State-Owned Enterprises (SOE) was largely diminished. 8.8 million workers among 15.7 million employments were laid off under project of "XiaGang". As a result, firms were able to pay more for the rest of persons engaged and the remuneration per capita rose a little from this year. When compared Figure 1-5 with Figure 1-6, over the year of 2000s, China's labor compensation relative to the trade partners changed not as largely as that relative to US.

[19] A commonly known social movement that took place in 1966-1976

In brief, China's labor compensation level of total economy was the lowest among the countries, while US was the highest. Japanese compensation increased the fastest. It was relatively low at beginning but it became the second highest just behind US in 2011. Among European countries, UK, Germany and Italy had a low labor compensation of total economy. Their compensation rose over time and has been larger than that of the trade partners since the end of 1980s. France's labor compensation level remained superior to 1 all the years. It paid more remuneration than other European Union countries. On contrast, Spain expended less remuneration than other major industrialized economies.

Indeed, the level studied is a relative index. The trade weights of each country have a significant effect on the final result. The comparison of the index relative to all the trade partners with that relative to US reveals that the US and Japan's level of labor compensation was not as high as the conclusion above without the trade weight effect. Especially for Japan, its labor cost was even lower than Spain in 2007 and 2008. US's level was also passed by France, Germany and Italy on several years. The raison is that in US and Japan's trade, the weights of emerging countries, including China were much larger than that in other industrialized countries' trade. When the emerging countries always had low labor compensation, US and Japan's relative level to them increased more in Figure 1-5 than Figure 1-6. No matter in which figure, China' level remained the lowest compared with the major industrialized countries.

However, as a country with brilliant burgeon; Chinese unchangeable salary level will bring on various social problems, such as rich state poor people, inequality of income and wealth distribution, even polarization, sensitive sense of belonging…These problems are imminent /or already to impair Chinese sustainable development and need to be solved as quickly as possible. As this paper highlights Chinese Competitiveness, we do not shed lights on this issue, but make it to be direction for future research.

3.1.2 China has lower relative labor productivity but continuously increased

Figure 1-8 and Figure 1-9 demonstrate relative labor productivity of total economy compared with US and with 17 trade partners[20]. The evolution of labor productivity seems more stable than that of labor compensation because we utilize the real value added at constant price and constant PPP of 1990 for labor productivity calculation. Indeed, all the countries' productivity increased over time but the speeds of growth

[20] Brazil is removed.

were different. Therefore, Figure 1-8 concerning their levels relative to US demonstrates diverse evolutions up and down. When taking the trade weights into account showed in Figure 1-9, the levels change again.

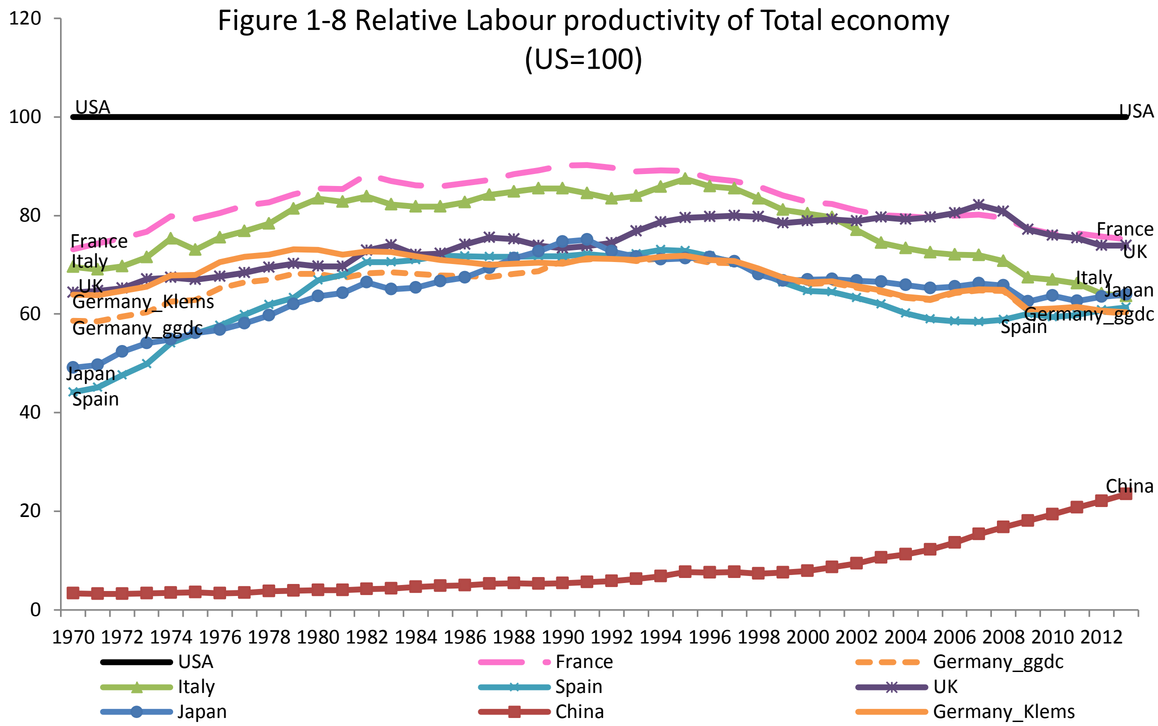


Figure 1-8 Relative Labour productivity of Total economy (US=100)

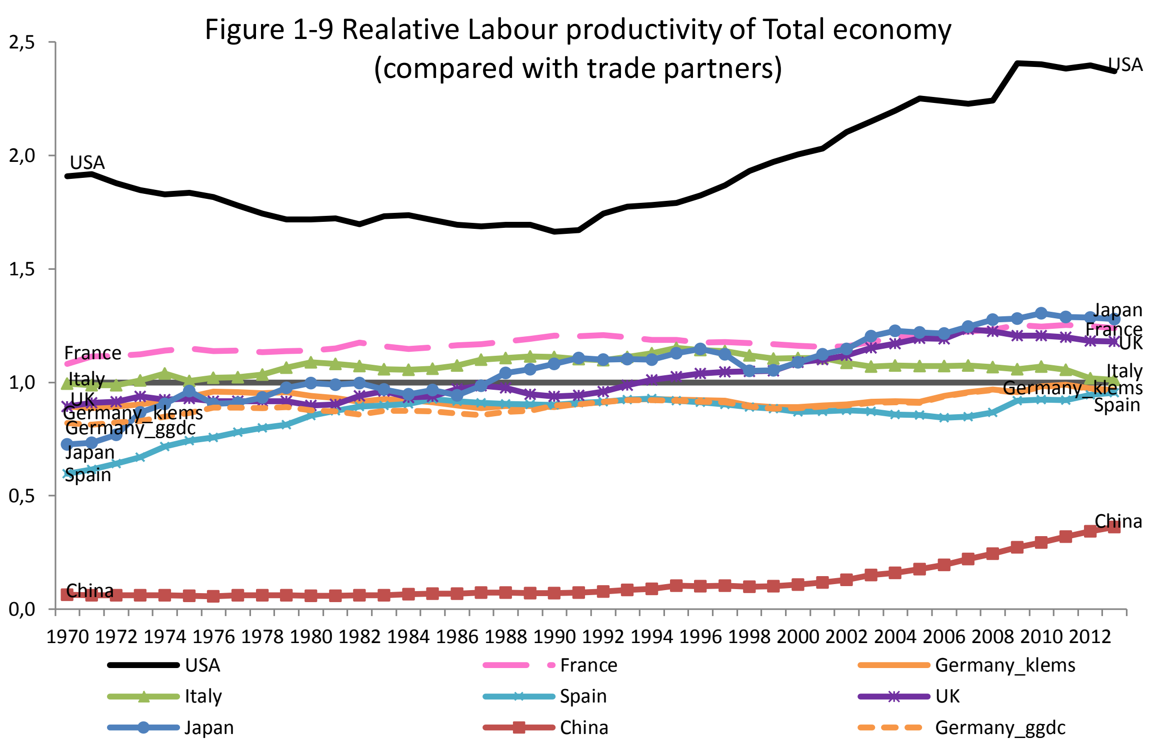


Figure 1-9 Realative Labour productivity of Total economy (compared with trade partners)

In Figure 1-8, the United States was the most outstanding economy with the highest relative level of labor productivity among industrialized countries. The wage-setting system is an important element. Workers there might to be fired at any time for any raison; employment protection is also weak. The only way to avoid being replaced is working efficiently. This so called “survival of the fittest” system permits, on one hand, the enterprises to choose more efficient workers, raise their productivity and cut down the cost of production; on the other hand, this system permits the workers to improve themselves and favorite overall productivity level. In this case, the gap between American line and the rest became larger and larger from 1990, except China and UK.

The United Kingdom’s relative labor productivity continued rising more rapidly than that of other countries. Until 2007, UK has been the second highest productive country. We could conclude that the stronger employment protection, the less productivity it has. Employees in US and UK are less protected, they are thus more productive. While those in Spain and Italy earn more assurance, they work less efficiently.

Furthermore, R&D expenditure and industrial policies of innovation also affect productivity variation. Mazier (1999) documented the research effort in UK, Germany and France were comparably among 2.2-2.4 as percentage of GDP from 1990s, while that in Italy was only 1.2 and in Spain 0.9, which was much lower. That also reduced the productivity level of the latter two economies.

The crisis has a significant impact on relative labor productivity. During the international crisis over 1979-1982 and 1990-1992, the industrialized countries’ growth of output stagnated, except the United Kingdom. Its labor productivity rose more rapidly than years before. In 2007 and 2008, UK’s productivity attaint to the second highest in the world, just behind that of US. Unfortunately, it did not avoid the impact of 2008 crisis, when the total economy turned to be less and less productive. Indeed, all the countries’ productivity declined at this moment except Spain and China. After then, the labor productivity of mostly countries recovered. France replaced UK’s second highest level.

Japan’s evolution of labor productivity was still due to the salary system characterized by seniority-based wage and long-term employment. It enhanced employees’ loyalty and team spirit. This circumstance inspired workers training themselves automatically and growing up with their firms together. Therefore the labor productivity increased. From 1990, the system changed with enterprise union, the labor compensation was cut down and the labor productivity turned to diminish.

In 2012, Japan is classed in the fifth. Its level passed Italy and became the fourth in 2013. However, in Figure 1-9, Japan is classed in the second. Difference is still the trade weights α_k^i according to Equation (4). As mentioned in last part of labor compensation, China occupied larger percentage in Japanese trade than in other countries. Given Chinese productivity was quite low, Japanese relative productivity level increased more than the rests. By contrast, UK's relative level diminished when taking account of trade weights because US, whose productivity was very high, represented a larger share.

China suffered low relative productivity level all the times. In point of history, China missed the three Industrial Revolutions and its technological progress lagged behind other industrial nations. It faced problems in popularization of education, especially in rural areas and its R&D expenditure was extremely tenuous. An increase happened at about 1998. Thanks to the "XiaGang" project, Chinese SOEs' share began to decrease. Gao Xu (2010) found that the share of SOEs (in terms of number) in industrial sector declined from nearly 40% to 5% between 1999 and 2008. Most small SOEs have been privatized or filed bankruptcy, while larger ones have been subsidized and/or merged to hopefully create stronger firms. This allowed China to lessen the burden of inefficient operations and ameliorate its overall productivity level. In virtue of Foreign Direct Investment, foreign invested firms, whose productivity is much higher than local one, helped China to catch up in terms of labor efficiency.

3.1.3 Relative labor compensation and relative productivity were highly correlated

The relationship between these two indexes is reciprocal. On one side, compensation influences productivity. More salary could incite workers to exercise their talents. On another side, productivity has significant positive effects on compensation. Wills and Wroblewski (2007) found that the gain from productivity would be equally distributed between labor remuneration and capital one.

In particular, Nickell and Layard (1998) proved a positive correlation between the Employment Protection Legislation (EPL) and Total Factor Productivity (TFP) through statistic regression analysis. Andrea Bassanini and al. (2009) developed this analysis by replacing TFP to labor productivity in the basic model. They pointed out that EPL also affected labor productivity, like what it did on TFP. In the long term, this affect is negative that means EPL tends to weaken labor productivity. In the short term, the affect depends on reforms' manner and target of labor market:

(1) EPL has negative effect on the new companies and the countries with a high productivity level. For the new enterprises whose total costs are limited, EPL aggravates their burdens so that they can't rapidly reallocate labor and financial

resources face technological and other changes. For the countries like US, UK, France and Japan, EPL lessens migration of workers and makes persons engaged loafing on the job, which is apt to lead a stagnation of productivity growth.

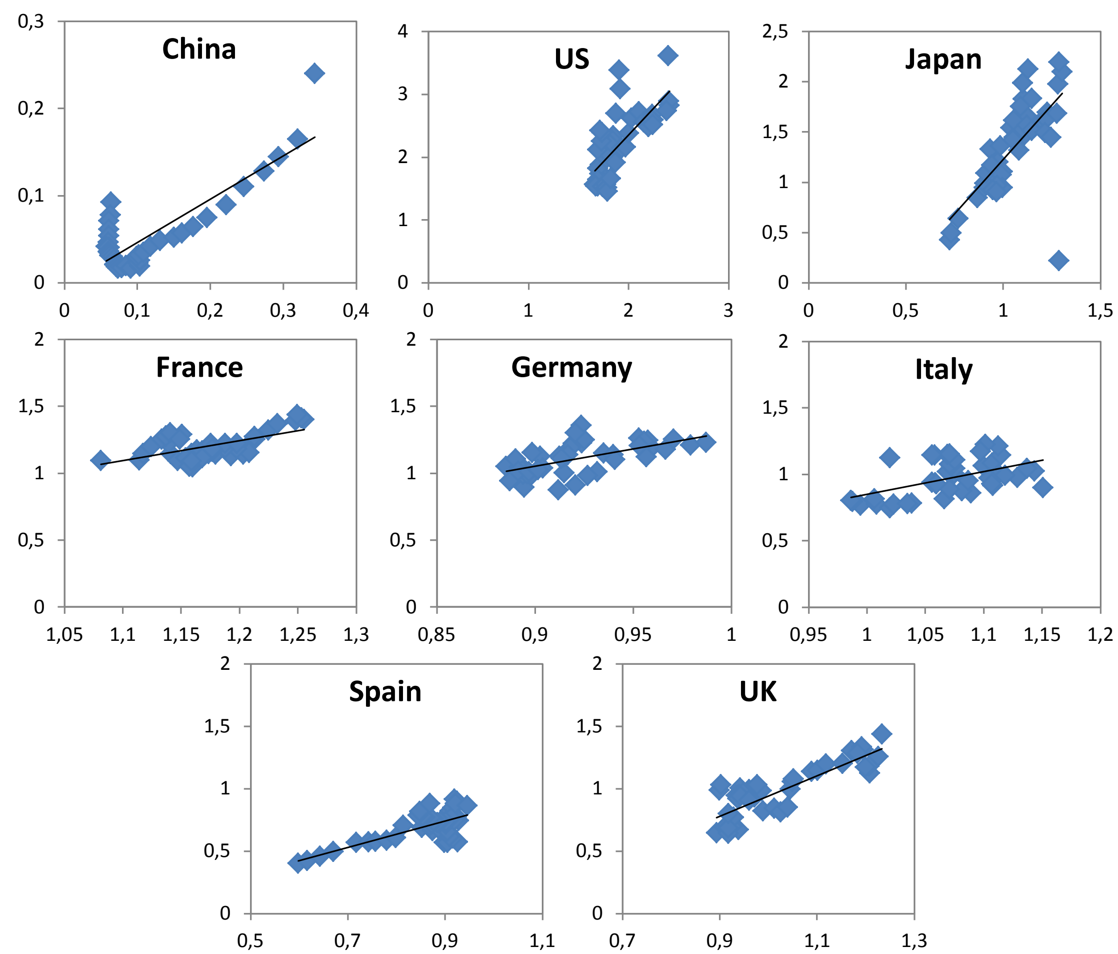
(2) EPL has positive effect on the less productivity countries, such as China, Spain and Japan before 1980. The restrictive legislations impose firms substituting capital to labor in production and accumulating capital in this way.

In brief, the effects rely on employment rate, share of industries protected by EPL and the speed of labor productivity growth.

This section tried an elementary study of relationship between relative productivity and remuneration by Pearson's correlation coefficient written as follows:

$$P_{rw,rp}=\frac{cov(RW_i,RP_i)}{\sigma(RW_i)\,\sigma(RP_i)} \qquad (12)$$

Figure 1-10 Correlation between relative productivity and relative labor compensation among China and major industrialized countries



In Figure 1-10, all the counties have productivity closely related to salary. In China and the United Kingdom, these two sets of indicators have large positive effects on each other with coefficients correspondingly equaling 0.85. The coefficient is smaller in Spain than in other countries but it is still superior to 0.5. We could conclude that among China and major industrialized countries, there's relationship between salary and productivity. Especially in China, the efficiency of production could be improved by rising labor compensation.

	China	USA	Japan	France	Germany	Spain	Italy	UK
correlation coefficient	0,85	0,74	0,70	0,61	0,60	0,52	0,74	0,85

It is worthwhile to note that regional integration also improves labor productivity. Ali (2007) estimated PS model and confirmed that the European Integration would theoretically and empirically promote economies of scale and ameliorate the productivity of members. China profits from labor absorption of migrants from rural to urban areas, especially in the construction and non-qualified manufacturing sectors. Its evolution of manufacturing sector will be studied in next section.

3.1.4 China has much lower relative unit labor cost than major industrialized economies

We suppose the average level of these economies equal 1. The value inferior to 1 means the country pays less labor cost than its rivals; hence it is advantageous in terms of cost. By contrast, when RULC surpasses 1, the country is considered to be disadvantageous.

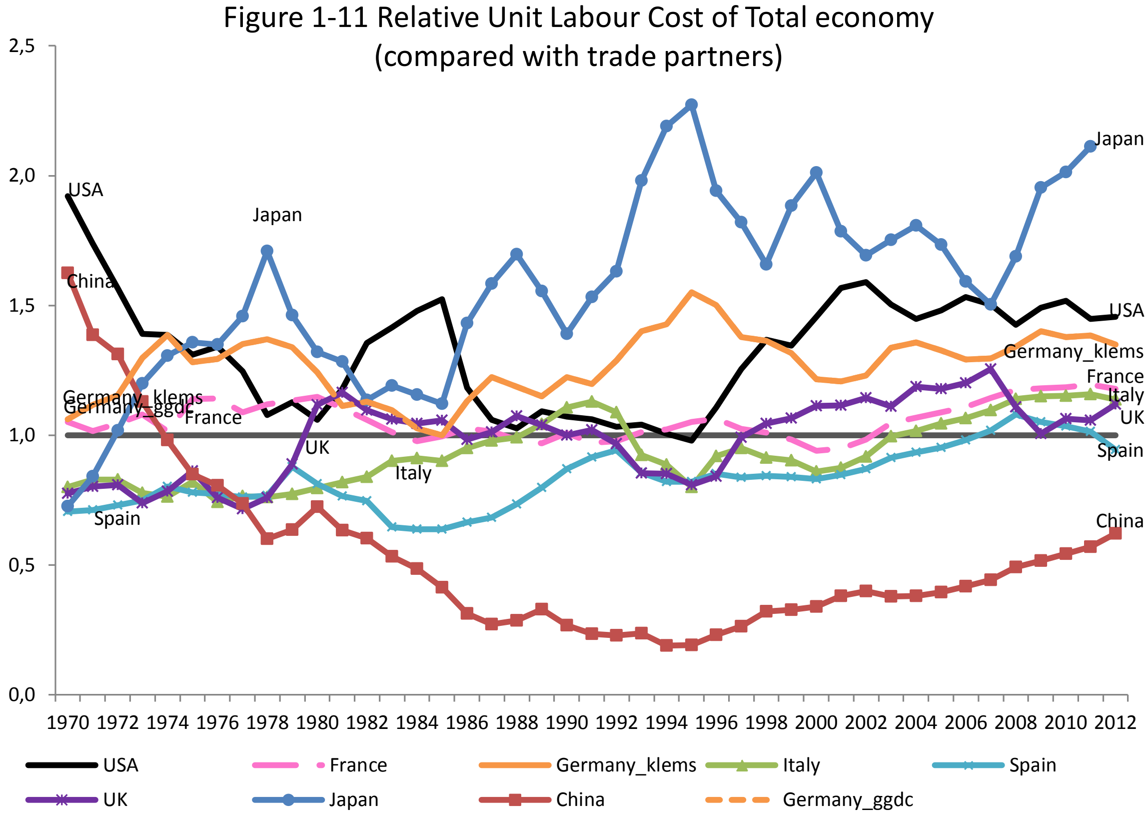


Figure 1-11 Relative Unit Labour Cost of Total economy (compared with trade partners)

Figure 1-11 describes Relative Unit Labor Cost levels across countries. Chinese value after 1974 was lesser than 1. It has continued declining until 1995. After the reform of 1978, its level was the least among these economies', i.e. it wined most from cost competitiveness with shield of its tiny compensation and increasing productivity. Since 1995 China's relative labor compensation has increased more quickly than its relative labor productivity, thus the relative unit labor cost increased. It means that China's cost advantages have lessened since 1995.

On contrast to China, another Asian country, Japan had the relative unit labor cost always in the highest level. It lost the cost competitive forces nowadays. At outset of 1970, Japanese relative cost was the lowest among the country group. It possessed most cost advantages than others, including China. However, from n 1974, Japan began to lose its advantages quickly. During 1975-1981 it lost totally the cost advantages and became the most costly for total economy. The successive appreciation of yen is an important element since we noted above that Japanese exchange rate influenced its labor costs.

Nevertheless, Japan still mushroomed during this period. The real level of unit labor cost was not as high as calculated above. If Japan was rapidly handicapped by cost, it couldn't emerge as a major industrialized country. The raison is that China and other emerging countries represented large share of Japan's trade. As these economies' costs were tiny, Japanese unit labor cost relative to them became much higher than reality. Therefore, we took into account of only US economy and recalculated RULC among them.

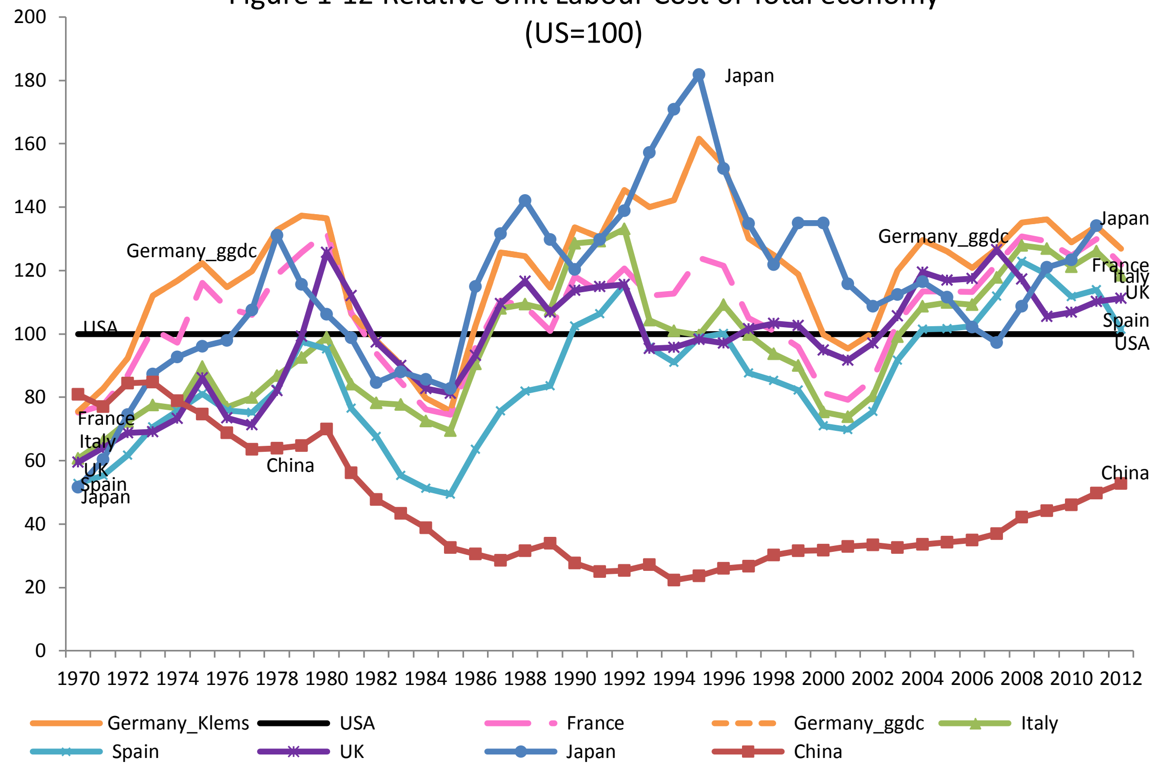


Figure 1-12 Relative Unit Labour Cost of Total economy (US=100)

Figure 1-12 illustrates the new results of relative unit labor cost level compared with US. As it demonstrated, both Japan and US became more advantageous than the results of Figure 1-11. In Figure 1-11, Japanese level of relative unit labor cost was higher than all the European countries, while in Figure 1-12, the level was usually lower than some European countries. Especially from 2004, Japan's level was passed by Germany and its level was lower than all the European countries over 2006-2007.

As Japanese compensation declined largely from 1995, its losses of cost competitiveness diminished from the same year and it reappeared competitive in 2007. The subprime crisis stopped this comeback.

The same difference occurs in US. In Figure 1-11, the US was handicapped in cost over all the times, with the ratio RULC superior to 1. In Figure 1-12, US total economy was advantageous during 1986-1993 and 2004-2012. In US trade, China and Mexico took up a larger percentage than in other countries' trade. Given Chinese and Mexican unit labor costs were quite low, US relative level raised more than other advanced countries, so that US suffered more loss of competitiveness when China is taken into account.

As for other advanced economies, there exists differences between Figure 1-11 and Figure 1-12 yet they are not as large as in Japan and US. In Figure 1-11 the ratio relative to all the 19 countries, Germany was characterized by cost handicap and it was tending to be more and more unpropitious. France and UK's relative unit labor costs were lower than Germany and they remained close to average level. At outset in 1970, the relative cost levels of France and Germany were closed to each other. During the next decade, Germany's relative unit labor cost was much higher than France. Their gap narrowed greatly between 1980 and 1985. After 1985, the gap re-enlarged until 1995. Since then, it was smaller and smaller and recently it has not changed much. Italy and Spain owned cost advantages with relative unit labor costs inferior to 1 over most time. However, they lost cost competitiveness in recent years. Only in 2012, Spain was revealed to be advantageous again. Italy still suffered cost handicap.

When looking at their cost competitiveness relative to US in Figure 1-12, all the European industrialized countries has reduced cost handicap since 2008. Germany and France's levels varied more closely. The trade weights are the main raison as what has happened for US and Japan. ULC of Spain was the lowest in both two figures but its real level relative to US shows that Spain has been handicapped than US since 2004. The towering labor protection and poorest productivity deteriorated its cost competitiveness at a great range.

3.2 China versus new industrialized and emerging countries

Figure 1-4b illustrates the exchange rate evolution during 1970-2012 with 1999=100 as what has done for last section. A currency depreciation promotes the price competitiveness while an appreciation damages the competitiveness.

Different from developed countries, mostly emerging economies' exchange rate against US dollar depreciated over time. Their price competitiveness was enhanced at the same period. Since the year of 2000s, China, Thailand Malaysia and Philippines's national currency has appreciated, while other emerging countries including Vietnam, India and Mexico's currency continued depreciating.

As for the new industrialized economies, Singapore and Taiwan's currency continued appreciating. Korean exchange rate has depreciated until the end of 1990s then it begun to appreciate.

3.2.1 Chinese level of relative labor compensation was lower than new industrialized economies but higher than emerging countries, excluding Malaysia.

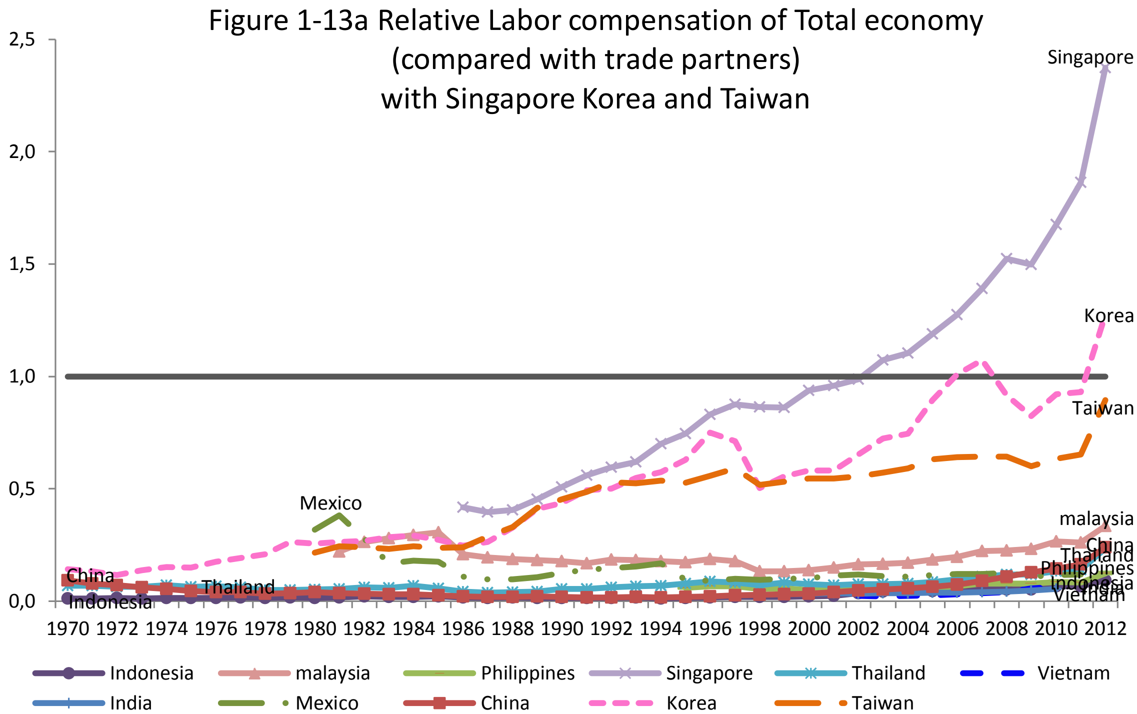


Figure 1-13a Relative Labor compensation of Total economy (compared with trade partners) with Singapore Korea and Taiwan

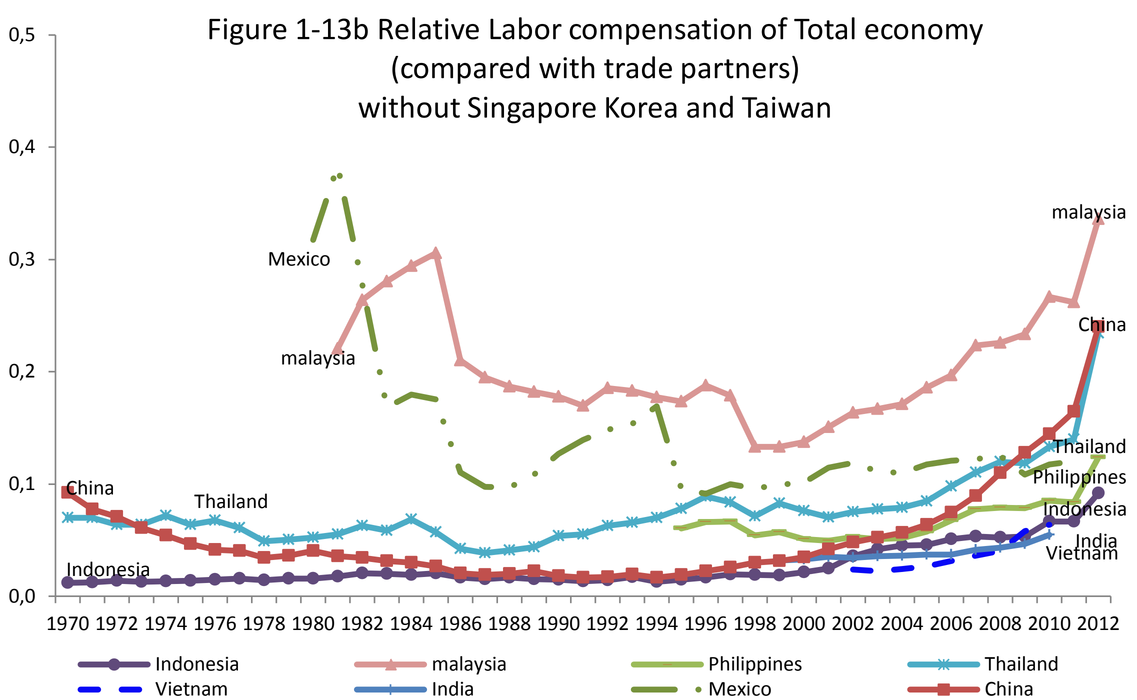


Figure 1-13b Relative Labor compensation of Total economy (compared with trade partners) without Singapore Korea and Taiwan

The interesting thing is over 2011-2012, the new industrialized economies and emerging countries' relative labor compensation all increased, while the developed countries' level declined such as in Italy and Spain.

As showed in Figure 1-13a and Figure 1-13b, China's level of relative labor compensation was much lower than new industrialized economies, including Singapore, Korea and Taiwan. Among them, Singapore's employee in total economy earned the highest wages and salaries. Since 2002, its relative labor compensation has been higher than the average level. Until 2012, the level was even higher than mostly developed countries, except for US and Japan.

Korean relative labor compensation was higher than average level from 2011. In 2007 the level was also higher than 1 but after the subprime crisis, its labor compensation reduced.

Indeed, the exchange rate of South Korea, affects relative labor cost but not as significantly as the impact of Japanese exchange rate. For instance, Korean currency "won" kept depreciating till 1986, but its compensation level continued rising instead of turning down. Korean government plays an important role in economy activities. Since 1970s, it carried out policies of depreciation and developed Export-Oriented Industries. Export and GDP expanded fleetly as awaited. In corresponding, wage level was put up in order to avoid negative impact of depreciation on workers' earning and then on their employment effort. Hence, Korean income including remuneration per capita has accumulated over this period. At the same time, exactly in 1978, a new democracy was introduced in this country, which required more salary, better employment protection and more effective negotiation than before. That's another raison for Korean outstanding growth in remuneration.

However, as a result of rapid growth and investment, Korea encountered an inflationary press. The economic policy was therefore shifted from "growth" to "stabilization", that's why exchange rate did not move so much as it performed 1986 ago. Since then, Korean currency has generally appreciated with relative compensation level increased, except the period of East-Asian crisis over 1996-1998, when "won" depreciated and remuneration level diminished simultaneously. For this purpose, we could say that exchange rate still affects the relative labor costs in Korea, but this effect is not applicable for all the time.

As same as China, Korean wages were also determined by national grid. Thus Korean remuneration level is not significantly influenced by exchange rate.

Taiwan's level of relative labor compensation was lower than Singapore, Korea and world average level but higher than China. During 1986-1992, 2009-2012, Taiwan's national currency appreciated and its wages and salaries increased side by side. Thus Taiwan's wages and salaries were affected by the exchange rate.

Nevertheless, it is also revealed that for certain periods, no matter how evolve the exchange rate, Taiwan's relative labor cost did not vary much. Over the three years of 1980-1983 Taiwan's currency depreciated and over the next three years 1983-1986 the currency appreciated. Yet Taiwan's relative labor compensation remained at the same level during these six years. As for the rest period 1992-2009, the relative level also did not vary even though the exchange rate depreciated over the first decade and appreciated after then. Therefore, we could conclude that in Taiwan the exchange rate more or less affected the relative labor compensation level but not significantly.

Also demonstrated in Figure 1-13a and Figure 1-13b, China's recent level of relative labor compensation was higher than nearly all the emerging countries, except for Malaysia. Before the subprime crisis, China's relative compensation level was still lower than Mexico, Thailand and Philippines. After the crisis 2008-2009, Chinese currency continued appreciating and its wages and salaries increased rapidly at the same time. On contrary, all other emerging countries' exchange rate depreciated and their relative labor compensation stopped rising as before. Mexican wages and salaries declined over times, especially over 1981-1987. Yet its exchange rate did not vary at all until 1984. Then it began to depreciate fleetly. In this sense, the relative compensation level's evolution cannot be explained by exchange rate. The level of another two countries, Thailand and Philippines, did not vary much and the levels were passed by China.

The lowest level of relative labor compensation existed in Vietnam, India and Indonesia. In recent years, there is not palpable gap between their levels. At the outset of 1970s, it is only revealed that Indonesia's level kept the lowest yet other two countries were not available due to the lack of data.

Malaysia's relative compensation level decreased until 1998. After the crisis of 1998, the labor cost increased on contrast of other ASEAN countries and it is the only emerging country whose relative level was not passed by China.

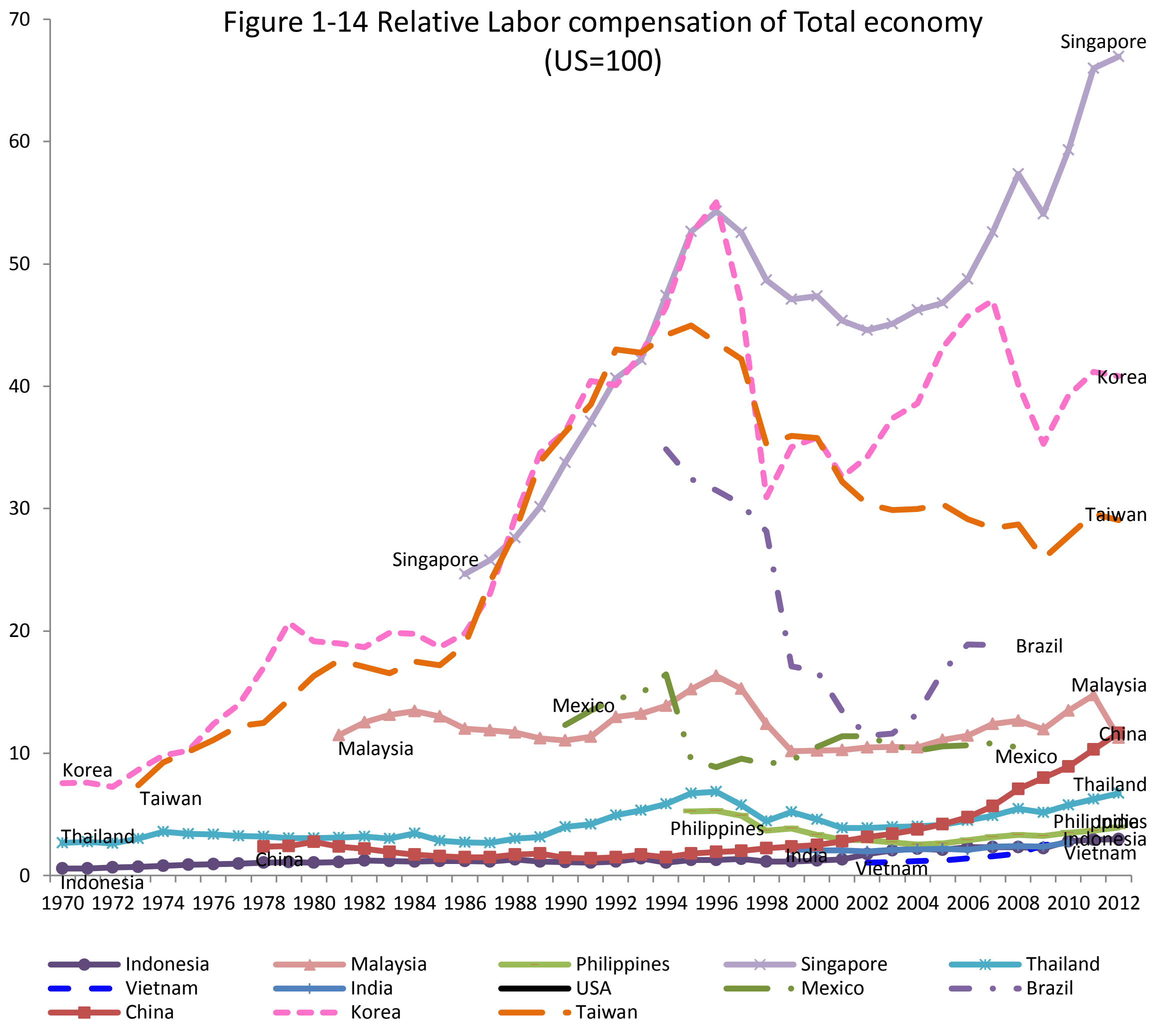


Figure 1-14 Relative Labor compensation of Total economy (US=100)

The level of relative labor compensation compared with US is illustrated in Figure 1-14. Its difference from Figure 1-13 relied on the trade weights. In reality when the effect of trade weights is not considered, the gap between Singapore and other emerging countries is not as large as that using the trade weights. Malaysia's labor cost relative to US decreased over 2011-2012 while that relative to the 18 trade partners rose instead.

3.2.2 China was less productive than new industrialized economies but more productive than emerging countries, except Malaysia and Thailand.

The evolution of relative labor productivity for total economy is showed in Figure 1-15 and Figure 1-16. Generally, the relative labor productivity of new industrialized economies increased much faster than China and other emerging countries. Besides, China's relative productivity increased faster than the rest emerging economies.

Figure 1-15 Relative Labor productivity of Total economy
(compared with trade partners)

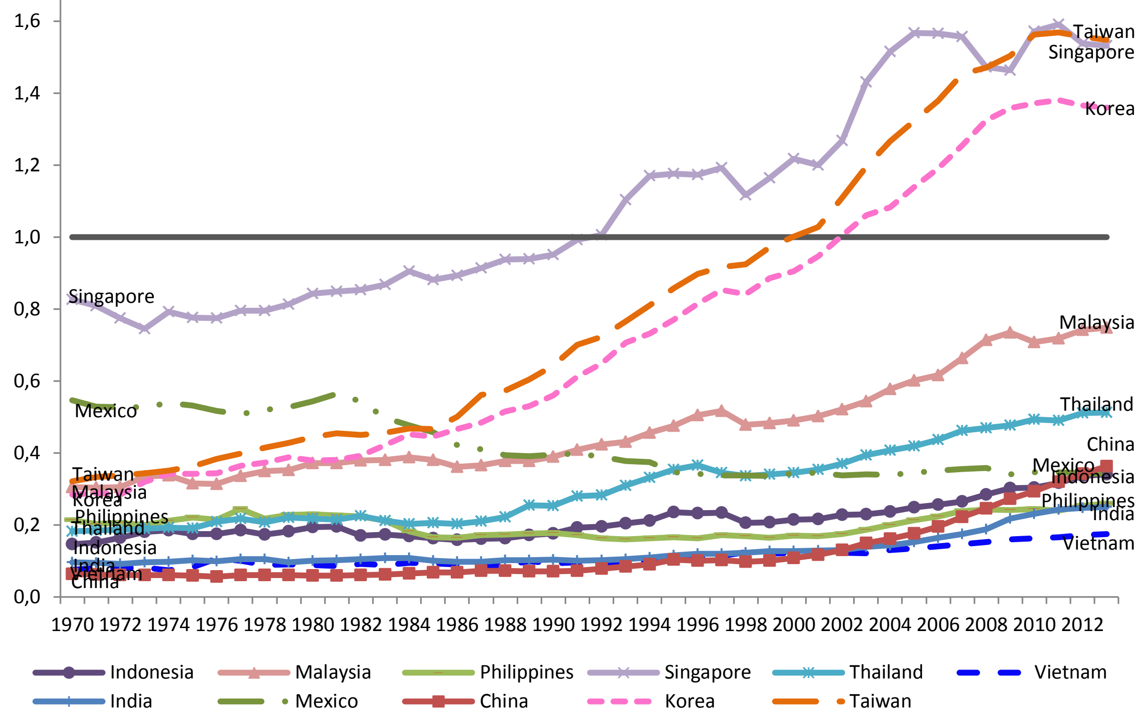


Figure 1-16 Relative Labor productivity of Total economy
(US=100)

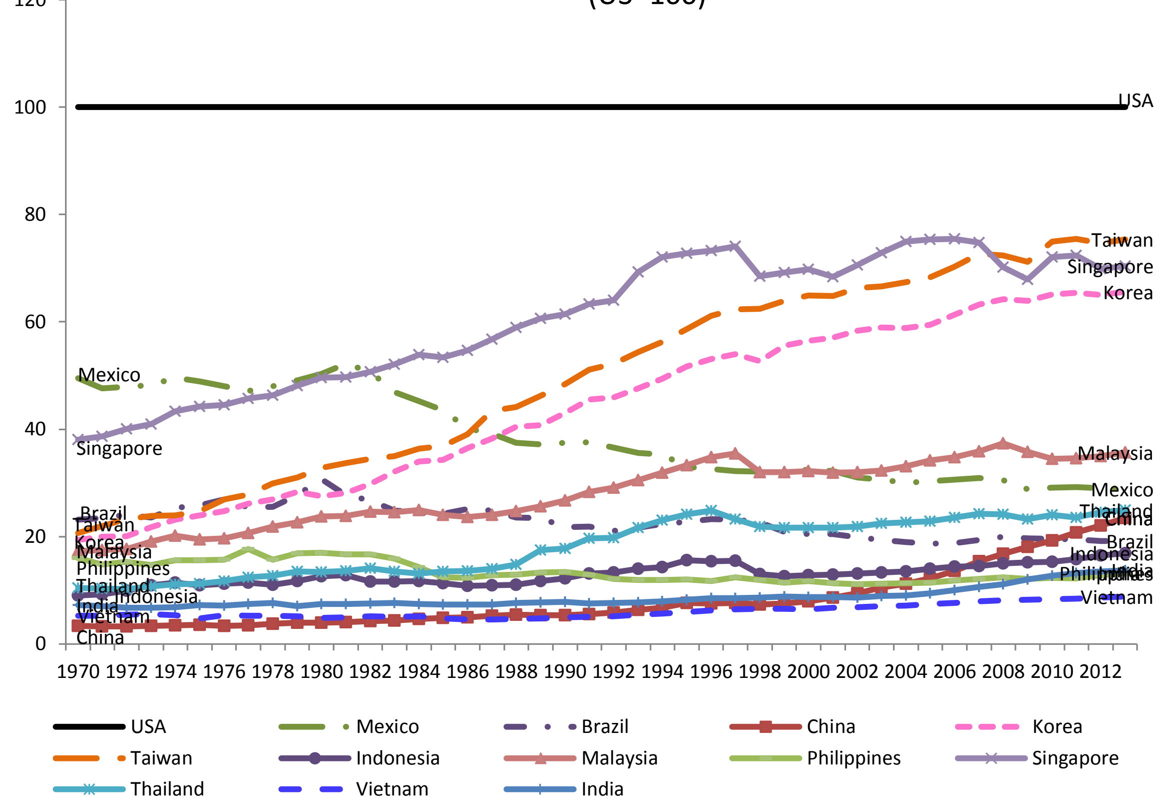


Figure 1-15 illustrates that among the three new industrialized countries, Singapore always won the highest level of relative labor productivity of total economy. Yet its speed of growth was not as high as other two new industrialized countries, Taiwan and Korea. The gap between them was thus smaller and smaller. The level of Taiwan increased the fastest. In 2012, it passed Singapore and became the most productive Asian country. Korean level also went up quickly. These three new industrialized economies were all more productive than Japan and their levels were only under US.

Malaysian relative compensation level was higher than China. Its level of relative labor productivity was also higher than the later. Thailand's relative compensation level was under China and it did not vary much. However, Thailand's relative labor productivity was enhanced quickly and it was also more productive than China.

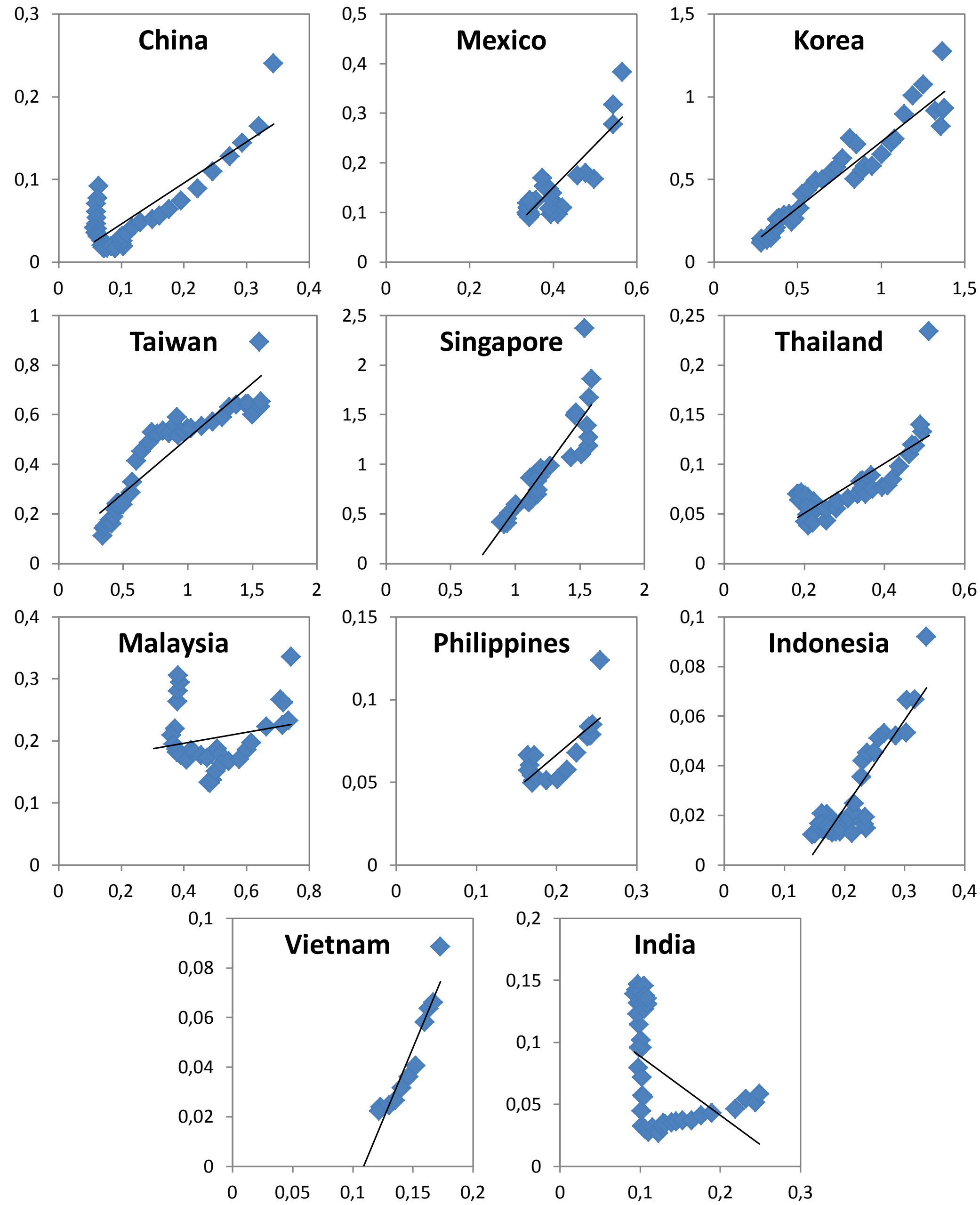
Among the countries whose relative productivity level was under China in Figure 1-15, Indonesia was the most productive country. Although Indonesian wages and salaries remained at the lowest level, its relative labor productivity was higher than Mexico, Philippines, India and Vietnam.

As same as China, India's relative labor productivity also began to rise quickly from the year of 2000s. Before 1990, India did not make any notable progress. This is abhorrent to common deduction. From 1991, the impressing commercial liberalization and the integration drove a rapid and suitable development in India. After then the dynamic innovation, especially in Informatics' field, promoted Indian labor productivity for total economy.

Mexican workers seemed less efficient than Chinese. Its relative labor productivity showed in Figure 1-15 was lower than that of China and it has continued decreasing since 1981. However, as revealed in Figure 1-16, Mexican level of labor productivity relative to US is not as low as its level relative to 18 trade partners. Its level of productivity relative to US was higher than China and Thailand all the times. The level was even higher than Singapore before 1981. The raison is due to the trade weight. US occupied a huge share in Mexico's trade while its share in other countries' trade was much smaller. Therefore, when all the 18 trade partners are taken into account, Mexico's relative level became lower. In addition, Brazil's level is also demonstrated in Figure 1-16. As same as Mexico, Brazil's labor productivity relative to US also continued declining after 1980.

3.2.3 Relative labor productivity and relative labor compensation were highly correlated with each other, except in Malaysia and India

Figure 1-17 Correlation between relative productivity and relative labor compensation among China, new industrialized countries and emerging countries



As showed in Figure 1-17 and the table below, the relative labor productivity and the relative labor compensation of the countries mentioned are highly correlated, except for Malaysia and India.

	correlation coefficient
China	0,85
Mexico	0,87
Korea	0,96
Taiwan	0,92
Indonesia	0,89
Malaysia	0,21
Philippines	0,77
Singapore	0,88
Thailand	0,78
Vietnam	0,94
India	-0,44

3.2.4 China was advantageous in cost than most of new industrialized economies (except Taiwan) but handicapped than all emerging countries.

Figure 1-18 Relative Unit Labor Cost of Total economy
(compared with trade parners)

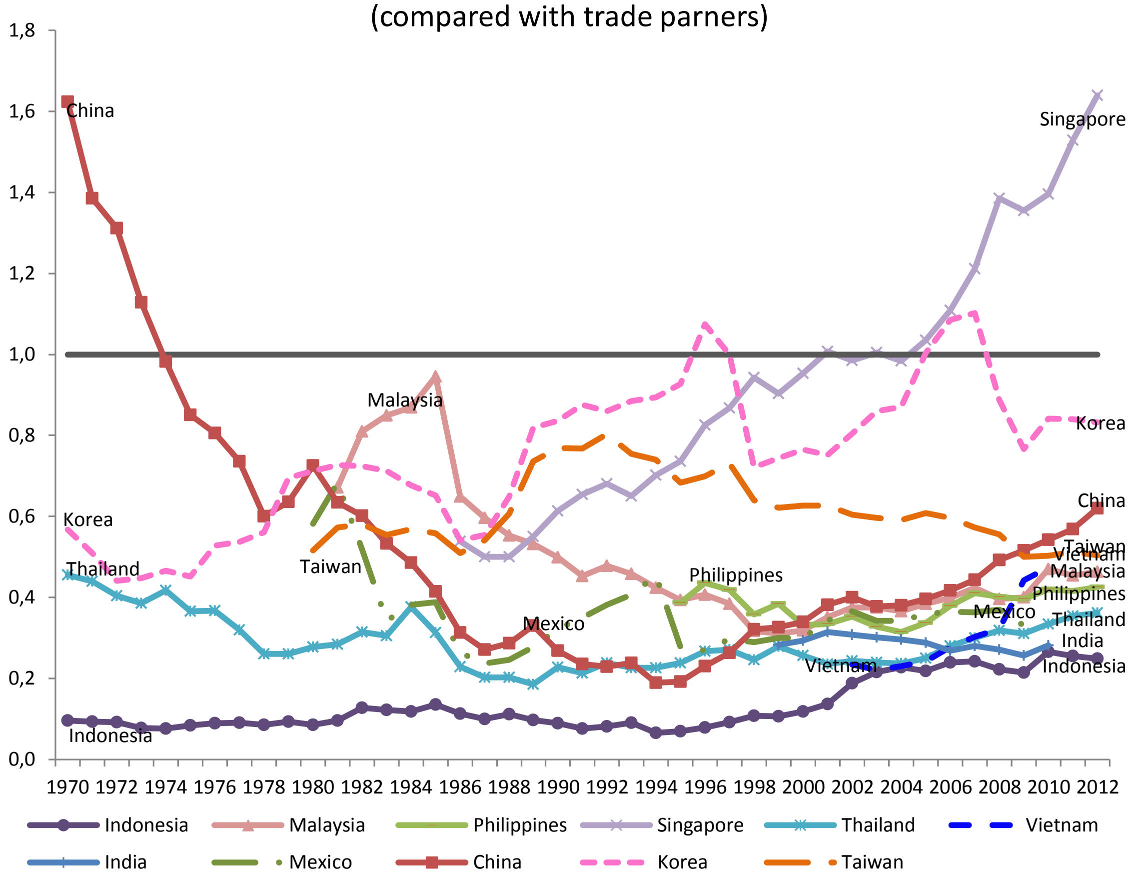
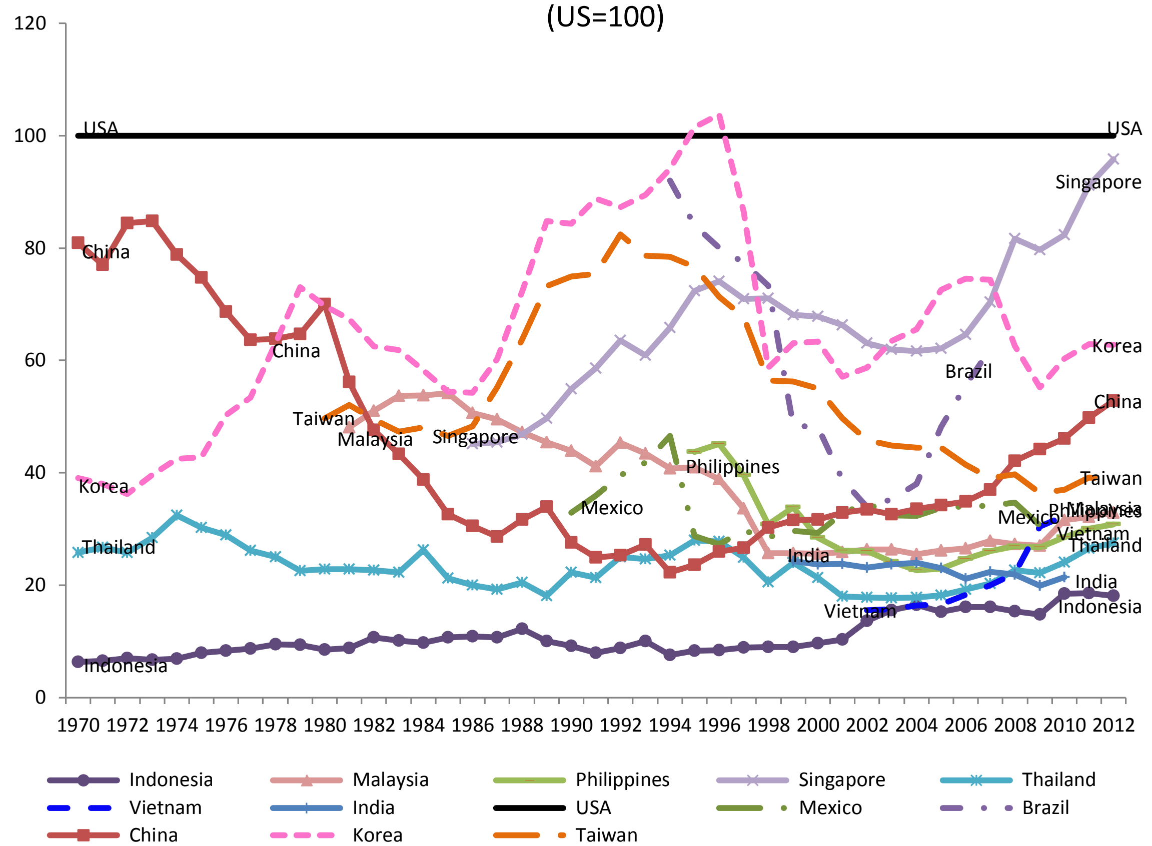


Figure 1-19 Relative Unit Labour Cost of Total economy (US=100)



Recently, China had a cost-advantage relatively to Singapore and Korea but a cost-handicap relatively to Taiwan. Because Taiwan's labor productivity increased the fastest all over the world and its labor compensation was not much higher than others.

As for the emerging countries, China's relative unit labor cost level has been higher than all the emerging countries since 2000. Indeed, China was the most handicapped in cost among the countries at beginning. Its relative cost per production continued diminishing rapidly and its cost competitiveness increased. During the decade of 1990-2000, China became competitive in cost when compared with Mexico, Thailand, Malaysia and Philippines. Over 1994-1995, its level was the lowest and it was only handicapped relative to Indonesia. At this moment, China was the most advantageous (except when compared with Indonesia) and its total economy burgeoned the most rapidly. After then, Chinese salaries and wages were fast putting up and the relative labor productivity did not change much. China's relative cost of total economy production increased quickly and it lost the cost competitiveness. If China wants to burgeon as before, it should find other competiveness such as the non-cost competitiveness that will be discussed in next chapter.

4 International comparison of Cost Competitiveness for manufacturing

We have already discussed the elements of cost competitiveness and the relationship between them in previous parts referring to the total economy. For the study of manufacturing sector in this part, we put all the countries together and assess their performances index by index.

4.1 China's level of relative labor compensation was much lower than industrialized economies but a little higher than emerging countries

For manufacturing calculation, we met a problem of German data. BLS and GGDC both utilize West Germany data for labor productivity calculation before 1991. This paper also adjusts the estimation of Germany's productivity by these two databases. In order to confirm the compatibility of the data and compare the real level of Germany with that of other economies, we also illustrate West Germany's estimation for labor compensation and unit labor cost in the figures.

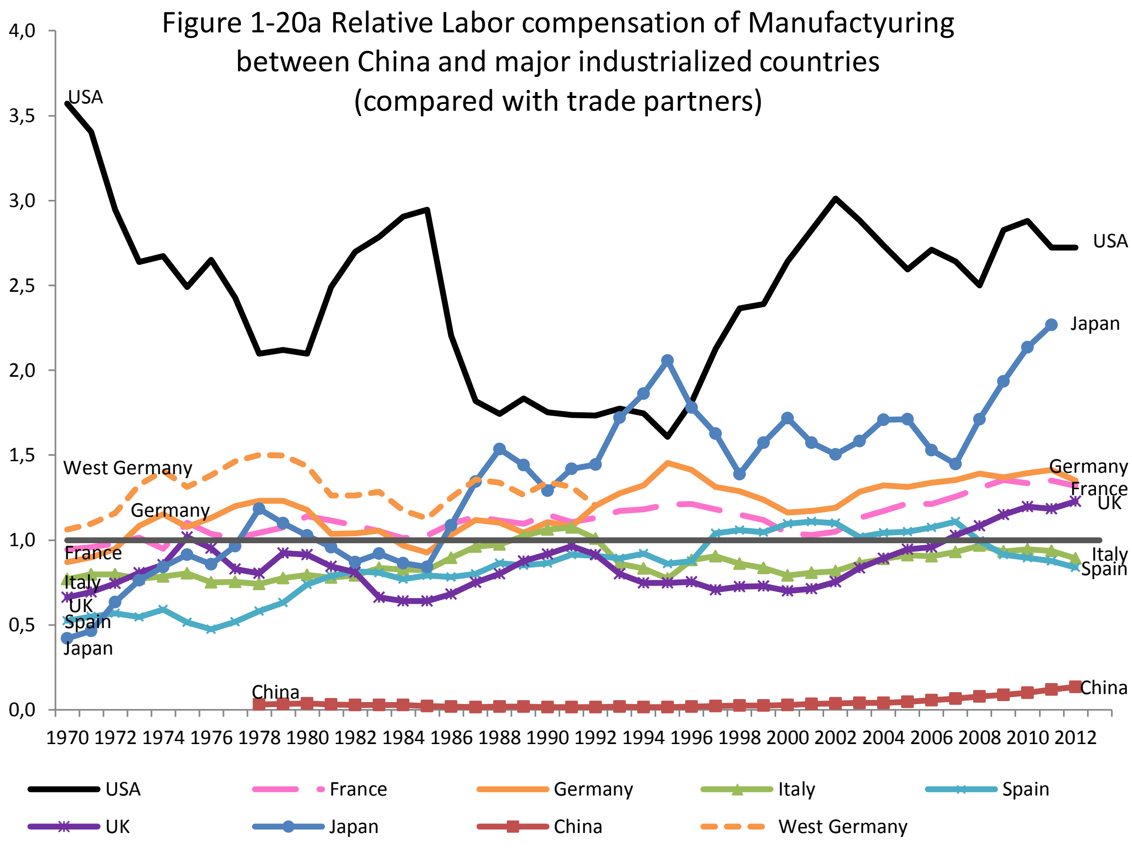
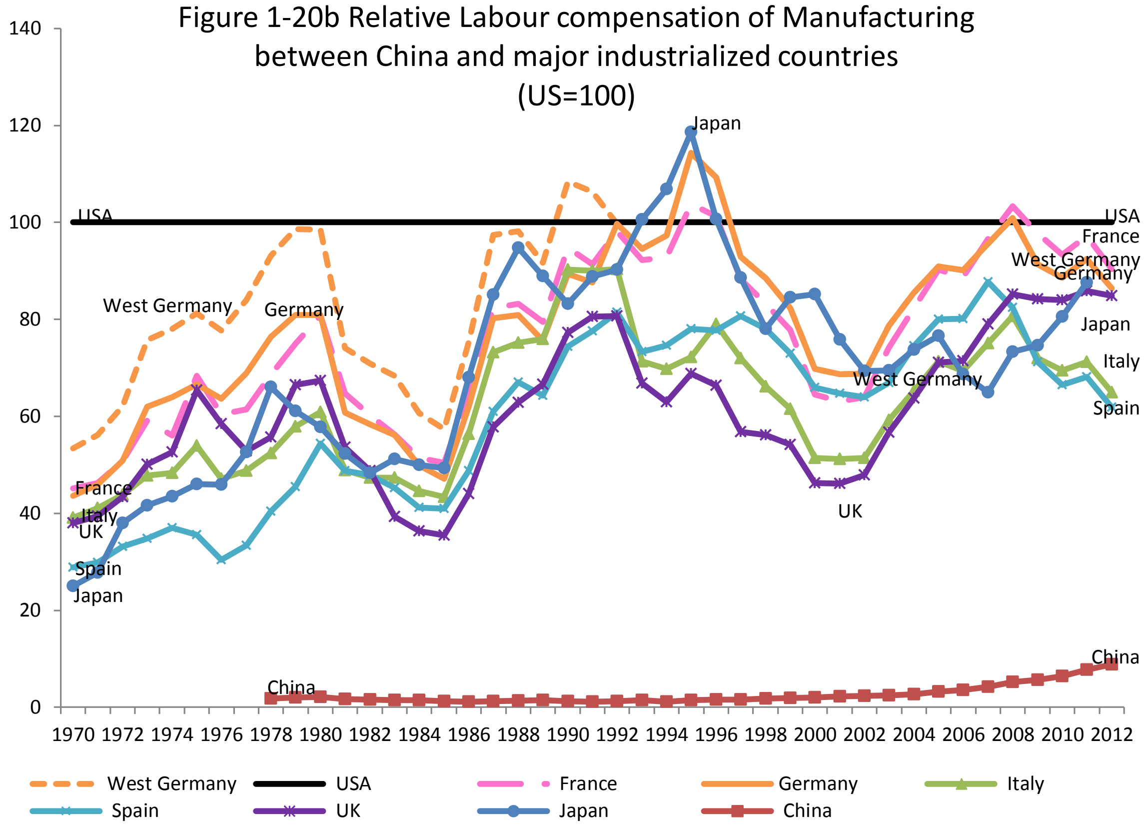


Figure 1-20a Relative Labor compensation of Manufactyuring between China and major industrialized countries (compared with trade partners)



Among the major industrialized countries, we compare the relative labor compensation of manufacturing showed in Figure 1-20a with that of total economy showed in Figure 1-5. France's relative labor compensation of manufacturing was lower than that of total economy. For total economy, French relative level of labor compensation was always higher other countries excluding US and Japan. Differently for manufacturing, its level was mainly lower than Germany and was more closed to 1, the average level of the 19 countries.

On contrast to France, Germany's relative labor compensation of manufacturing was higher than that of total economy. Before 1991, the West Germany paid more labor cost than East Germany. After then, the unified Germany's relative labor cost was higher than all other European countries, including France.

Italy's level of relative labor cost of total economy has been superior to 1 since the year of 2000s, while that of manufacturing has been inferior to 1 since 1990s. In Figure 1-20a, we could see that Italy's relative labor remuneration of manufacturing was always under the average level of 18 countries. Its level was even passed by Spain during 1996-2008. Spain's relative level increased more quickly for manufacturing sector than that for total economy. As for US and Japan, the evolution seems similar between total economy and manufacturing.

Figure 1-20b shows the relative labor cost of manufacturing compared with US. Japan and Germany's levels of labor compensation relative to US were not as high as their levels relative to the trade partners. This is due to de trade weights that have been already discussed in last section. Therefore we do not discuss again here.

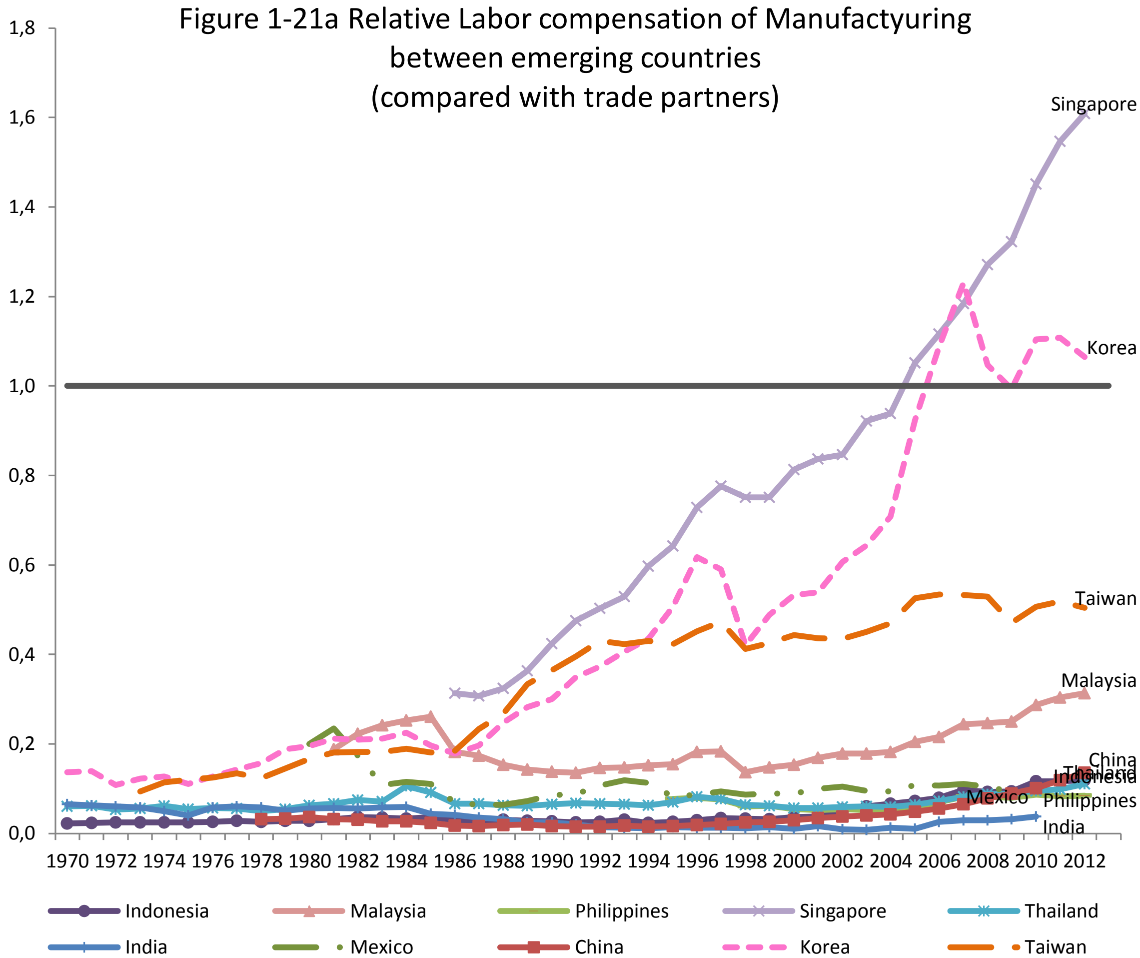
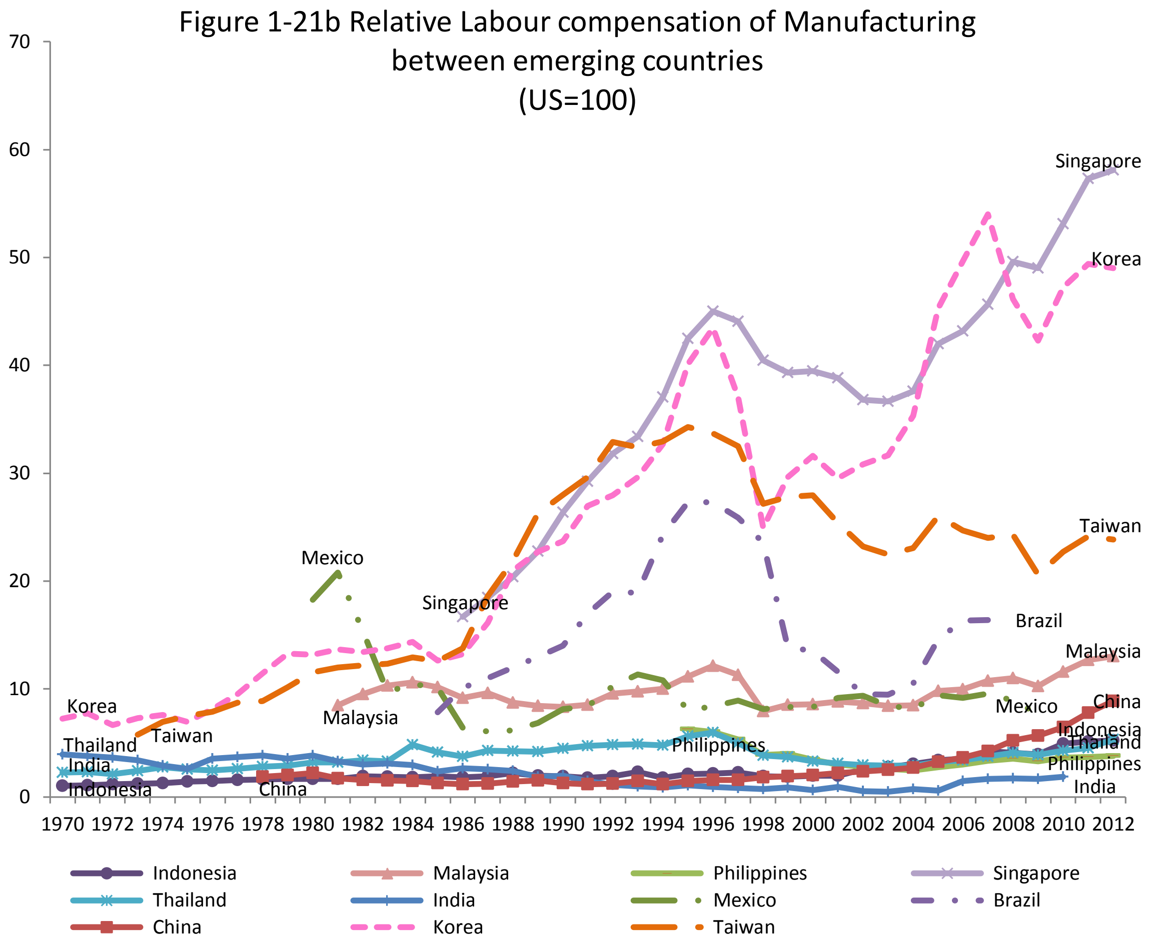


Figure 1-21a Relative Labor compensation of Manufactyuring between emerging countries (compared with trade partners)



Among the new industrialized economies, Singapore's relative labor compensation of manufacturing showed in Figure 1-21a was higher than that of total economy showed in Figure 1-13. The relative level of manufacturing became superior to 1 from 2004 and in 2012 it was 60% higher than average level of 18 countries. Differently, that of total economy became superior to 1 from 2002 and after a decade it was 150% higher than 18 countries' average level.

Korean relative remuneration of manufacturing attained a peak in 2007. After 2008 crisis, the remuneration's relative level decreased and was lower than that of 2007. Unlikely for total economy, its relative level also decreased after 2008 crisis but the 2012 level became higher than that of 2007. Compared with other countries, Taiwan paid higher remuneration for total economy in 2012 than the years before. Yet for manufacturing, it paid less remuneration in 2012 than before. When compared with China, China's remuneration level was much lower than them.

The evolution of emerging countries for manufacturing relative remuneration was similar as that for total economy. China paid more relative labor compensation for manufacturing than other emerging countries except for Malaysia. Chinese workers in rural unit and the migrant workers are also not taken into account in this part. Therefore its evolutions of relative wages and salaries for manufacturing and for total economy in figures are not revealed large differences.

4.2 China was less productive than industrialized economies but more than emerging countries, except Malaysia and Thailand.

Figure 1-22a Relative Labor productivity of Manufacturing between China and major industrialized countries (compared with trade partners)

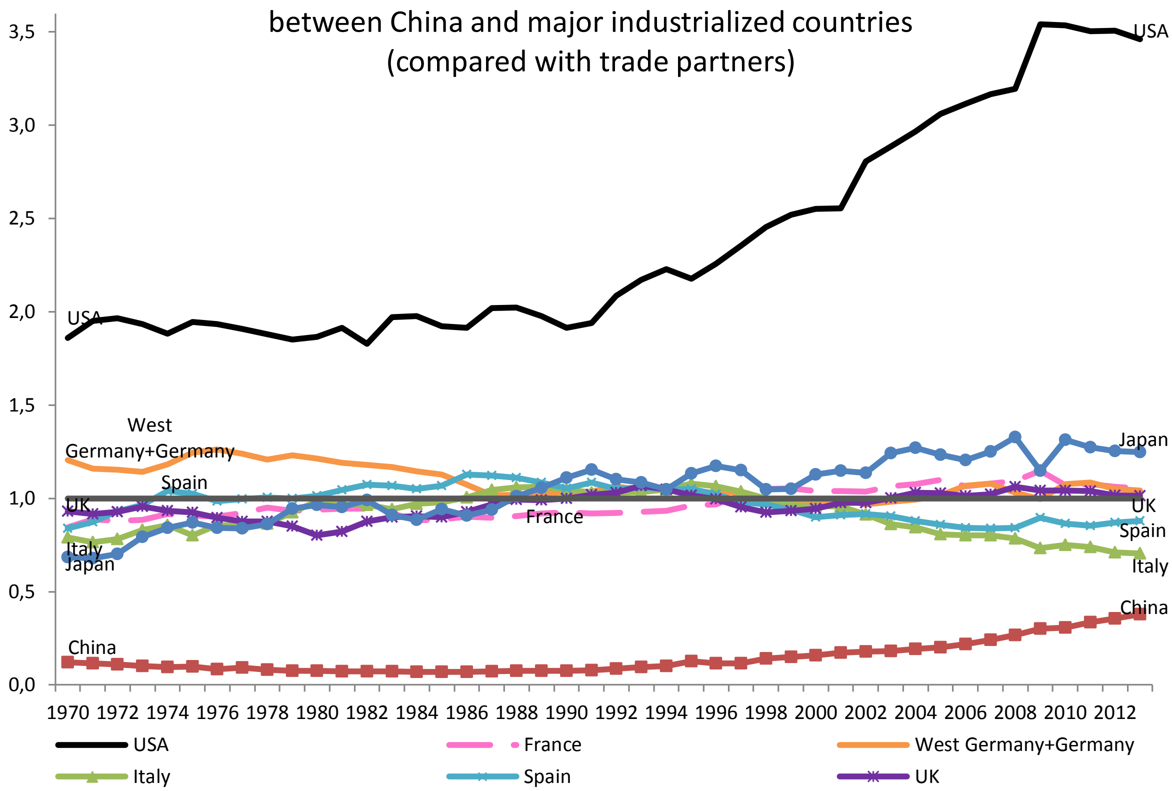
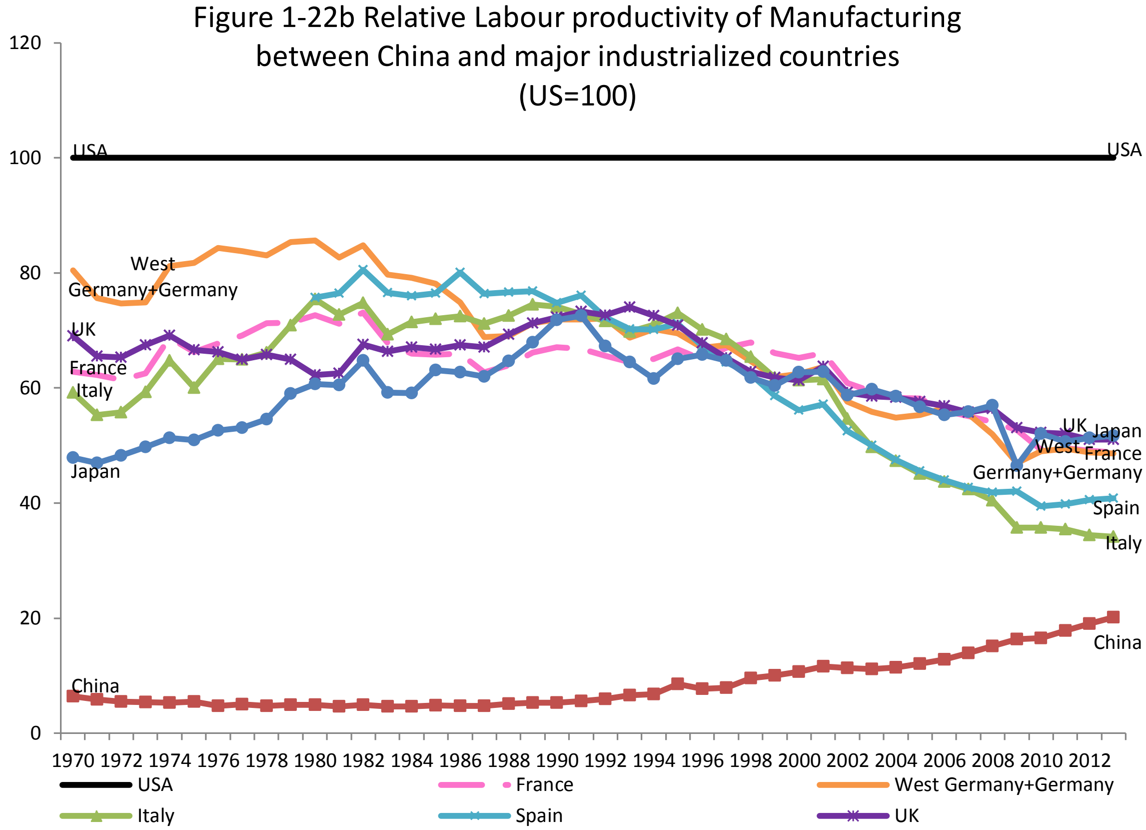


Figure 1-22b Relative Labour productivity of Manufacturing between China and major industrialized countries (US=100)



Comparing Figure 1-22a with Figure 1-9 for major industrialized countries, there are three types of difference between manufacturing and total economy. Firstly, the manufacturing was more productive than overall economy, for instance in US. At the beginning, the relative productivity level of US manufacturing remained stable but its total economy was less and less productive than the trade partners. Since 1990s, both manufacturing and overall economy's relative labor productivity has increased. Until 2012, the former has been 250% higher than trade partners' average level and the later has been 150% higher. Hence, the former, i.e. US manufacturing was more productive than its overall economy.

Germany's relative productivity of manufacturing was also higher than that of total economy. Its manufacturing relative productivity was always higher than 1 while the total economy's relative productivity was lower than 1 all the times. It should be noted that manufacturing relative productivity of Germany before 1991 was adjusted by that of West Germany. Thus the relative level was higher before 1991 than after.

Spain's manufacturing was more productive than its total economy compared with other developed and emerging countries. Its relative level of manufacturing was superior to 1 over 1973-1996 and It was more productive than trade partners during this period. Since the end of 1980s, Spain's relative productivity of manufacturing has declined. Its relative level was at outset higher than other European countries yet from 2000 it became lower. Nevertheless, Spain's manufacturing was still more productive than Italy. For total economy sector, Spain's level of relative productivity was the lowest among major industrialized countries over all the period excluding 1985-1990.

It is logical that in Spain and Italy, the share of R&D expenditure in GDP was lower than other major industrialized countries. Besides, the workers here earn more assurance and they work less efficiently. Therefore the relative productivity levels of Spain and Italy were the lowest among the major industrialized economies.

Secondly, the manufacturing was less productive than overall economy. In France, the manufacturing was less productive than the later. Before 1997, France's relative level of labor productivity was inferior to 1 and it was less productive than 18 countries' average level. Especially during 1987-1997, France was less productive than all other European countries mentioned in this paper. After 1998, France's relative productivity increased to above average level. It was even more productive than Germany.

Italy's manufacturing was also less productive than its overall economy. The manufacturing relative level was always inferior to 1 except for the decade of 1987-1997, while its total economy's relative level has remained higher than 1 since 1973. The year of 1990 was a peak of evolution of Italian productivity. Before 1990, Italy's manufacturing was more and more productive. After then, it was less and less productive. Until 2001, Italy has been the least productive European country mentioned in this paper.

UK's relative productivity of manufacturing remained stable around 1. Yet its relative productivity of total economy increased rapidly and was higher and higher than 1. The employees of manufacturing industry were less protected. They were not as productive as the workers of total economy production.

As for the last type, there is no difference between manufacturing and overall economy, for instance in Japan and China. In Japan, the relative level of productivity of manufacturing and overall economy both increased rapidly from nearly the lowest level to the highest level excluding US. China's manufacturing and overall economy was both much less productive than the trade partners.

Comparing Figure 1-23a with Figure 1-15 for new industrialized and emerging countries, the difference between manufacturing and overall economy exists in all the countries.

The largest difference is revealed in Taiwan. For total economy's production, Taiwan's relative productivity in 2012 was the highest among the new industrialized economies. By contrast for manufacturing, Taiwan's level was the lowest. Besides, Taiwan was more productive than others for overall economy's production, while for manufacturing, it was less productive than trade partners' average level. Singapore and Korea were both more productive than trade partners in manufacturing and total economy production. Difference is from 2008, Singapore's manufacturing was less productive than Korea but Singapore's overall economy stayed more productive than the later. Indeed, Korea was the second highest productivity economy for manufacturing production. As mentioned above, Korea introduced a new democracy in 1980s. It aggrandized remuneration and improved working conditions. Korean employees were then encouraged to wire in and productivity level went up from 20% to 160% (average level equals 100%).

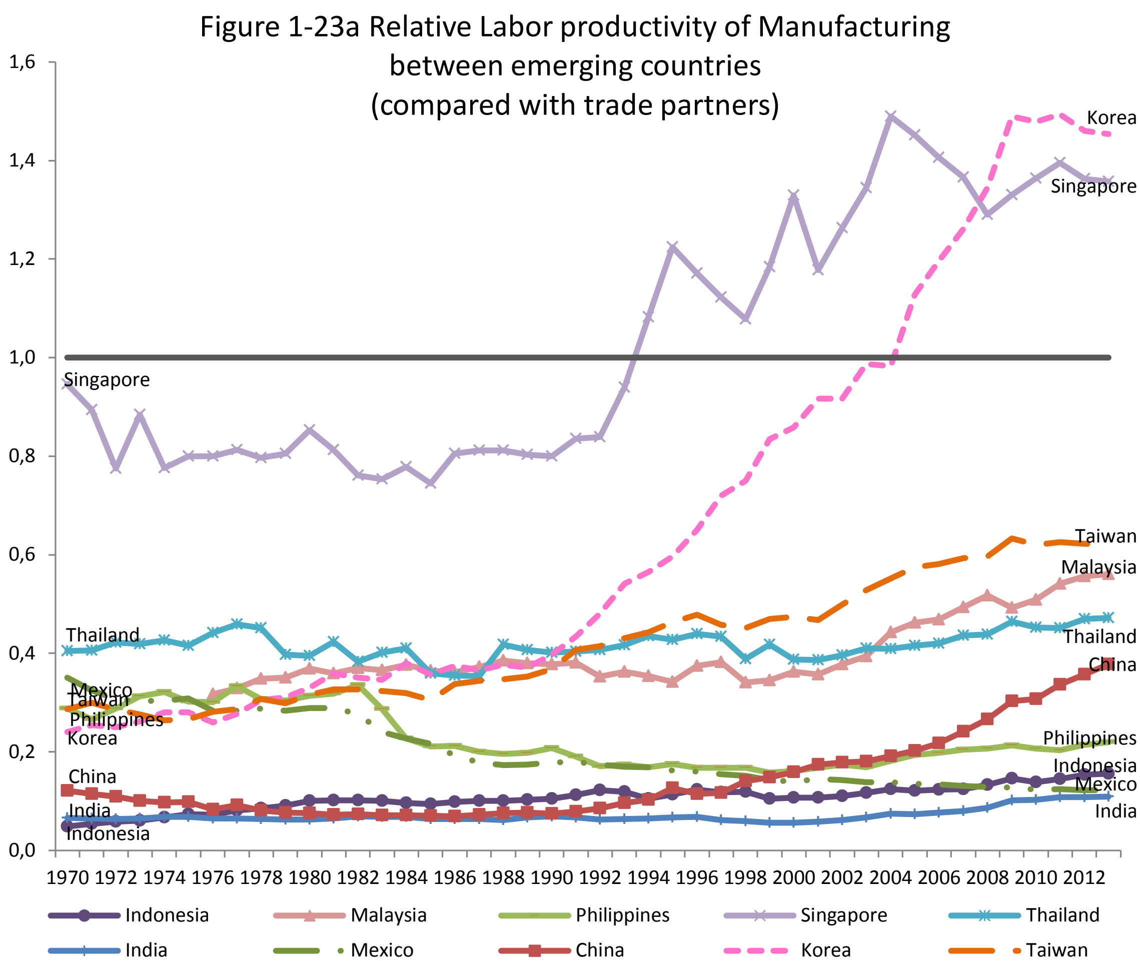
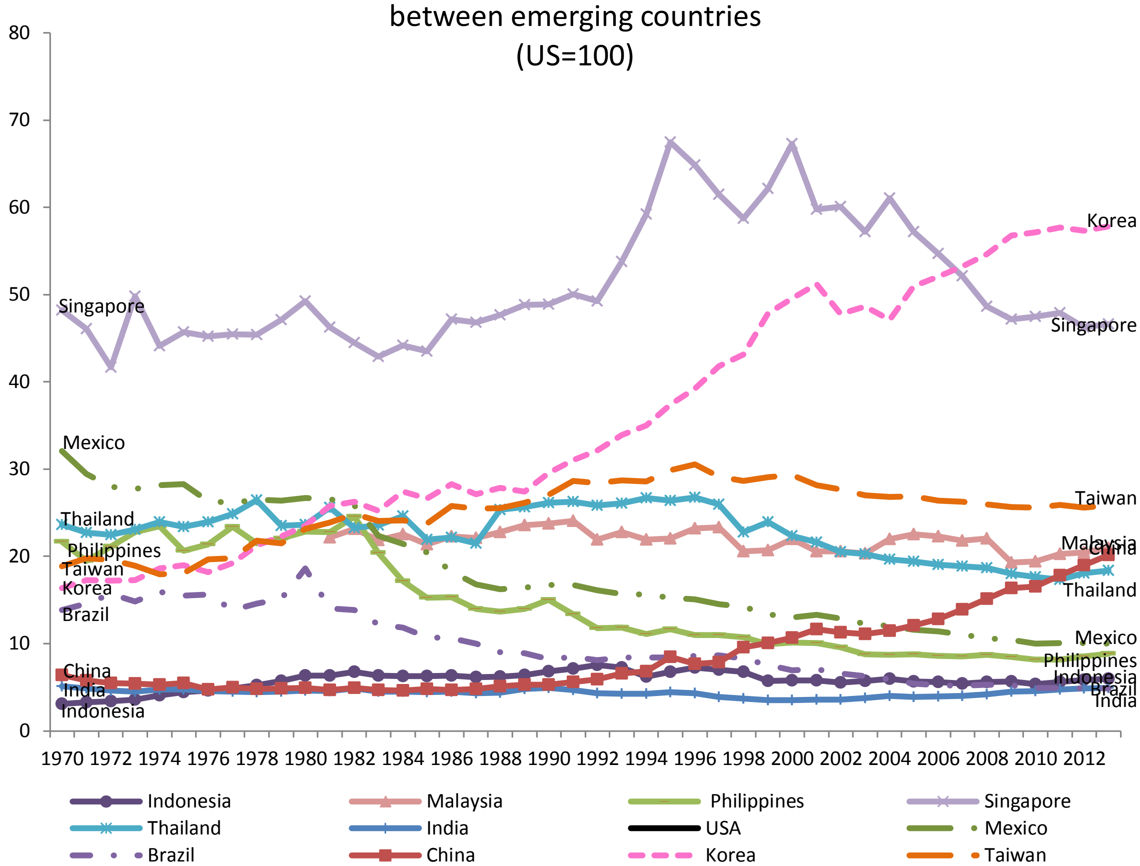


Figure 1-23a Relative Labor productivity of Manufacturing between emerging countries (compared with trade partners)

Figure 1-23b Relative Labour productivity of Manufacturing between emerging countries (US=100)



The emerging countries' manufacturing was all less productive than their overall economy. Among them, Malaysia was the most productive economy for manufacturing production but its manufacturing was still less productive than total economy. Thailand was a relatively stable economy among Asian countries. Even went through the 1997 financial crisis, its relative productivity in manufacturing did not go down much. It remained at the same level around 40%, assuming the trade partners average level equaling 100%. Thailand's productivity of manufacturing was always higher than other emerging countries. However, the relative value added per employee of total economy continued increasing from 20% in 1970 to 50% in 2012. Thailand's manufacturing followed a more steady evolution than total economy. Although at outset Thailand's manufacturing was more productive than that of Malaysia, in 2003 it was passed by the later, whose productivity increased quickly over time.

Philippines' manufacturing was more productive than overall economy. During the year of 1970s, its relative productivity of manufacturing was higher than mostly emerging countries, excluding Thailand. The relative level was even higher than that of Korea and Taiwan. However, Philippines' relative productivity of manufacturing declined faster than that of overall economy, especially over 1982-1984. From 2007, its manufacturing became less productive than overall economy.

Indonesia's manufacturing was much less productive than overall economy when compared to trade partners. At the beginning it was the least productive among emerging countries. However, Indonesia has transformed from agricultural economy to an industrial one, namely "industrialization" between 1970 and 1990. Thanks to that, its labor productivity of manufacturing continued to be strengthened over time. Yet the improvement stagnated during crisis of 1993 and the East-Asian financial crisis of 1998. The relative productivity level of manufacturing did not increase as quickly as that of total economy.

The relative productivity of Mexico and India's manufacturing was also much lower than that of total economy. Mexico's relative productivity of overall economy diminished largely but it was still higher than Indonesia, Philippines and India. Its manufacturing was less and less productive and from 2008 it was less productive than Indonesia and Philippines. India's relative labor productivity of total economy has been enhanced since 2000s but that of manufacturing seemed unchanged. India was always the lowest productive economy in the 19 countries for manufacturing production.

Compared with the emerging countries, China profited from a rapid rise of relative productivity. Although it remained less productive than Malaysia and Thailand, its relative productivity rose more largely and more quickly than them.

4.3 Interaction between relative labor productivity and relative labor compensation

Figure 1-24 Correlation between relative productivity and relative labor compensation of manufacturing

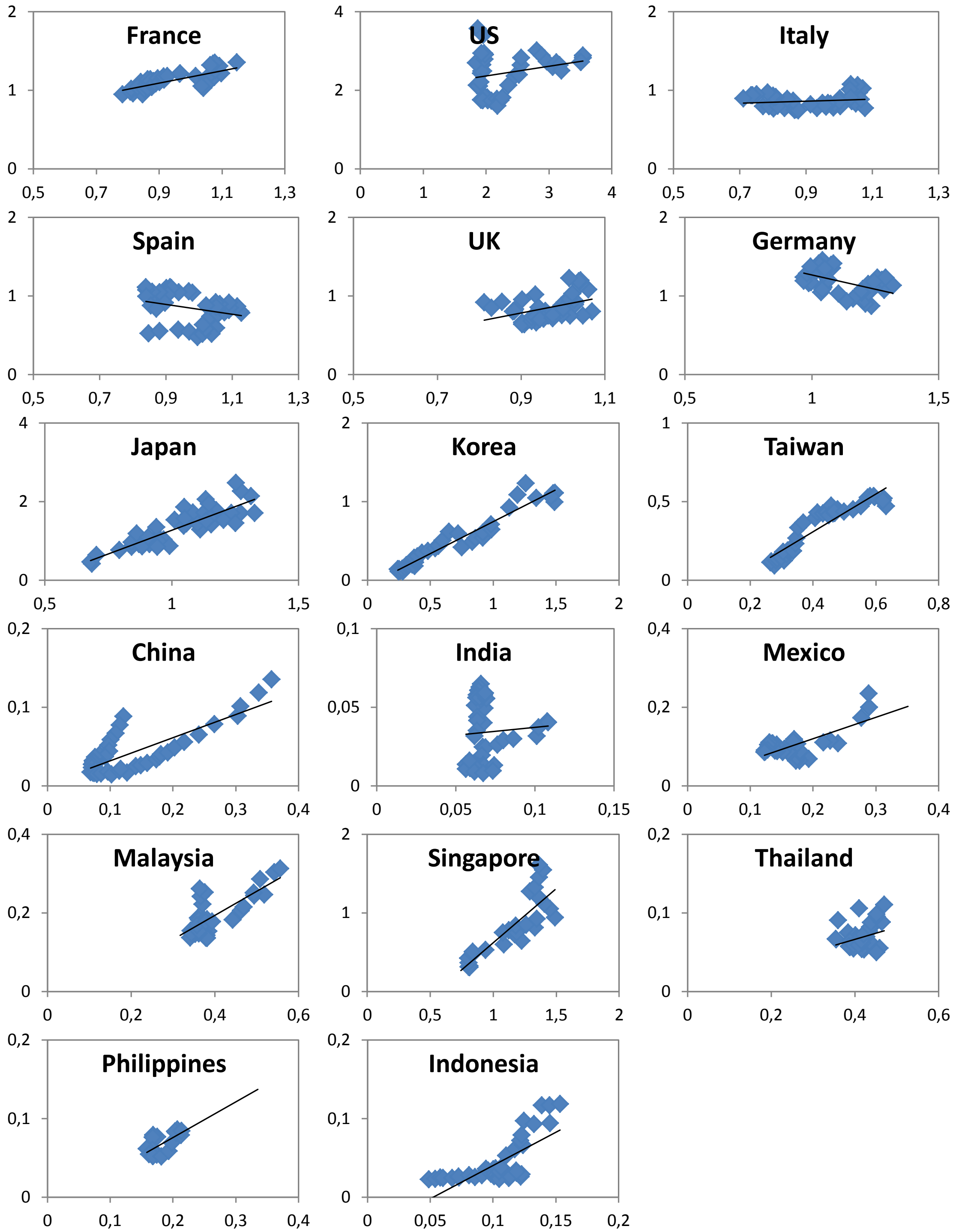


Figure 1-24 and the table below display the correlation coefficients between relative labor productivity and relative labor compensation of manufacturing. It is reminded that for total economy, these two indices are highly correlated with each other and the correlation coefficients are positive among nearly all the countries, except for India and Malaysia. Differently for manufacturing, there are three types of relationship:

	correlation coefficient
USA	0,29
Mexico	-0,42
France	0,75
Germany	-0,49
Italy	0,17
Spain	-0,31
UK	0,43
Japan	0,87
China	0,80
Korea	0,97
Taiwan	0,92
Indonesia	0,72
Malaysia	0,51
Philippines	-0,57
Singapore	0,90
Thailand	0,30
India	0,06

Firstly, in UK, Thailand, US, Italy, and India, the correlation coefficient is positive and inferior to 0.5. It is difficult to improve the productivity by increasing labor remuneration. In UK, the correlation coefficient is not quite low (0.43). Differently in US, the coefficient (0.29) is much lower than that of total economy (0.85). US was not specialized in manufacturing production. The system of coordination between labor productivity and labor remuneration in this industry was not as efficiently as in other sectors. Italian workers earned more assurance thus their labor productivity stayed at a low level no matter how varied the wages and salaries. The correlation coefficient here is as low as 0.17. India's relative productivity and relative labor costs are not correlated at all. More salary could not incite workers to exercise their talents. On the other side, the gain from labor productivity would not lead higher labor remuneration.

Secondly, in Germany, Spain, Mexico and Philippines, the correlation coefficient is negative. The productivity growth here cannot swell payment for workers. Even if they are more paid, they still loaf more or less on the job which is apt to lead a stagnation of productivity. Therefore, the labor cost, including rise of salary and better protection, will aggravate burdens. These countries cannot rapidly reallocate labor and financial resources face technological and other changes.

Finally, the relative labor productivity and relative labor compensation were highly correlated with each other, such as in China, Korea, Taiwan and Singapore. These countries could improve labor productivity by putting up wages and salaries. On the other hand, the increasing efficiency of production also promotes earnings.

As China suffered the low level of labor productivity, it could enhance the productivity by raising wages and salaries. If Chinese labor cost remains at the low level and the R&D expenditure was still extremely tenuous, its labor productivity cannot be improved efficiently.

4.4 China was more cost advantageous than all the industrialized economies and emerging countries, except Thailand.

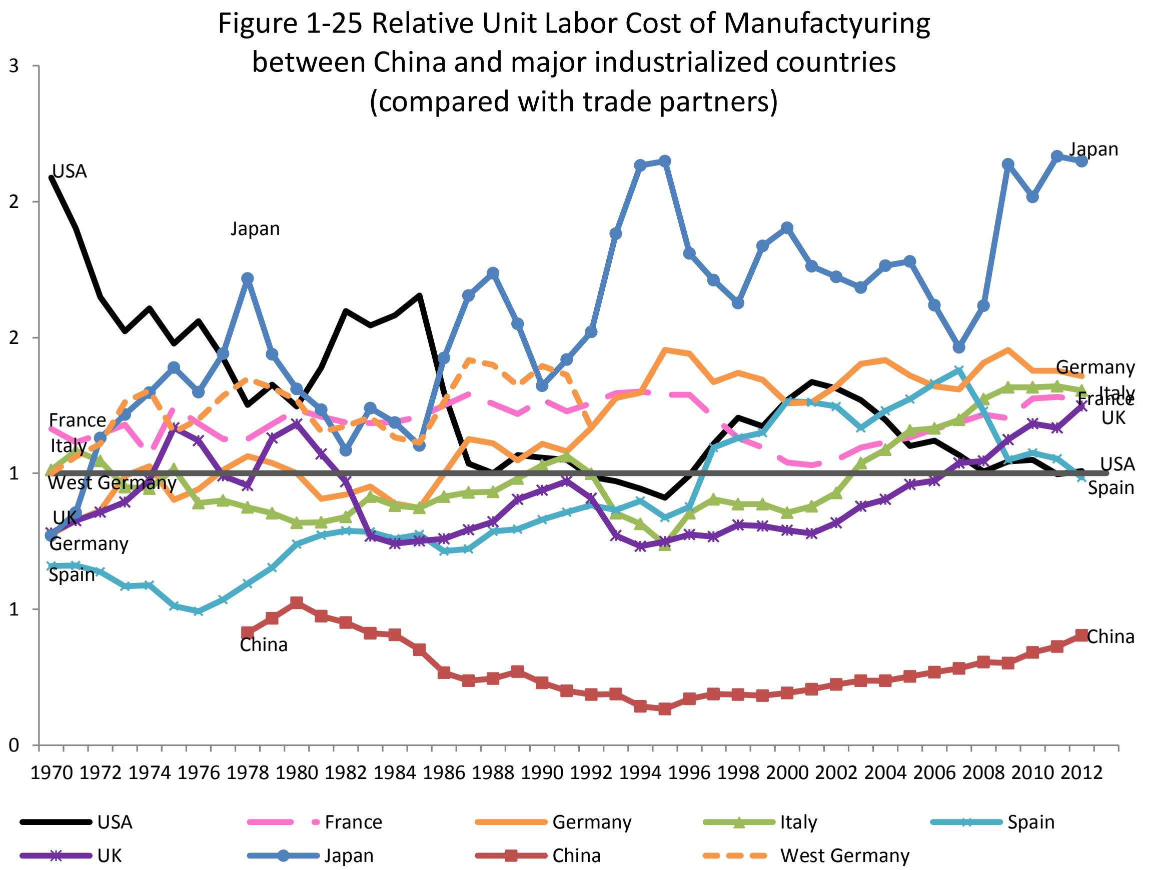


Figure 1-25 Relative Unit Labor Cost of Manufactyuring between China and major industrialized countries (compared with trade partners)

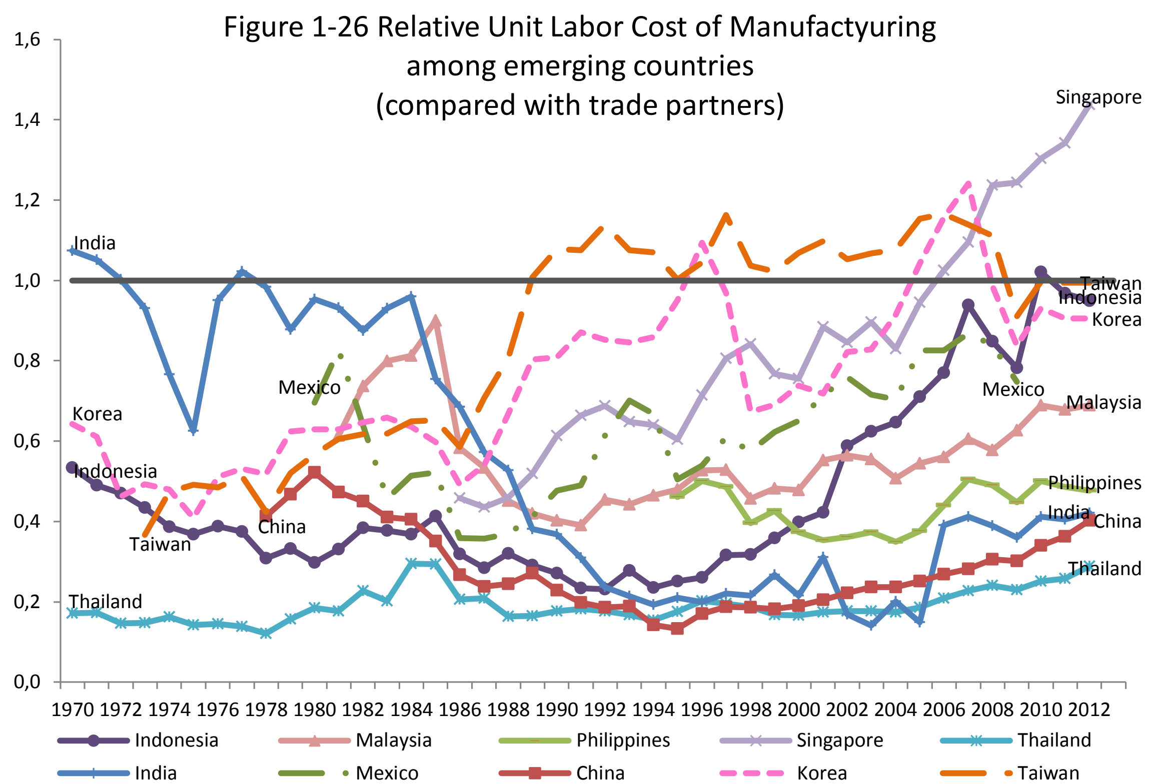


Figure 1-26 Relative Unit Labor Cost of Manufactyuring among emerging countries (compared with trade partners)

Generally speaking, all the emerging countries were less paid, less productive and more competitive in cost than industrialized countries.

Recently, Japan, Germany and Singapore were the most handicapped countries in cost of manufacturing production. The major industrialized countries were all handicapped in cost with the relative unit labor cost superior to 1. Other two newly industrialized countries, Korea and Taiwan had a lower relative cost level than major industrialized one. Korea earned a strong productivity force and relatively lower compensation than other developed economies thus it was principally competitive in cost with the RULC inferior to 1. Taiwan's RULC was superior to 1 over the decades of 1987-2007. Its level reduced little after the 2008 financial crisis but was still around 1. Taiwan was therefore less competitive than its trade partners.

All the emerging countries' manufacturing was competitive in cost than their trade partners, except India at outset. India was the only country whose RULC of manufacturing was superior to 1 but only over 1970-1972 and in 1977. Despite of less advantage before 1984, its relative cost level began to diminish fleetly from this year and it declined the fastest all over the world. Till 2002, India became the most competitive in cost. Even after the largely increase of 2006, India remained competitive than mostly emerging countries except for China and Thailand. Figure 1-4b reveals that

Indian exchange rate has depreciated since 1980s and its remuneration started lessening to the lowest level among these countries. Its RULC was then reduced and India was more and more competitive until the mid-2000s. It is concluded that the exchange rate has a significant effect on Indian cost competitiveness. However, different from China, Indian development was driven by service industry rather than manufacturing. Hence, Indian productivity in total economy improved, while that in manufacture remained unchangeable. For the same purpose, Indian remuneration stayed in the lowest level.

Thailand's manufacturing was more productive and less paid than China. Its RULC level was therefore lower than China and the lowest among all the countries. It indicates that Thailand was the most competitive in manufacturing export. 1985-1988 and 1996-1998 were its two sparkling periods. First is due to the favorable exchange rate. Figure 1-4b shows that "Baht" depreciated apace during 1996-1998. Its remuneration in dollars was accordingly diminished. Second is relevant to the FDI that owned a prominent place in its progression. The foreign firms set up their production line in Thailand owing to its delighted efficiency, i.e. the high employment productivity and the slender labor cost (equivalent or inferior to Chinese one). From this point of view, Thailand is a ferocious competitor for China.

Indonesia was the most handicapped in cost among emerging countries. Indonesian currency depreciated roughly during the East-Asian financial crisis and its labor compensation went down over 1997-2000. The workers were depressed and the outputs were reduced. As a result, ULC rose and it lost a little cost competitiveness.

Mexican growth relies on the oil revenue instead of manufacturing profits, so it seems to be fragile face external shocks. When the currency depreciated, its remuneration persisted in cutting down. Innovation is the traditional weakness in Latin America, for instance, less R&D expenditure, unsound system and infrastructure of higher education, deficient university-enterprise cooperation… All of them hindered the development of productive forces and made Mexican labor productivity downward successively from 1980s, even though it has been the highest at initial.

China's relative cost level declined rapidly after the reform of "open-up" in the end of 1970s. It was more and more competitive in cost than most rivals. Over 1994-1997, China's manufacturing was the most advantageous in cost than all the trade partners. However, the cost level begun to rise from 1995 and China lost cost-advantages when compared to Thailand or India.

Figure 1-27 and Figure 1-28 illustrates the unit labor cost relative to US without trade weights. Different from Figure 1-25 and Figure 1-26, Japan's unit labor cost relative to US was recently less than that of Italy, France and Germany. Yet it was handicapped in cost than all European countries when compared to all its trade partners. Germany's labor cost relative US was lower than that relative to all the trade partners. On contrary, Italy and France's unit labor cost relative to US was higher than that relative to trade partners. These differences are due to the trade weights α_k^i from Equation (4).

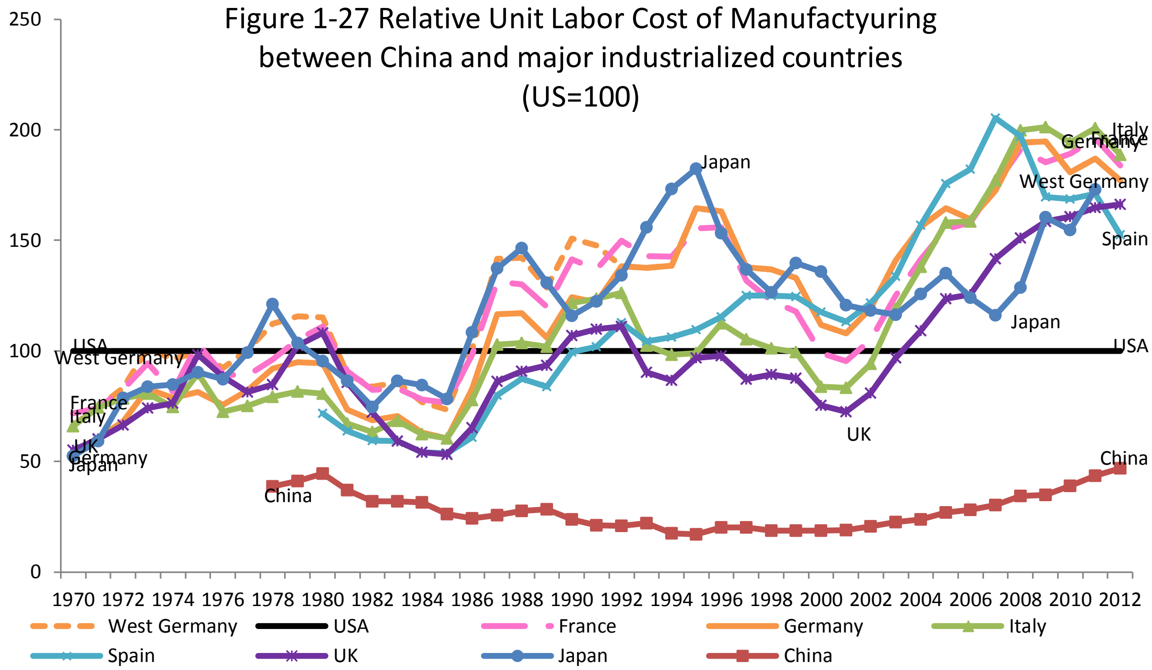


Figure 1-27 Relative Unit Labor Cost of Manufactyuring between China and major industrialized countries (US=100)

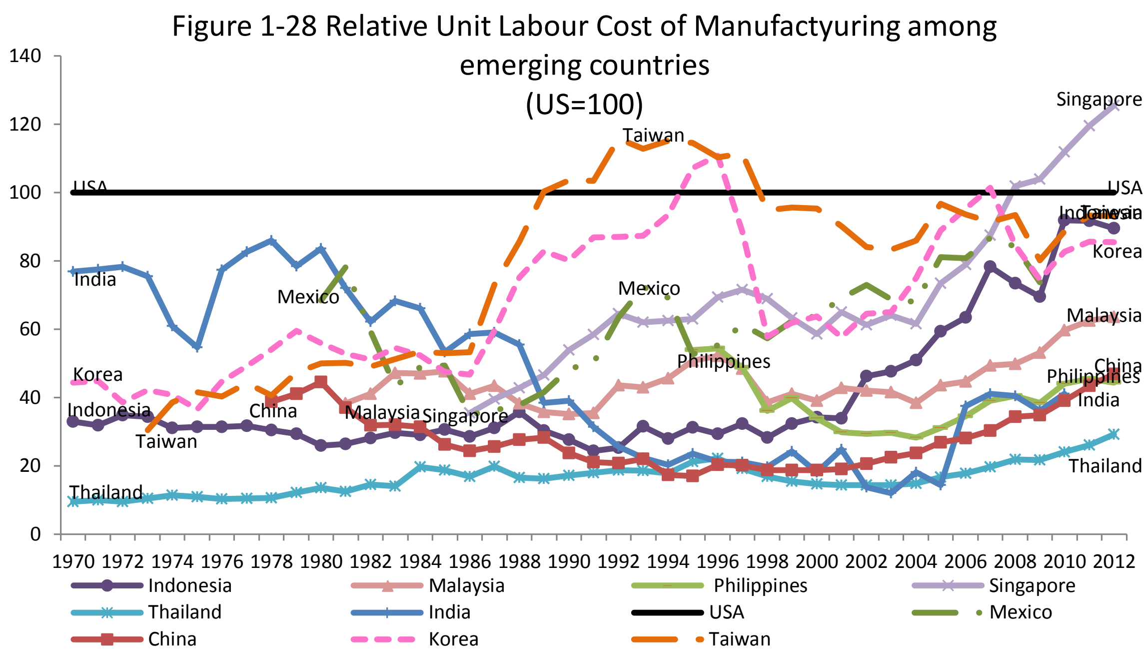
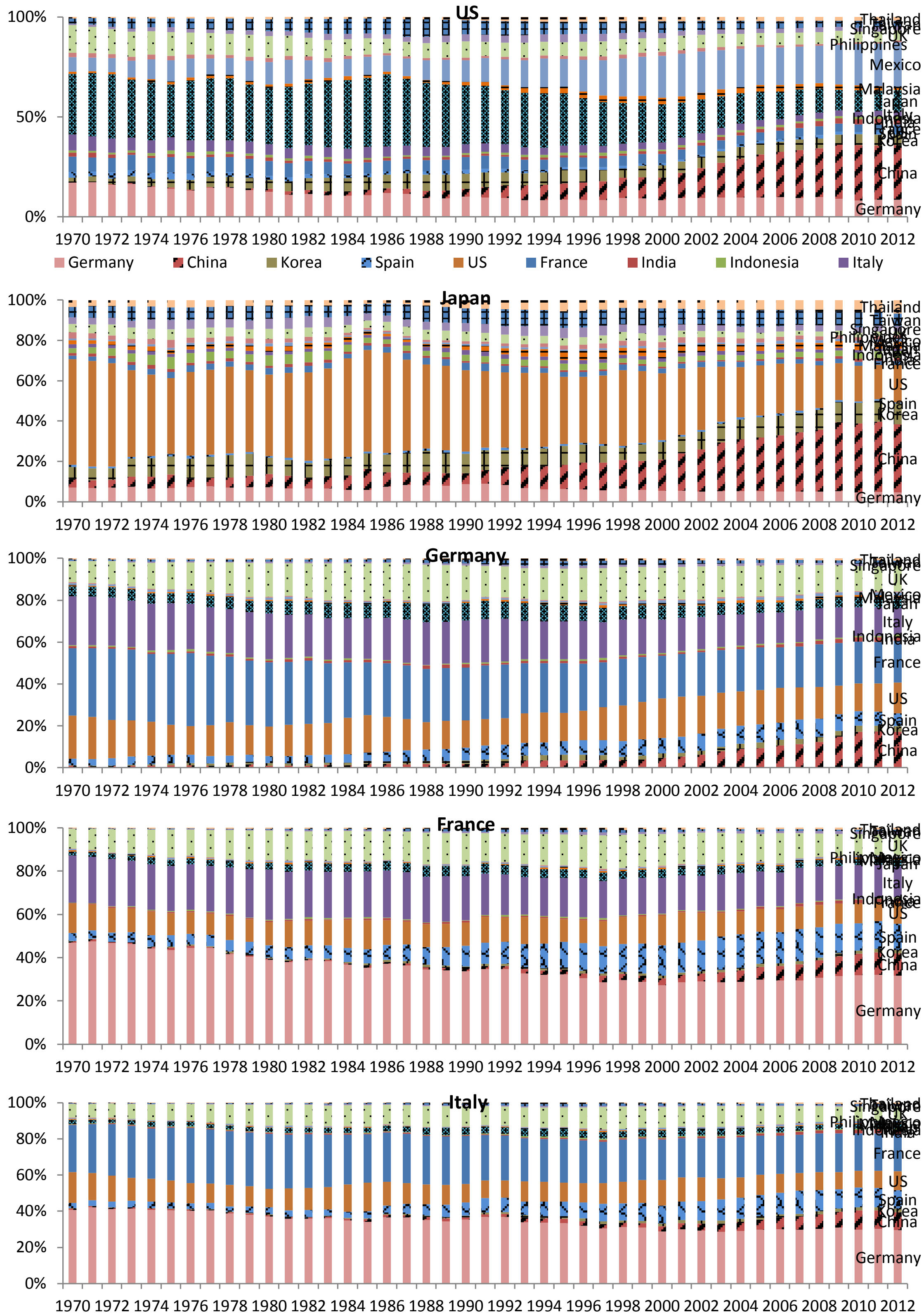
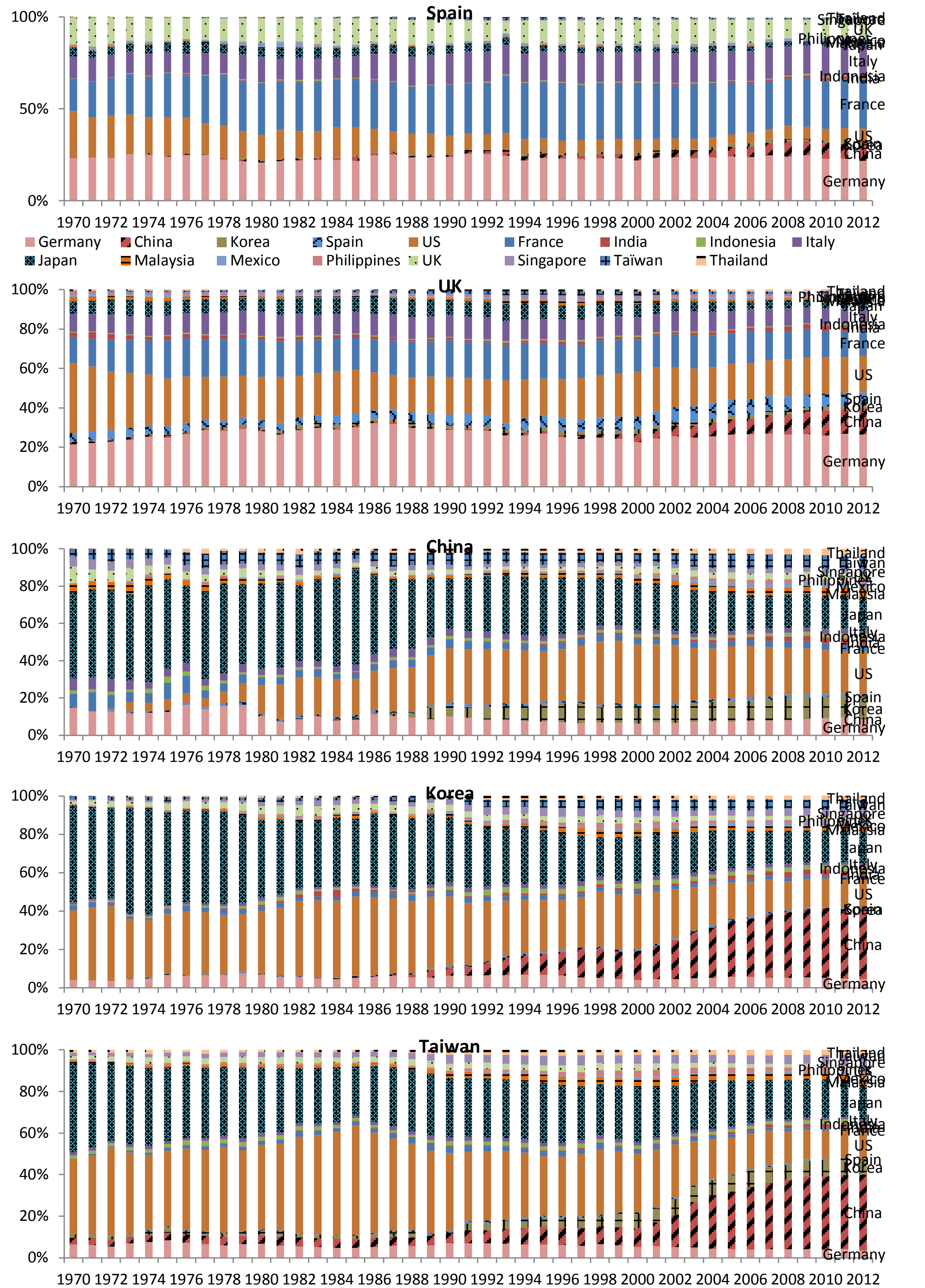


Figure 1-28 Relative Unit Labour Cost of Manufactyuring among emerging countries (US=100)

Figure 1-29 Trade weights of manufacturing (calculated according to Equation 4)




Spain
100%
50%
0%
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012
Germany
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UK
Singapore
Taïwan
Thailand
UK
100%
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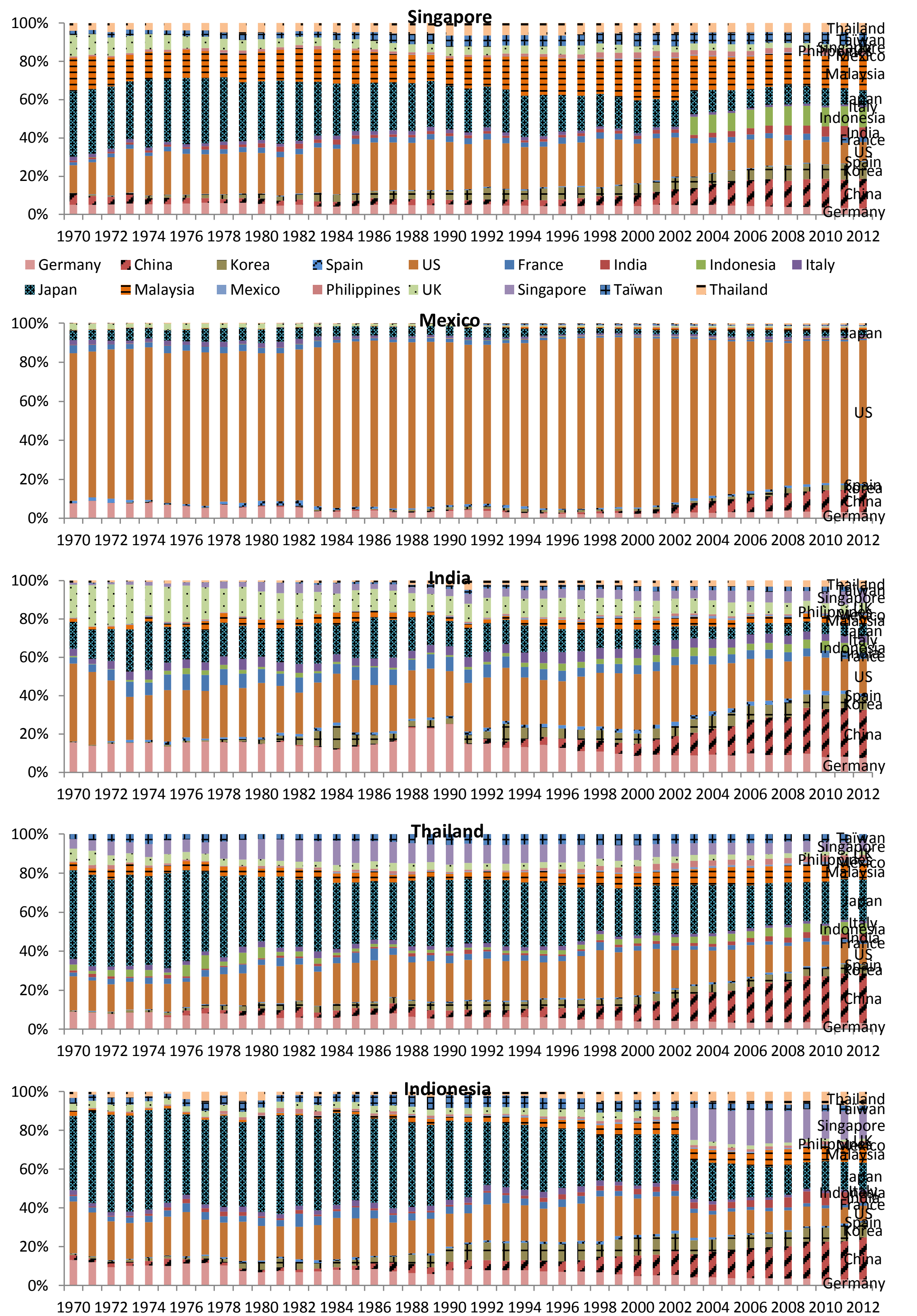
Singapore
Germany
China
Korea
Spain
US
France
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Mexico
Philippines
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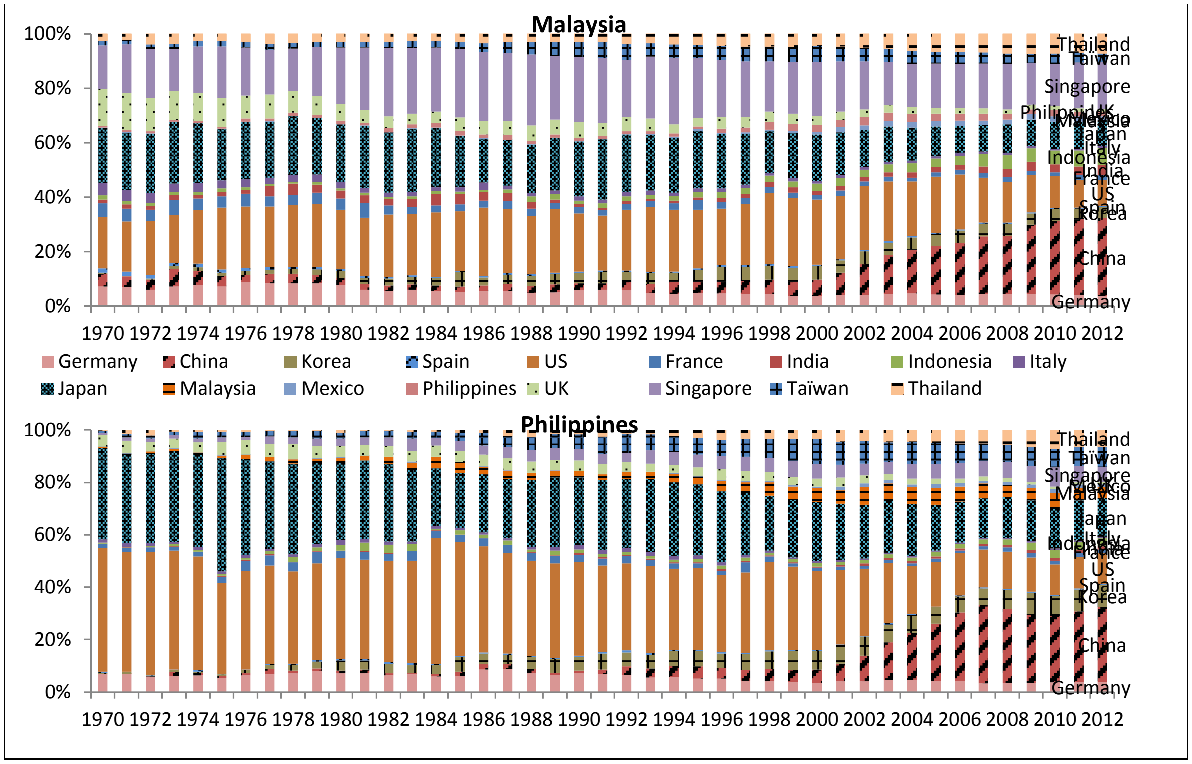


Figure 1-29 reveals that China occupied larger percentage in US, Germany and Japan's trade than in others. Given Chinese unit labor cost was quite low, Japanese and German relative labor cost level increased more than the rests. By contrast, UK's relative level diminished when taking account of trade weights because US, whose labor cost was very high, represented a larger share.

In fact, one country's commercial performance relies on cost advantages (CA) as well as non-cost advantages (NCA). We now turn into the empirical analysis of relationship between cost competitiveness and trade performance. This chapter shades the light on cost competitiveness hence we only utilize the relative unit labor cost (RULC) as the dependent variable in next section.

5. Empirical study and indirect measurement of Non-Cost competitiveness

5.1 Methodology

Commercial performance could be expressed by the index of Trade Coverage Rate (TCR) as ratio of export value to import value. In Equation (13), P_{xi} is the price of export from country *i*; EXP_i is the export volume, then $P_{xi}\,EXP_i$ represents export value in US dollars and $P_{mi}\,IMP_i$ stands for the import value. TCR_i superior to 1 means a trade surplus of country *i* because its exports are more than imports.

$$TCR_i = (P_{xi}\,EXP_i)/(P_{mi}\,IMP_i) \qquad (13)$$

$$RTCR_i = \frac{(P_{xi}\,EXP_i)/(P_{mi}\,IMP_i)}{\Sigma_{k=1}^{n-1}(P_{xk}\,EXP_k)/\,\Sigma_{k=1}^{n-1}(P_{mk}\,IMP_k)} \qquad (14)$$

In order to facilitate the comparison, we introduce Relative Trade Coverage Rate (RTCR) in Equation (14). When $RTCR_i$ is superior to 1, the country wins more trade surplus than its commercial partners. It must be mentioned that in this section *n=18*[21]; hence the $RTCR_i$ level is relative to 17 economies rather than the rest of world. This causes little bias against reality but is compatible with the previous study on cost advantages.

Given the commercial performance relies on cost advantages (CA) and non-cost advantages (NCA), its measuring index RTCR can be also determined by these two elements. Mathis and al.(1988) pointed out an equation like:

$$RTCR=\alpha CA + \beta NCA \qquad (15)$$

The cost advantages (CA) have been analyzed by Relative Unit Labor Costs and the non-cost advantages (NCA) depend on the number of patents, R&D investment, innovation expenditure…which are not possible to be measured directly and exactly. However, as showed in Equation (15), *NCA* could be estimated indirectly by *RTCR* if the variable *CA* was given.

	RTCR<1 (bad performance)	RTCR >1 (good performance)
RULC <1	A/ non-cost handicap > cost advantage	B/ cost advantage
RULC >1	C/ cost handicap	D/ non-cost advantage >cost handicap

The table above displays four cases:

[21] The Brazil is excluded in this estimation due to its abnormal evolution.

(1) When a country's RULC<1, it profits from cost competitiveness but the performance is bad. This economy suffers a significant impact of non-cost handicap that worsen the performance. (case A)

(2) RULC<1, the country is advantageous in cost and has usually a good commercial performance. (case B)

(3) When a country's RULC>1, it loses from cost handicap and the performance often deteriorates. In this case, we can't examine whether the country is non-cost advantageous or not. (case C)

(4) RULC>1, country is handicapped in cost but it possesses non-cost advantages that can offset losses of cost handicap. Its RTCR will be superior to 1. (case D)

5.2 Finding of Trade performance and Non-Cost Competitiveness

Data in this section derive from CHELEM-CIN under ISIC rev.3 classification system.

Figure 1-30 reveals that the developed countries' commercial performance appeared stable and generally varied in range of ±0.5 around 1 (except Japan), while the developing countries in Figure 1-31 followed an upward tendency until 1998 and evolved in scope of ±1 around 1. China is an outstanding economy keeping prosperity and now it is known as the largest exporter in the world. The detail will be discussed in follows.

Figure 1-30 Relative trade coverage ratio of Manufacturing among China and major industrialized countries (compared with trade partners)

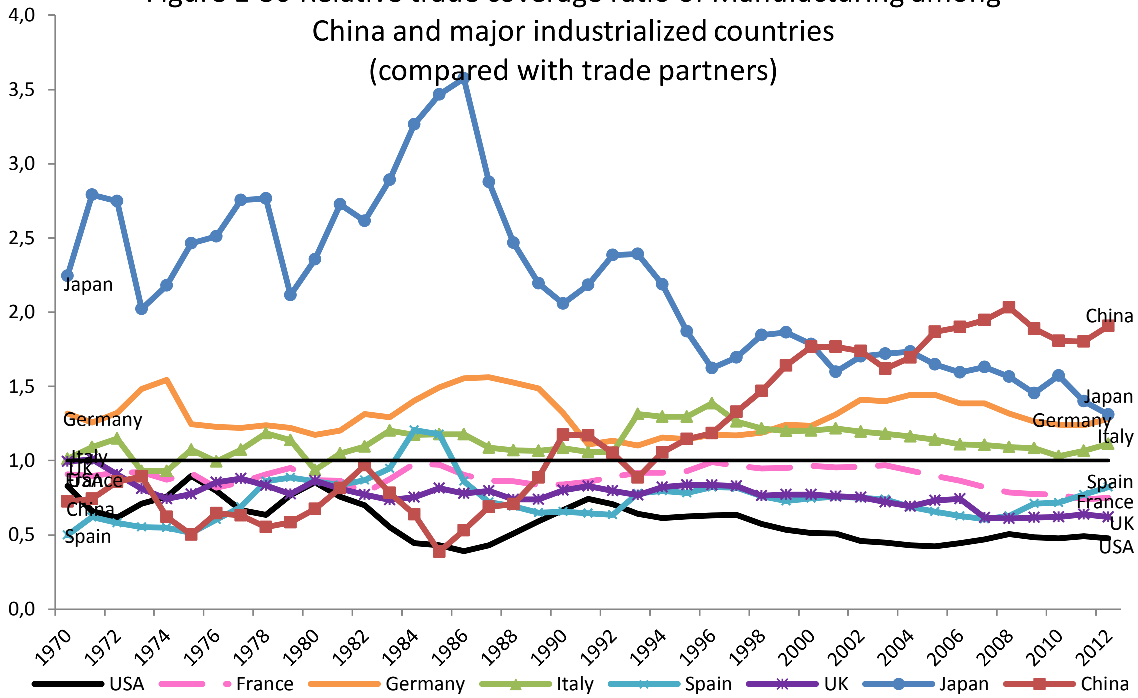


Figure 1-31 Relative trade coverage ratio of Manufactyuring among emerging countries (compared with trade partners)

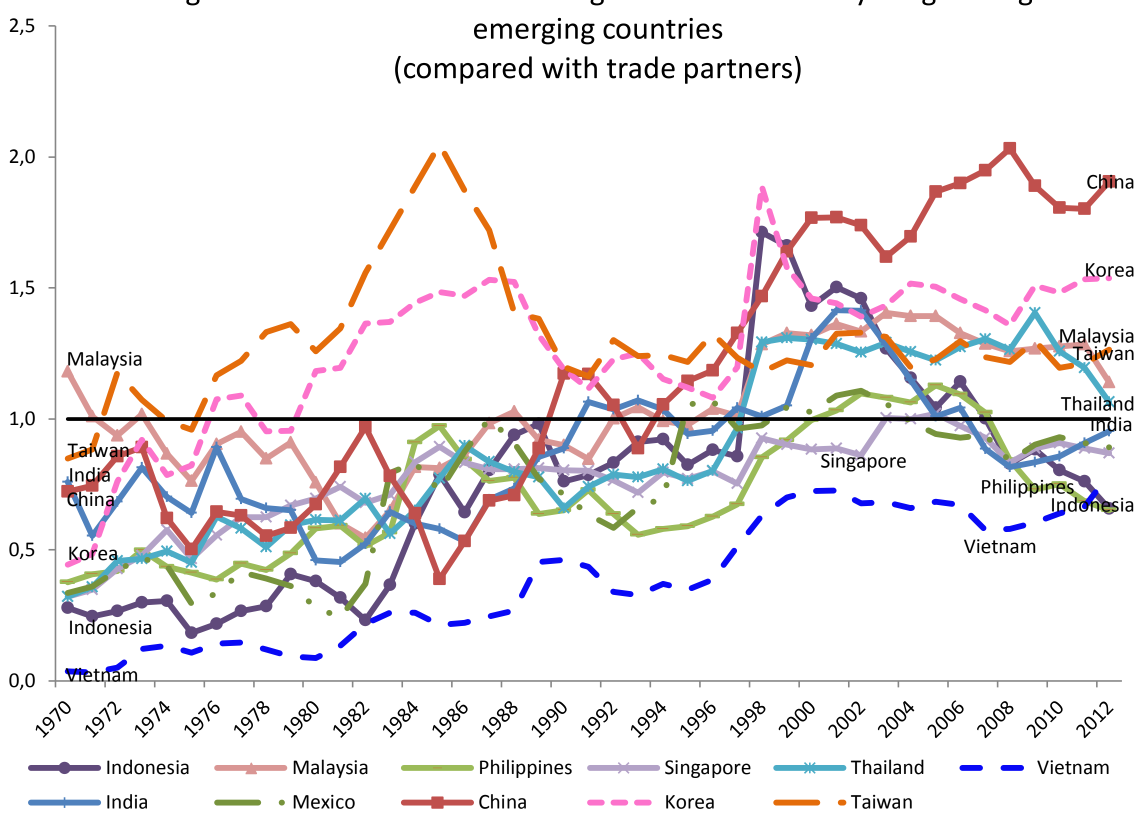
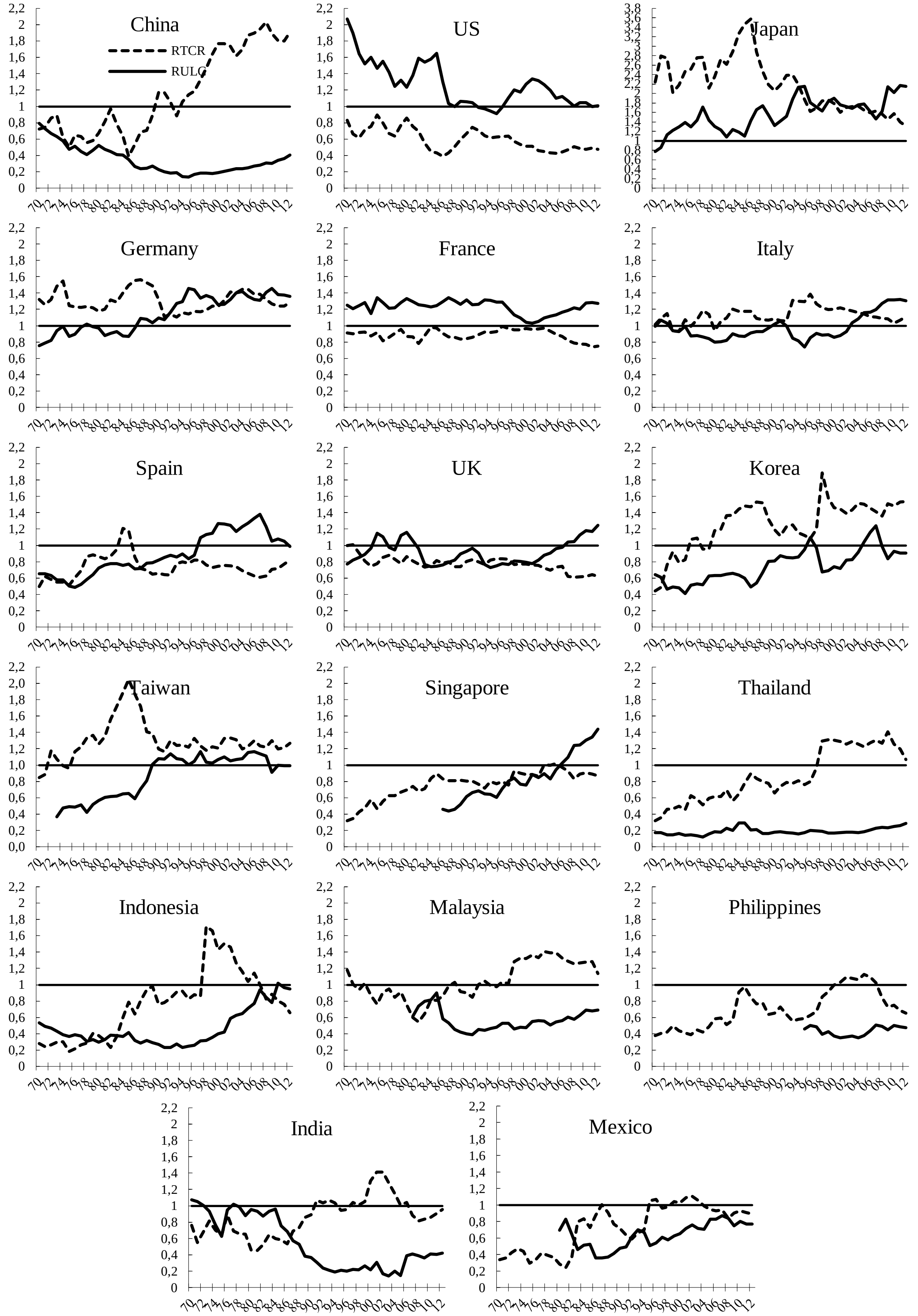


Figure 1-32 Cost Advantage (RULC) and trade performance(RTCR)



After the international comparison by level, we now turn to the impact of cost competitiveness on trade performance. Figure 1-32 puts Cost Advantage (measured by RULC) and trade performance (measured by RTCR) together so that we can conclude each country's competitiveness clearly.

	RTCR<1 (bad performance)	RTCR>1 (good performance)
RULC<1	**A/ non-cost handicap**>cost advantage - China before 1994 - emerging countries at outset - Philippines all time excluding 01-07 - Korea before 1979 - US between 1992-1996 - UK 1982-2007 - Spain before 1997	**B/ cost advantage** - China after 1994 - emerging Countries afterward (except Philippines) - Korea after 1979 - Taiwan before 1990 - Italy between 1975-2002
RULC>1	**C/ cost handicap** - USA before 1992 and after 1996 - UK 1974-1982, after 2007 - France - Spain after 1997 - Singapore after 2006	**D/ non-cost advantage** >cost handicap - Japan - Germany - Italy after 2003 - Korea 2005-2008 - Taiwan after 1990

The table above displays the conclusion from Figure 1-32 in detail. China is advantageous in cost over all the time. Its RTCR has been inferior to 1 before 1990s and it belonged to type A/ for which the non-cost handicap damaged commercial performance. Since1994 China has moved into type B/. The relative labor cost level continued increasing and China lost more and more cost competitiveness. Nevertheless, its RTCR became superior to 1, rising largely and successively. It is to say that Chinese export progression nowadays is sub-served mainly by the non-cost competitiveness, instead of cost advantages.

Mostly emerging countries have similar tendency of evolution to China, in other words, they pertained to case A/ at outset and then fell into type B/. Indeed, all the emerging countries profited from cost competitiveness all the times. Yet their trade performance was at beginning deteriorated by non-cost handicap and after was enhanced more by cost advantages. However, the evolution varied a little differently. Thailand and Malaysia won a good trade performance afterward and maintained it until 2012. Indonesia and India also enhanced the trade performance but did not succeed in maintaining it. Their relative trade coverage ratio has been inferior to 1 since 2006 and returned to type A/. Philippines and Mexico earned lightly a good performance thanks to the cost competitiveness but only during few years.

The three new industrialized economies, Korea, Taiwan and Singapore revealed three different types of evolution. Korea was handicapped in cost and suffered from a bad performance before 1979 (case A/). Then its trade performance was enhanced by cost competitiveness (situation B/). Taiwan's trade performance was always good. Before 1990 the trade performance was thanks to the cost advantages. After then, it was the non-cost competitiveness that promoted its trade. Singapore suffered mainly the non-cost handicap and the bad trade performance. It lost more and more cost competitiveness and the relative trade coverage ratio stagnated.

USA and France belonged to the type of cost handicap (case C/). Yet their evolutions were not the same. According to Figure 1-32, French cost handicap and performance index were both around 1. Therefore, its non-cost competitiveness was very likely to locate around average level[22]. Otherwise, its performance will be away from 1. Differently, USA meliorated cost competitiveness with labor cost level generally decreased but its trade coverage rate continued diminishing. This means the non-cost handicap hampered American commercial development at least during the decade of 1986-1996 when USA won a cost advantage but lost net export position.

UK and Spain at outset were advantageous in cost but handicapped in non-cost. They suffered bad trade performance due to the non-cost handicap (situation A/). Spain lost the cost advantages from 1997 and the external performance was devastated. It fell into case of cost handicap (case C/).

Japan and Germany have remained in type D/ since 1970s. Korea resided in case A/ and Italy in case B/ in beginning. By the end of 1990s, both of them went to situation D/. These four developed countries lost their cost advantages but ameliorated the non-cost one that enhanced their performance. However, at present they possess trade coverage rate level lower than China. Their levels tend to decrease, while China held its level upward. For this raison, the cost advantage still occupies an essential role in the trade activities. With both cost and non-cost competitiveness, China became the only country maintaining a successive rapid progress of manufacturing industry, although its cost competitiveness has declined since mid-1990s.

[22] $RTCR = \alpha CA + \beta NCA$, so RTCR is determined by CA and NCA. When the variable RTCR and CA both are around average level, NCA are very likely to be also around average level. There are still other possibilities. According to the derived equation: $NCA = \lambda RTCR - \theta CA$. The level of NCA depends on the coefficient λ and θ. We just adduce the general conclusion. Whether it's true or not needs a further estimation.

The non-cost advantageous economies seem to be also the countries with large R&D expenditure and high labor productivity, excluding Italy. Thus Italian notable non-cost competitiveness should be explained by other index. Furthermore, USA suffered non-cost handicap despite of high technical efforts and labor productivity. An interesting thing is that after the subprime crisis engendered in this ground, American performance recovered strangely. As for France, whether it's non-cost advantageous/ disadvantageous is not yet proved. They all need other way of interpretation.

5.3 Empirical study

We first divided panel data over 1970-2012 into three groups: All country, developed country and emerging country. Developed country comprises US, Japan, Germany, France, Italy, Spain and UK. The rest countries are included in the group of emerging countries.

Table 1-1 Panel unit root test (ADF-Fisher Chi-square: statistic and prob.)

	all country		developed country		emerging country	
	level	Difference	level	Difference	level	Difference
RULC	47,06*	238,36***	24,65*	106,08***	24,33	147,86***
	(0,10)	(0,00)	(0,07)	(0,00)	(0,22)	(0,00)
RTCR	59,3***	313,96***	30,74**	123,41***	33.46**	186,89***
	(0,009)	(0,00)	(0,01)	(0,00)	(0,03)	(0,00)

Note: Null hypothesis: unit root and non-stationary

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

Table 1-1 reports the results from ADF Fisher unit root tests[23]. The series of RULC and RTCR have not unit root and are stationary for "all country" group and "developed country" group. For "emerging country" group, the series of RTCR are stationary but RULC are not. We use "first difference rate" for their estimation in follows.

[23] We also use IPS unit root test and results, available on request, are similar to those reported below.

Table 1-2 HAUSMAN test results

	all country			developed country			emerging country		
	Fixed	Random	Prob.	Fixed	Random	Prob.	Fixed	Random	Prob.
RULC (level)	-0,327	-0,282*	0,009	-0.323	-0.316	0.135	-0,342	-0,296	0,641
RULC (difference)	-0,114	-0,111	0,612	-0,096	-0,086	0,344	-0,125	-0,113	0,344

Note: prob. values concern random effects estimation

* Significant at 10% level

The HAUSMAN test was used to select a preferable model between fixed effects and random effects. Table 1-2 presents results by comparing fixed effects model with random effects model. Since HAUSMAN test statistic under random effects model is significant in one out of six cases, the fixed effects model was selected. We then rewrite Equation (15) to Equation (16).

$$RTCR_{it} = \alpha RULC_{it} + \mu_t + \gamma_i + \varepsilon_{it} \tag{16}$$

Where $RTCR_{it}$ represents relative trade coverage rate of country i at year t, $RULC_{it}$ represents relative unit labor cost of country i at year t, μ_t is unobserved common time-effect, γ_i is unobserved country-effect, and ε_{it} is the error term.

Table 1-3 reports the estimated results of Equation (16). We used two types of fixed effects for each group's estimation. One is time fixed effects (μ_t) showed in column (1) (3) (5) (7). Another is time plus individual fixed effects ($\mu_t + \gamma_i$) showed in column (2) (4) (6) (8). Since the series of RULC for "emerging country" group is not stationary, we added first difference in its estimation showed in column (7) and (8). The results here are completely consistent with the inference in last section. All the estimated coefficients have expected signs and are statically significant at the level of 1%. This indicates the robustness of previous inference.

Generally speaking, relative costs have negative impacts on trade performance. A cost augment leads a reduction in manufacturing exports relative to imports. The impact is similar for developed and developing countries. A 10% cost augment leads a 2%-3.5% reduction of export relative to import. Non-cost factors evaluated by constant have positive effects. Its impact is more significant for major industrialized countries than for emerging countries. In developed country group, a 10% increase of non-cost advantage leads to 15% (or 13.6%) growth in exports relative to imports. In emerging country group, a 10% increase of non-cost advantage leads to 11% (or 12%) growth in export import ratio.

Table 1-3 estimation results for Relative Trade Coverage Ratio (TCR) equation

	all country		developed country		emerging country			
	TCR (level)		TCR (level)		TCR (level)		TCR (first difference)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	FEi	FEit	FEi	FEit	FEi	FEit	FEi	FEit
Relative Cost(level)	-0,28***	-0,39***	-0,34***	-0,22***	-0,21***	-0,35***		
	(-5,73)	(-7,89)	(-6,27)	(-3,59)	(-2.64)	(-5,92)		
Relative Cost(difference)							-0,34***	-0,39***
							(-3,73)	(-3,99)
Constant	1,29***	1,38***	1,50***	1,36***	1,12***	1.20***	0,02**	0,02***
	(30,7)	(32,51)	(23,74)	(19,52)	(23,63)	(34,33)	(2,45)	(2,73)
C_China	-0,04	-0,06			0,11	0,16	0,01	0,01
C_spain	-0,30	-0,26	-0,46	-0,43				
C_france	-0,06	0,01	-0,20	-0,21				
C_germany	0,34	0,40	0,19	0,19				
C_indonesia	-0,40	-0,41			-0,26	-0,19	-0,003	-0,003
C_india	-0,28	-0,28			-0,14	-0,07	-0,02	-0,02
C_italy	0,11	0,16	-0,04	-0,02				
C_japan	1,33	1,44	1,21	1,16				
C_korea	0,18	0,20			0,30	0,40	0,01	0,01
C_malaysia	-0,05	-0,10			0,08	0,04	0,003	0,002
C_mexico	-0,27	-0,31			-0,14	-0,16	0,004	0,004
C_philippines	-0,29	-0,41			-0,15	-0,35	-0,01	-0,01
C_singapore	-0,19	-0,23			-0,08	-0,13	-0,001	0,01
C_thailand	-0,37	-0,41			-0,21	-0,18	0,003	0,003
C_taiwan	0,28	0,30			0,38	0,48	-0,01	-0,003
C_uk	-0,26	-0,22	-0,42	-0,39				
C_us	-0,36	-0,27	-0,48	-0,50				
Observations	705	705	340	340	365	365	355	355
Adjusted R^2	0,64	0,65	0,83	0,83	0,27	0,67	0,02	0,18

Note: *** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

For "all country" group, individual-fixed and time-fixed effects conduct similar results, except for France. When we introduce dummy variables of each country, we found that mostly emerging countries were disadvantageous in non-cost side because estimated coefficients are negative. The new industrialized countries, such as Korea and Taiwan were advantageous in non-cost side. The major industrialized countries like Germany, Japan and Italy are competitive in non-cost but US, UK, France and Spain are not. The coefficients of France (-0.06 is negative but near zero, i.e. France is handicapped but still around average level. When time-fixed effects are considered, its variable becomes closed to zero and positive (0.01).

We then distinguished industrialized countries from emerging countries. Dummy variables of developed countries diminished (column 3-4 have variables inferior to column 1-2) and those of emerging countries rose (column 5-6 variables superior to column 1-2). It is logically correct. Industrialized countries are absolutely more competitive in non-cost when compared with emerging economies; emerging countries are less competitive in front of developed ones.

When considering only developed countries, Germany and Japan always won non-cost competitiveness. France and Italy become disadvantageous. As Figure 1-32 showed, Italy was non-cost advantageous after 2003 so over the whole period of 1970-2008 its variable becomes negative (-0.04 and -0.02). The estimated coefficient of France in developed country group decreases much and is also negative (-0.2) under cross-country effect. The comparison of Italy with France suggests that Italy was disadvantageous in non-cost during 1970-2012 but not so much handicapped as France. Since Italy became non-cost advantageous from 2003, it is understandable that its constant coefficient is not largely inferior to zero.

When considering only emerging countries, estimation is not satisfied with determinant coefficient (R^2). When time and individual effects are taken into account, estimation is more or less valuable with R^2 equaling 0.67 (column 6). Here China becomes advantageous in non-cost. However, dependent variable RULC here is not stationary so the results of “all country” group are preferable.

6. Conclusion

This chapter studies China’s competitiveness in comparisons with 19 other countries. Both cost and non-cost competitiveness have significant impacts on trade performance. Emerging countries always benefited from the cost advantages but lost from non-cost handicap. Developed economies were mainly disadvantageous in cost but also handicapped in non-cost aspect, except Germany and Japan. Italy, Taiwan and Korea improved non-cost competitiveness in recent years. However the overall industrialized countries are still anxious.

Labor compensation, labor productivity, exchange rate and trade weights in previous period are four elements determining cost competitiveness. Salary system, R&D expenditure and regional integration are also relevant. In the process of total economic production, labor compensation and productivity affect each other significantly, except for Malaysia and India. For manufacturing industry, they are highly correlated only in Korea, Taiwan, Singapore and China. An increase of relative productivity level was always followed by a rise of labor compensation.

This chapter shades lights on the calculation of relative index of total economy and manufacturing. For relative labor compensation and relative labor productivity, the United States' levels were the highest among 19 countries. The workers in US were the most productive and highest paid. Japan's levels were lower than US but higher than the rest of countries. In France, Germany, UK and Italy, the workers were always more productive and paid than their trade partners. On contrary, Spanish workers were less efficient and less paid. It should be noted that UK and Italy's manufacturing makes an exception. Their relative labor productivity and remuneration were both under the world average level.

When considering relative unit labor cost, Japan was the most handicapped in cost among the countries mentioned in this chapter. It was followed by US, Germany, France, Italy and UK for the total economy and by Germany, Italy, France and UK for manufacturing. These countries were all handicapped in cost for these industries' productions. Spain seems to be the only major industrialized country that was advantageous in cost. Meanwhile, US manufacturing's cost competitiveness was around the world average level. Yet its relative cost of total economic production was much higher than world average one.

Among new industrialized countries and emerging countries, Singapore's employees were the most productive and paid. It was the only country that was handicapped in cost relative to the trade partners. The labor remuneration and productivity of Korea were higher than average level. Nevertheless it was advantageous in cost compared with its trade partners. Taiwan was more productive than its trade partners. Its level of labor compensation was lower than the later. Thus Taiwan was also competitive in cost.

China, for the overall economy and manufacturing industry, is characterized by strong cost competitiveness. Its relative level of labor compensation was much lower than industrialized countries but a little higher than emerging countries except for Malaysia.

China improved its labor productivity with political supports. Although it was still much less productive than industrialized countries, its production became more efficient than the rest of emerging countries, excluding Thailand and Malaysia.

The final index of relative unit labor cost shows that for the total economy, China had a cost advantage compared with industrialized economies. Yet it was handicapped in comparison to emerging countries. Its level of cost per output was higher than that of all the emerging economies. For manufacturing, Chinese relative unit labor cost has remained lower than that in developed countries and in most developing countries, aside from Thailand. Since 1990s, China could not maintain its low cost level with a rise of labor remuneration. Its exports relied more on non-cost competitiveness. The empirical study suggests that if certain emerging countries could be advantageous in non-cost, it must be China and Malaysia. We need to work over the way of enhancing non-cost competitiveness in next chapter.

Meanwhile, the exchange rate and institutions also influence competitiveness. Their impacts vary across countries. For instance, in China they do not have any significant effects while in Japan they are important elements. We therefore need further empirical estimations of these relationships.

It should be noted that the robustness of China's estimation also needs to be confirmed. Chinese PPP applied in this chapter was undervalued and its productivity was correspondingly overvalued. China's labor cost only comprises the average wage of person engaged in Urban Units. The workers in rural unit and the migrant workers earn much less than employees in urban units yet they are not taken into account. China's labor compensations are hence overestimated. It is hard to say whether the final indices (relative unit labor cost) are overestimated or underestimated. This may be further discussed in future research.

Chapter II

The non-cost competitiveness of Chinese export: Specialization and structural change

ABSTRACT

The structure of China's export has widely changed since the 1990s, i.e. it has become more specialized in sophisticated sectors. The policies and strategies of Chinese government have encouraged this trade revolution. The outcome is impressive at the world trade level. However the input-output analysis of vertical specialisation provides a different picture. China's structural change and trade dynamic have become more dependent on imports from other countries than before. The higher the technological level of Chinese export, the larger the need of imported inputs. The empirical study confirms this assessment.

Key words: China, structural change, vertical specialization, input-output table

1. Introduction

As we know, China's emergence was mostly led by exports. Since the reform of opening up, China has promoted export through various channels like reducing the cost of production, shifting the structure of export, implementing policies of subvention in order to develop key sectors. We have already studied China's cost advantages in chapter 1 and in a working paper (SU 2011). Thus in this chapter we would like to analyse the structural change of exports. The analysis of the export structure shows that China has become more specialized in sophisticated sectors between 1970 and 2012. For instance, the export of electronics at high-tech level leapt from 3% of world trade in 1990 to about 1/4 in 2010. The share of electric sector also rose above 20% recently.

However with the intensification of the division of labour and global integration, an exported product contains imported inputs from abroad. According to Ricardo's theory of comparative advantage, each partner countries gains from trade. The question is what will be the distribution of this gain between the different partners. Greg Linden (2007) gives the example of the "IPod" 30GB of 5th generation. For every 300$ IPod sold in the US, the factory cost is 150$, of which China holds 4$ and US 14$. China custom statistics define the value of an IPod export as 150$ surplus for China, i.e. a 150$ deficit for the US, but actually the US gains more (at least 14-4=10$). The measurement by pure export statistics therefore drives to wrong conclusions.

Hummels, Ishii, Yi (HIY 1999) propose the concept of vertical specialization and the measurement by input-output table, which permits to evaluate changes in the "nature" of international trade according to the stage of production. Chen (2001) analyses China-US trade with the same method. He notes that although China experienced a rapidly increasing export, the local content of Chinese exports did not rise as much as the local content of US's exports. This is why China gained less than US. According to the study of Koopman et al. (2008), the local content of Chinese exports in high-skilled sectors was lower than that in low-skilled sectors. Chen (2008) points that the export growth of sophisticated sectors cannot increase china's domestic value added. By contrast, the domestic value added of Chinese exports decreased during 1995-2002. This chapter aims at analysing what led China's structural change. If it was led by domestic production, China would gain more from structural transformation. If it relied on increasing imports of inputs, China would gain less from a unit of export.

We use vertical specialization and input-output tables to assess China's local content of export over the 1995-2007 period. Thus we provide three contributions: 1) While previous researches use the input-output table of 2002, we extend the period to 2005 and 2007. 2) We compute vertical specialization shares, also named imported inputs, in china's production for export of 135 sectors, which is the most disaggregated level possible. Besides, we match the sector classification of China with the OECD classification. We transform the 135 sectors' input-output table into a 48 sectors' table and we compare our findings with OECD's calculation to confirm the robustness of our results. 3) A large number of researchers argue that Chinese exports depend more on imported inputs than before but few of them can prove it. We build a macroeconomic equation to estimate the linear correlation between the export and the foreign content, and then we obtain an additional result on foreign dependence variation.

The chapter is organized as follows. Section 2 presents China's structural changes of export during the 1970-2009 period by stage of production, technological level and sector. Section 3 analyses the foreign value added, as well as the vertical specialization share of export between 1995 and 2007: It firstly introduces the theory and the selected methodology; secondly it explains data sources and comparison; finally it combines input-output tables with trade data and illustrates preliminary results. Section 4 provides empirical studies to confirm our findings. Section 5 gives conclusions and future directions of research.

2. Structural changes measured by export

2.1 Revealed Comparative Advantage (RCA)

One of the well-known indexes of specialization is the Revealed Comparative Advantage (RCA). It measures the relative degree of export specialization of a country in comparison with the world.

In fact, there are two principal approaches of international trade referring to the Comparative Advantage: Ricardian theory and Heckscher-Ohlin-Samuelson (HOS) model. Ricardian model assumes that comparative advantage varies across countries because of technological differences. While HOS model considers that the pattern of specialization is determined by different factor endowments (labor, capital, qualified labor and non-qualified one…). This difference depends on relative prices of factors rather than technology changes.

Bronwyn Hall (2008) assessed the effect of innovation on Italian productivity growth with OLS and IV estimation methods. The result showed that there is no significant relationship between innovation process and Italian firms' development. The technology changes have little impacts on OECD members. Only in UK and Germany, this effect is significant but still small. According this article, we prefer HOS model in the following study.

However, it's extremely difficult to measure comparative advantage and test HOS model because the relative prices of certain factors are unavailable. Balassa pointed out this difficulty and thought it was not necessary to chase down all the relative prices that influence specialization. By contrast, it could be revealed by the pattern of exchange called Revealed Comparative Advantage (RCA)[24].

This chapter uses RCA and sector classifications derived from CEPII CHELEM-CIN database. Instead of Balassa's classic evaluation basing upon export structure, CEPII highlights the trade balance and national market size with formula below:

$$RCA1_{ik} = \frac{1000(EXP_{ik}-IMP_{ik})}{GDP_i} - \frac{EXP_{ik}+IMP_{ik}}{EXP_i+IMP_i} * \frac{1000*(EXP_i-IMP_i)}{GDP_i} \tag{17}$$

$$RCA2_{ik} = \frac{1000(EXP_{ik}-IMP_{ik})}{GDP_i} - \frac{W_k}{W} * \frac{1000*(EXP_i-IMP_i)}{GDP_i} \tag{18}$$

Where:

RCA_{ik} is the revealed comparative advantage of product *k* in country *i*
EXP_{ik} is the export of product *k* in country *i*
IMP_{ik} is the import of product *k* in country *i*
EXP_i is the export of all the products in country *i*
IMP_i is the export of all the products in country *i*
W_k represents the world trade of product *k*
W represents the world trade of all the products

Equation (17) notes the first version of RCA calculation and Equation (18) refers to the second version. Their differences are:

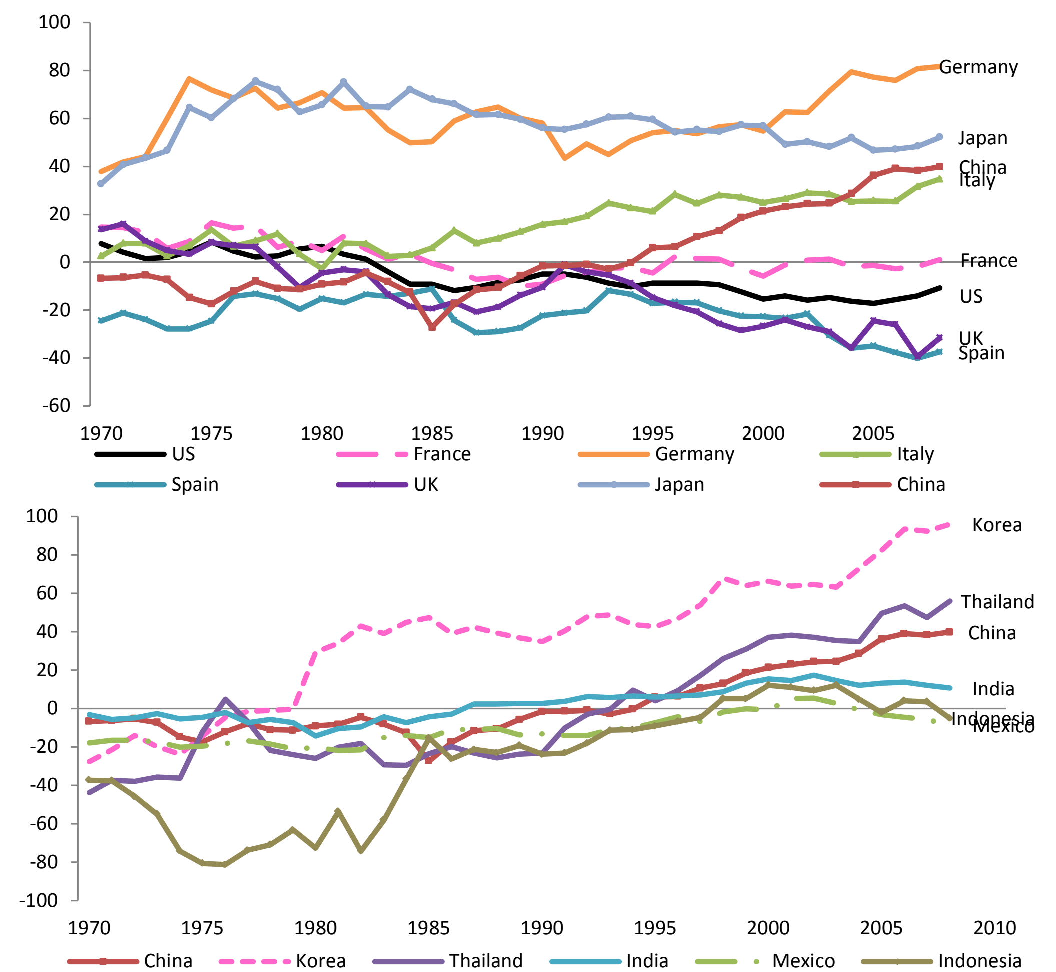
(1) GDP values are different: GDP of *RCA1* is converted in US dollars with official exchange rate, while *RCA2* with Purchasing Power Parity rate.
(2) Trade Balances are different: *RCA1* takes the trade of only goods into account, while *RCA2* covers the trade of both goods and services.

[24] According to Balassa in 1965, $RCA=(E_{ij}/E_{it})/(E_{nj}/E_{nt})$.
Numerator is the export of product "*j*" from a country "*i*" relative to this country's exports of all the products; denominator is the export of product "*j*" from all the countries "*n*" relative to all countries' exports of all the products.

(3) Trade Weights are different: *RCA1* restricts the weights in trade of country *i*, but *RCA2* expands the calculation to the trade over the world instead of only country *i*.

This chapter chooses RCA2 in Equation (18) with anchor of GDP in 1996 for two reasons: firstly, GDP measured with PPP rate is consistent with previous study of labor productivity whose calculations also use PPP rate. Secondly, RCA2 refers to the trade of goods and services across global market, so its deduction will be more appropriate than RCA1 that uses only the trade of goods.

Figure 2-1 Revealed comparative advantage for manufacturing (in 1000 ppp GDP)



Source: ISIC classification, data from CHELEM-CIN

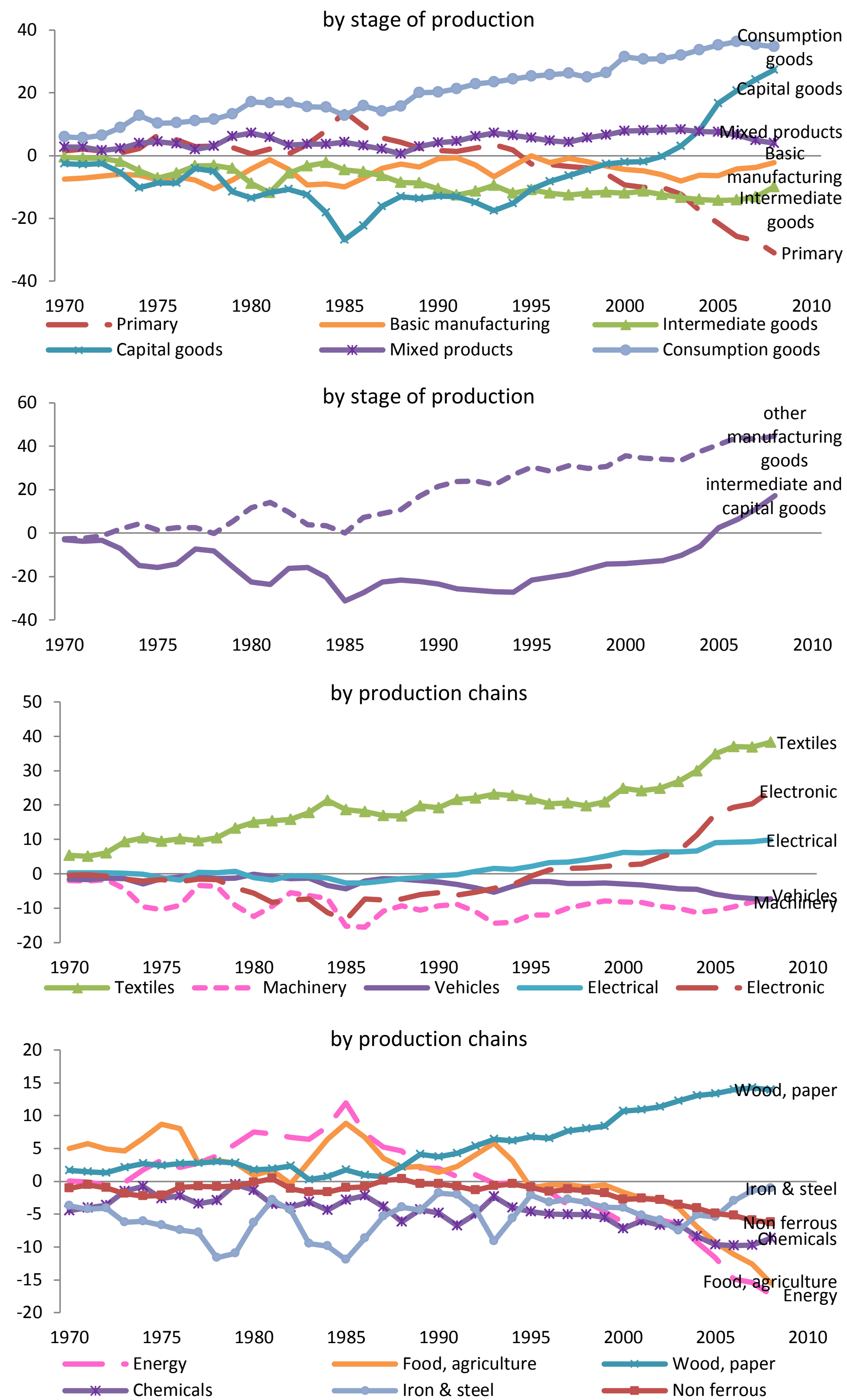
Figure 2-1 presents the specialization process of each country. It confirms chapter 1's conclusion of non-cost competitiveness by the trade coverage ratio and clarifies it. The countries with positive RCA won a non-cost competitiveness in manufacturing. At the contrary, the countries with negative RCA lost the non-cost competitiveness and were handicapped.

At the outset, China and emerging countries suffered from a non-cost handicap. Then they increasingly benefited from non-cost competitiveness in manufacturing. In recent years, they became comparatively advantageous in manufacturing export.

Japan, Korea, Germany and Italy had a cost disadvantage but a non-cost advantage. Korea has got a non-cost advantage since 1979. Italy was specialized in manufacturing despite lower labor productivity. Its manufacturing products were well known by the style and quality, particularly in the leather, footwear and apparel industries. The US, France and Spain were handicapped in both cost and non-cost aspects. Although US spent heavily on R&D and Innovation, it highlighted the development of high-tech products and financial market instead of traditional manufacturing industry. Thus the US was less and less specialized in manufacturing exports. After the Subprime Crisis, its Revealed Comparative Advantages in overall manufacturing industry re-rose.

Several experts believe that the structural reform of export has driven the current Chinese prosperity. To further discuss this view, we need to present RCA detailed by sector or stage of production.

Figure 2-2 China's Revealed Comparative Advantage (RCA) by stage of production



Source: CHELEM-CIN classification and data

Figure 2-2 shows China's specialization changes by stage of production and by chain of production. The industries here are divided by CHELEM international trade sectoral classification[25]. Across the stages in the production process, China was not specialized in the primary, basic and intermediate manufacturing products. Its specialization degree of primary products declined from 1985.As for the basic and intermediate goods, China's degree of specialization increased a little after 2005. China's most competitive sectors were consumption goods and capital products.

Across the production chains, China was not specialized in the vehicles, machinery, food, agriculture, energy, iron & steel, non-ferrous and chemicals. Among them, the degree of specialization rose in iron & steel and machinery, while it went down in other production chains. China's most competitive sectors were textile, electronic, electrical, wood and paper. Generally, China was more and more specialized in sophisticated products, such as electronic, electrical, machinery and capital goods. Its non-cost competitiveness was therefore enhanced for them. Besides, China's specialization of traditional low-skilled exports, including textile, wood and paper also increased.

However, RCA measures the relative degree of specialization of a product in comparison with the world. Due to the changes of politics, strategies, prices…a country's structure of export may vary differently from its relative specialization degree compared with other countries. Therefore we need to use other index to measure China's specialization changes.

2.2 Export ratio

Another widely used index is the export ratio. The sight of specialization measured by it is revealed at two levels. At the international level, we measure the market share by dividing the export of sector *i* (EXP_i) by world trade of this sector (W_i) in Equation (19a). In addition, we divide trade balance (EXP_i-IMP_i) by world trade (W_i) to assess the trade performance (Equation 19b). At the national level, we measure the specialization degree by dividing export of sector *i* (EXP_i) by china's total export (EXP_t) in Equation (19c).

$$EXP_i/W_i \quad (19a)$$

$$(EXP_i\text{-}IMP_i)/W_i \quad (19b)$$

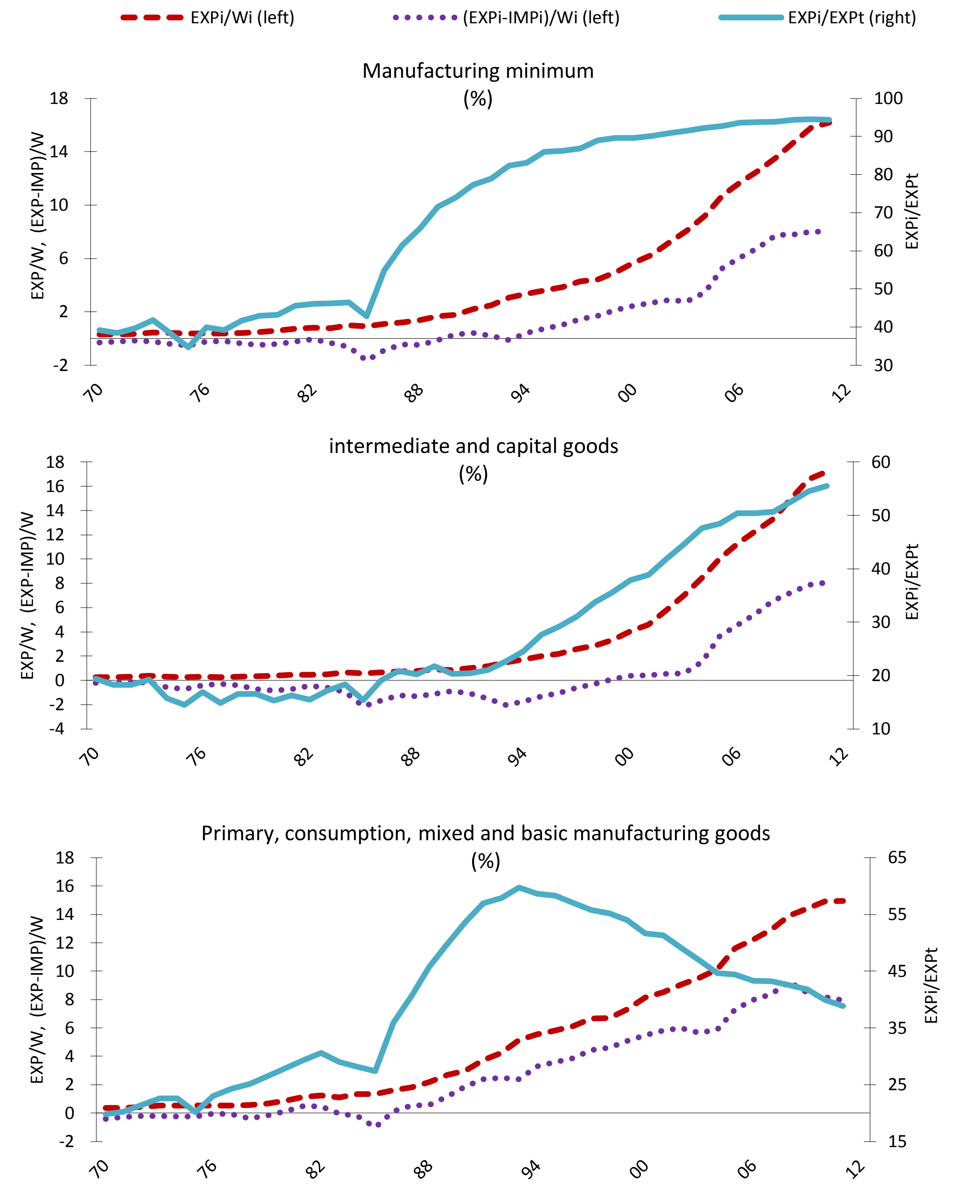
$$EXP_i/EXP_t \quad (19c)$$

[25] CHELEM International trade sectoral classification is showed in the website (English version): http://www.cepii.fr/cepii/fr/bdd_modele/tools.asp?id=17

All the data in this section derive from CEPII CHELEM-CIN database during 1970-2012. The sectors are unified according to CHELEM classification.

2.2.1 by stage of production

Figure 2-3 China's specialization by stage of production



Source: CHELEM-CIN classification, author's own calculation

Figure 2-3 presents the evolution of specialization of Chinese exports according to CHELEM international trade sectoral classification.

The left axis describes the evolution of relative specialization at international level, measured by EXP_i/W_i and $(EXP_i\text{-}IMP_i)/W_i$. It shows that the development of $(EXP_i\text{-}IMP_i)/W_i$ was similar to that of RCA in last section. 1985 was the turning point for China's manufacturing exports. Before this year, China's manufacturing trade deficit increased. After then, it began to decrease largely. Particularly, China's specialization degree in intermediate and capital goods did not rise quickly. Before the years of 2000s, china's import of intermediate and capital goods was superior to its export of these sectors. Thus $(EXP_i\text{-}IMP_i)/W_i$ and RCA were both negative. Since the mid-2000s, these two indexes have become positive and have increased significantly.

On contrary, the specialization into other manufacturing goods, including Primary, consumption, mixed and basic manufacturing goods, increased rapidly and was always positive. China was generally specialized in these sectors. Nevertheless, their specialization of export declined from the mid-2000s. Exactly speaking, the ratio of their trade balances on world trade began to decrease from 2008. We need to study China's internal specialization measured by EXP_i/EXP_t to find the raison.

The right axis describes the evolution of the export structure at national level (inside China), measured by EXP_i/EXP_t. The blue line shows that the share of manufacturing export continued to increase, especially from 1985. China's specialization of manufacturing was enhanced and the trade deficit relative to world trade declined from this year. Until 2012, the manufacturing industry accounted for more than 90% of Chinese total export.

From 1985, the export share of primary, consumption, mixed and basic goods rose significantly. The share of intermediate and capital products' export also increased but it did not increase as fast as consumption and basic goods. Since 1994, the share of manufacturing export has varied stably around 90%. The share of primary, consumption, mixed and basic goods fell from 60% to 40% over 1994-2012. While the share of intermediate and capital goods continued rising from about 25% to 55% over the same period.

China was recently more and more specialized in intermediate and capital goods rather than primary and consumption ones. Hence, the ratio of trade balance on world trade of primary and consumption goods decreased recently, while that of intermediate and capital goods continued increasing.

It should be noted that in this part discusses the specialization degree of only two groups of goods: the first group comprises intermediate and capital goods; the second group comprises the rest manufacturing goods, including primary, consumption, mixed and basic goods.

Recently, China was specialized in intermediate and capital goods. However, it was indeed specialized in only capital products rather than intermediate ones. As revealed in Figure 2-2, RCA of China's export of intermediate goods was always negative. China was not specialized in this stage of production. At the same time, RCA of capital goods' export increased significantly and became positive from 2000s. Thus RCA of the first group (intermediate goods + capital goods) increased and became positive from 2000s.

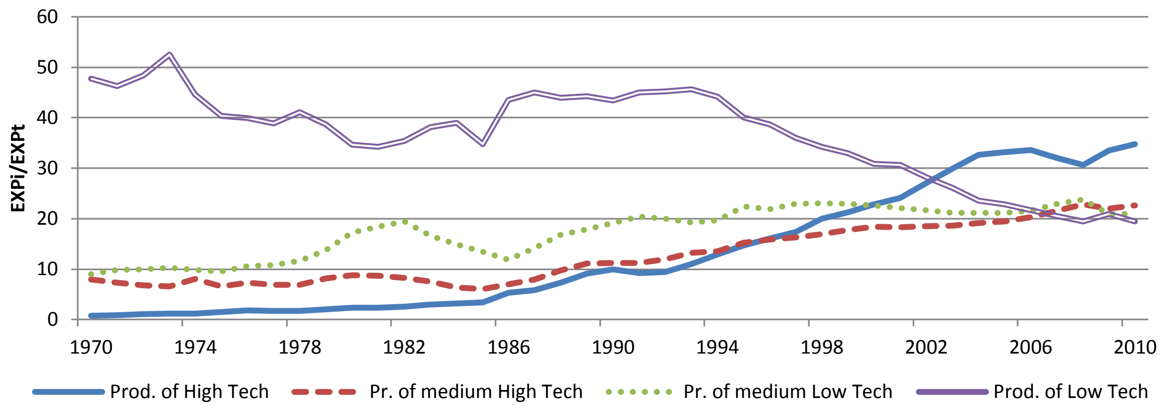
When regarding the second group, RCA of China's export of primary goods continued declining from 1985, that of mixed and basic manufacturing goods stayed around the same level and that of consumption goods rose quickly. Here discusses their RCA together (primary goods + consumption goods + mixed goods + basic manufacturing goods) instead of their individual evolutions.

To sum up, China's specialization in manufacturing export, both from the national and the international levels, has increased since 1985. This was mainly due to the rapid growth of China's consumption and basic manufacturing exports. China was not specialized in intermediate and capital goods during this period.

After one decade (1995), China decided to enhance the specialization into intermediate and capital goods in production chains, while reducing the specialization in other stages. Another decade later (2005), China was specialized (and more and more) in intermediate and capital goods' export. However, the growth of its world market share for primary, consumption mixed and basic manufacturing goods was largely hit and then went down quickly from 2008. Also since 2008, the speed of growth of China's overall manufacturing world market share has slowed down. Therefore, an interesting issue is to understand what happened during the 1995-2007 period that caused this slowness.

2.2.2 by technology level and sector

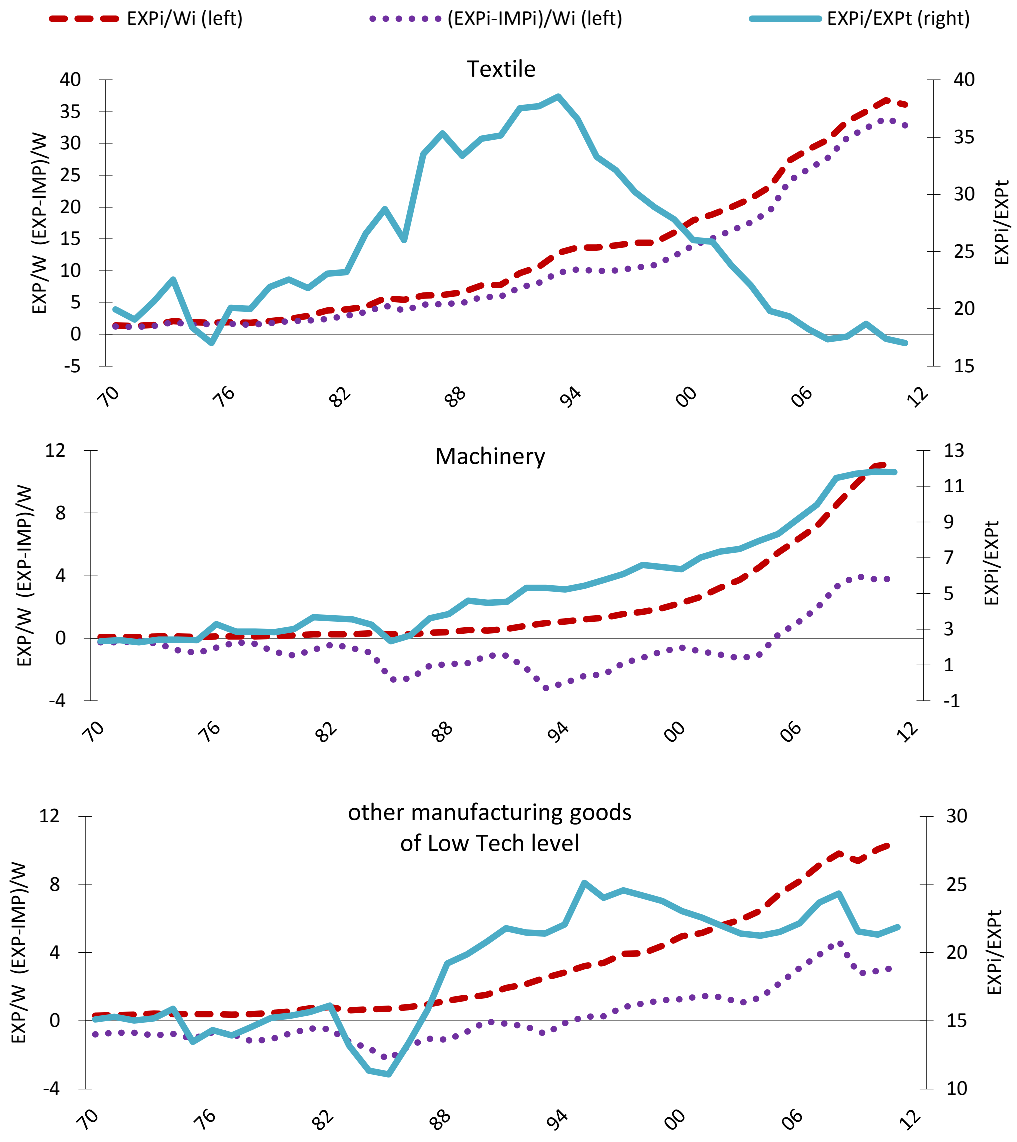
Figure 2-4 China's export structure by technology level



Source: CHELEM-CIN, author's own calculation

Figure 2-4 shows the changes of China's export structure. Before 1985, China was closed and the export structure did not change. After that year, the sophisticated sectors represented by the blue and the red line started to take off. The low-skilled sectors were still dominating Chinese export. From 1994 to 2004, we can see a fast change of technology levels. The export share of low-tech products decreased while that of the high-tech products increased to about 1/3. In 2002, high-tech products (blue line) exceeded low-tech goods and dominated Chinese export. Nevertheless, its progression braked from 2004, even dropped. An interesting thing is after the subprime crisis in 2008, its export was straightened.

Figure 2-5 China's specialization by production chain
(at low-tech and medium-low-tech levels)



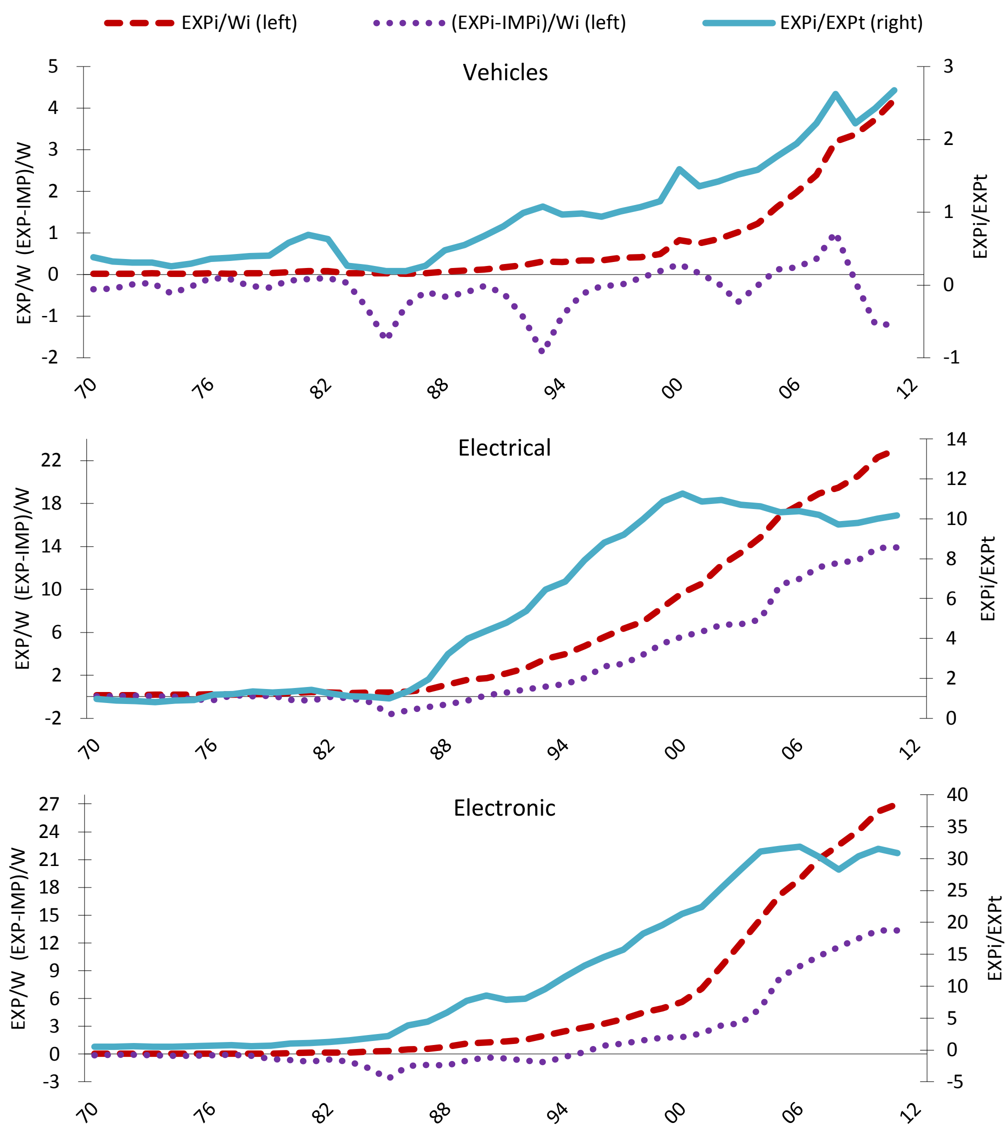
Source: CHELEM-CIN, author's own calculation

Figure 2-5 presents three low-tech and medium low-tech industries. Textile is the low-tech traditional sector. It includes consumption goods (majority) and intermediate goods (minority like needle and knit). From 1995, its export share has decreased and its performance in world market was simultaneously attacked. However China's world market share has continued to grow and recently it still accounts for more than 1/3 of world trade. This traditional sector has remained competitive.

Machinery industry's exports have increased as well. Its shares in China's export and on the world market have both expanded at the same time. In 2009, machinery accounted for 11% of Chinese export.

Other manufacturing industries such as wood paper, chemical, steel and non-ferrous, belong to low- and medium-low-tech levels. They strongly rely on natural resource processing. Figure 2-5 shows their specialization degree as a wave, going up from 1984, 2002 and going down from 1995, 2008.

Figure 2-6 China's specialization by production chain (at high-tech and medium-high-tech levels)



Source: CHELEM-CIN, author's own calculation

Figure 2-6 presents three high-tech and medium-high-tech sectors. The sector of vehicle (medium-high-tech) contains intermediate and capital goods. Although it represents a small share of Chinese export, its share has still increased. The Electric sector is a medium-high-qualified branch. The export shares of sectors, such as appliances, electrical equipment and supplies, have decreased since 2000. Electronics' export share has also declined from 2004, even though it accounted for nearly 30% of Chinese export.

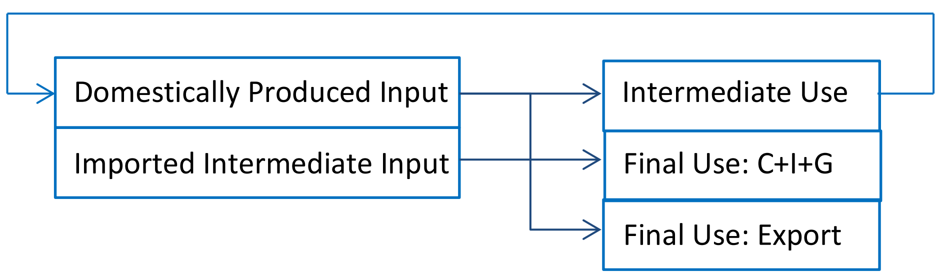
In summary, structural reform in China succeeded over the 1994-2004 decade. The structure of Chinese export has shifted from low-skilled sectors to high-skilled sectors until 2004, when the sophisticated sectors' export share stopped growing, and even decreased in industries such as electric and electronics. Recently, China has intensified its specialisation in medium-low-skilled industries, such as mechanical, wood paper, steel…which are based on national resource.

In the next section, we will discuss the source of China's structural transformation over 1994-2004 and what happened afterward until 2008. Because the data of input-output table for 1994 are not available, we analyse the period of 1995-2005, and then we extend it to 2007.

3. Sources of Structural changes

3.1 Theory and methodology

Table 2-1 simple process of intermediate input and output



As Table 2-1 illustrates, a country produces intermediate inputs domestically for output. When it is not enough, the country imports inputs to satisfy internal and external demands, including the production, consumption (C), investment (I), government expenditures (G) and export. Meanwhile, the output produced is also used as domestically produced inputs in the next periods of production. The process circulates back and force.

There are two ways to transform the export: altering domestic production and altering inputs' import. If the rise of High-Tech exports is based on the increase of domestically produced products, the local content of the exports will increase. On the contrary, if the growth of the sophisticated sectors is based on the increase of imported inputs, the local content of these sectors' exports will decrease. The structural change of export will rely more on imports than before and becomes therefore less satisfactory.

Table 2-2 Formal input-output table (IO table)

Output / Input			Intermediate Use	Final Use						Gross Output or Import
			Production Sector (j) 1,2,…, n	Household Consumption	Gouvernement expenditure	Gross Capital Formation	export	error	total	
Intermediate Inputs	Domestically produced Intermediate Inputs	1 (i) ⋮ n	**$\underline{CI^D}$**	C^D	G^D	I^D	EXP	ERR^D	**$\underline{F^D}$**	**$\underline{X_i}$**
	Imported Intermediate Inputs	1 (i) ⋮ n	**$\underline{CI^M}$**	C^M	G^M	I^M		ERR^M	**$\underline{F^M}$**	**<u>IMP</u>**
Primary Inputs	Depreciation of Fixed Capital Compensation of Employees Net Taxes on Production Operating Surplus		**<u>VA</u>**							
Total inputs			**$\underline{X_j}$**							

Hummels, Ishii, Yi (HIY 1999) proposed the concept of Vertical Specialization (VS) of export, based on the imported intermediate inputs in the production for export. The share of vertical specialization is also the share of foreign value added. This chapter aims at analysing the variations of vertical specialization share of Chinese exports and finds out the main source of china's structural changes. If China's VS share in high-skilled exports declines, its domestic value added will increase. By contrast, if the VS share of high-tech exports increases and the domestic content declines, China's structural changes of export will rely more on imports than before and the dependence of Chinese exports on other countries will increase.

Table 2-2 presents the structure of the input-output table (IO table). We use this basis to design a series of equations, following HIY1999, and to calculate vertical specialization share.

3.1.1 Vertical balance

The vertical calculations are as follows:

$$CI_{ij}^{D}+CI_{ij}^{M}+VA_j=X_j$$

$$a_{ij}=\frac{CI_{ij}^{D}}{X_j}$$

$$b_{ij}=\frac{CI_{ij}^{M}}{X_j}$$

$$c_j=\frac{VA_j}{X_j}$$

$$A^D=\begin{pmatrix} a_{11}\ a_{12}\ \dots\ a_{1n} \\ \dots \quad\quad \dots \\ \dots \quad\quad \dots \\ a_{n1}\ a_{n2}\dots\ a_{nn} \end{pmatrix} \quad A^M=\begin{pmatrix} b_{11}\ b_{12}\ \dots\ b_{1n} \\ \\ \\ b_{n1}\ b_{n2}\ \dots\ b_{nn} \end{pmatrix} \quad A^V=(c_1\ c_2\dots c_n)$$

$$u=diag(1,1,\dots,1)$$

$$uA^D+uA^M+A^V=u \tag{20}$$

$$VS=\frac{CI_{ij}^{M}}{X_j}EXP_i=uA^MEXP \tag{21}$$

Where:

CI_{ij}^{D} denotes domestically produced inputs of sector *i* for producing sector *j*.

CI_{ij}^{M} denotes imported inputs of sector *i* for producing sector *j*.

VA_j denotes value added in production of sector *j*.

X_j denotes total Input of sector *j*. It is equal to gross output of sector *i* (X_i), when *i=j*.

a_{ij} denotes direct input coefficients of domestic products, dividing domestically produced inputs of sector *i* for producing sector *j* by Total Input of sector *j*.

b_{ij} denotes direct input coefficients of imported goods, dividing imported inputs of sector *i* for producing sector *j* by Total Input of sector *j*.

c_j denotes value added ratio, dividing value added by Total Input of sector *j*.

A^D is n×n direct input matrix of domestic production of inputs

A^M is n×n imported input matrix

A^V is 1×n value added matrix

u is unit matrix (1 × n diagonal matrix).

EXP_i denotes export of sector *i*.

EXP is n×1 export matrix.

Equation (20) illustrates the vertical balance, which is used for testing if the matrix' estimation is correct. The vertical specialization (VS) is computed in Equation (21), according to HIY 1999 methodology.

Indeed, the imported inputs of sector *i* are used in the production of sector *j* ($\Sigma^i CI_{ij}^M$). At the same time, sector *j*'s outputs are used for the export, consumption, investment or for other domestic production in the second, the third...periods. Before being exported, the imported inputs circulate in several stages of production, as indicated in Equation (22). Equation (21) computes the vertical specialization by using direct imported inputs. However, when indirect imported inputs in the second, the third…periods are taken into account, Equation (21) becomes Equation (23). The final methodology of computing vertical specialization share is defined in Equation (24a) and Equation (24b).

$$A^M+A^MA^D+A^MA^DA^D+A^MA^DA^DA^D+...=A^M(I-A^D)^{-1} \quad (22)$$

$$VS=\frac{CI_{ij}^M}{X_j}EXP_i=uA^M(I-A^D)^{-1}EXP \quad (23)$$

$$VSS_i=\frac{VS}{EXP_i}=\frac{CI_{ij}^M}{X_j}\frac{EXP_i}{EXP_i}=\frac{CI_{ij}^M}{X_j}=uA^M(I-A^D)^{-1} \quad (24a)$$

$$VSS_t=\frac{VS}{EXP_t}=\frac{CI_{ij}^M}{X_j}\frac{EXP_i}{EXP_t}=uA^M(I-A^D)^{-1}\frac{EXP_i}{EXP_t} \quad (24b)$$

Where:

VSS_i is the imported inputs in production for export of sector *i*.

VSS_t is the share of vertical specialization in Chinese total export.

$(I-A^D)^{-1}$ is the Leontief inverse matrix.

EXP_t is the overall export of China.

3.1.2 Horizontal balance

When considering horizontal balance, we refer to Koopman (2008) study and calculate the domestic and foreign value added share.

$$CI^M+F^M=IMP \quad (25)$$

$$CI^D+F^D=X \quad (26)$$

$$A^DX+F^D=X \quad (27)$$

$$X=(I-A^D)^{-1}F^D \quad (28)$$

$$DVA=A^V*\Delta X/\Delta F^D=A^V(I-A^D)^{-1} \quad (29)$$

$$FVA=u-DVA=u-A^V(I-A^D)^{-1}=uA^M(I-A^D)^{-1}=VSS \quad (30)$$

Where:

IMP is n×1 import matrix.

F^M n×1 matrix, indicates the final use of imported inputs of sector *i*.

F^D n×1 matrix, gives the final use of domestic inputs of sector *i*, including consumption expenditures, investment and export.

X denotes n×1 output matrix. For each sector, gross output equals gross input. Thus we obtain Equation (27) then Equation (28).

$CI^M=\sum^j CI_{ij}^M$ n×1 matrix denotes intermediate use of domestic inputs of sector *i*.

$CI^D = \sum^j CI_{ij}^D$ n×1 matrix denotes intermediate use of domestic inputs of sector *i*.

DVA denotes domestic value added.

FVA denotes foreign value added.

According to Equation (30) and Equation (24a), foreign value added (FVA) calculated horizontally is equal to the vertical specialization share (VSS) calculated vertically. After the calculation for each year and each country, we test the accuracy of results with equation (20) and equation (28).

3.2 Data and preliminary results

This chapter utilises two data sources: OECD and China National Bureau of Statistics (NBS).

Table 2-3 differences between OECD data and NBS data

	OECD	NBS
Available years	95 97 2000 2002 2005	97 2002 2007
Manufacturing sectors' number (code)	22 sectors (code4-25)	81 sectors (code11-91)
overall sector's number	41/ 48 sectors	123/ 135 sectors
whether calculate imported inputs matrix	yes	no

Table 2-3 presents their differences. Firstly, the number of available years of OECD IO table is higher than that of NBS. However, the latest year of NBS is 2007, which is more recent than the former (2005).NBS also publishes the input-output table (IO table) for 1995, 2000 and 2005, but these tables only contain 33 or 42 sectors, according to China custom classification. Thus if use them, we will have a problem of consistence with OECD classification. Secondly, NBS IO table embodies 123 sectors for 1997, 2002 and 135 sectors for 2007. Differently, OECD identifies 41 sectors for 1997 and 48 sectors for the other years. As for manufacturing, NBS contains 82 sectors, while OECD has only 22 sectors. Thirdly, OECD provides the imported inputs' data in IO tables but NBS does not publish the matrix of imported inputs officially.

We distinguish imported matrix of NBS table and calculate VS shares for 1997 and 2002. Then we calculate VS shares by using OECD IO table and compare them with the VS shares by NBS. If they are compatible, we will extend the period to 2007 by using NBS table.

At the outset, we reconstruct NBS 123 and 135 sectors' table into 48 sectors, which are the same as OECD sectors. It should be noted that the data for imported inputs of OECD IO table are not available for all sectors. The details of the availability of each year are given in the table below.

OECD IO table year	number of sectors	number of available sectors	number of available manufacturing sectors	code of unavailable sectors
1995	48	28	16	10, 14, 17, 19, 23, 24, 28, 29, 34, 35, 36
1997	41	38	22	33, 34, 41
2000	48	38	21	23, 27, 28, 34, 35, 36, 40, 41, 42, 47
2002	48	45	21	23, 28, 48
2005	48	37	18	10, 14, 23, 24, 28, 34, 35, 36, 40, 41, 48

We reconstruct NBS 48 sectors' IO table with the correspondence as follows:

OECD 2002 IO table codes	NBS 2002 IO table codes	NBS 2007 IO table codes	OECD 1997 IO table codes	NBS 1997 IO table codes
1	1-6	1-5	1	1-5 13
2	7-8	6-7	2	6-12
3	9-12	8-10		
4	13-22	11-24	3	14-21
5	23-29	25-31	4	22-29
6	30	32	5	30
7	32-33	34-35	6	32-33
8	36-37	37-38	7	36-37
9	38-44 46	39-45 47	8	38-43 45
10	45	46	9	44
11	47-48	48-49	10	46-47
12	49-53	50-56	11	48-54
13	54-57	57-60	12	55-58
14	58-59	61-62	13	59-60
15	60	63	14	61-62
16	61-65	64-72	15	63-66 73-74 82
17	76-77	84	16	76 81
18	72-74 78	77-81 85	17	75 77-78
19	75 79 80	82-83 86-87	18	79

20	81	88	19	80
21	67-68	74	20	68
22	69	75	21	69
23	N.A.	N.A.	22	70
24	66 71	73 76	23	67 71-72
25	31 34-35 82-85	33 36 89-91	24	31 34-35 83-85
26	86	92	25	86-89
27	87	93		
28	N.A.	N.A.		
29	88 114	94 121		
30	89	95	26	90
31	102	108	27	100
32	103 104	109 110	28	101 111-112
33	90-93 97	96-98 101-102	29	91-97 102-105
34	94	99		
35	95-96	100		
36	98 110	103 116		
37	99-100	104-105	30	98-99
38	105-106	111-112	31	106-107
39	107	113	32	108
40	108	114	33	N.A.
41	101	106-107	34	N.A.
42	111	117	35	120-123
43	109 112-113	115 118-120	36	110
44	123	135	37	109 124
45	117	126	38	118
46	118-119	127-129	39	115 117
47	115-116 120-122	122-125 130-134	40	113-114 116 119
48	N.A.	N.A.	41	N.A.

N.A. stands for Not Available

Then, we remove the sectors for which the data are not available. We assume that the share of imported intermediate inputs in total intermediate inputs of sector i equals the ratio of import relative to the sum of import and gross product [26]of this sector.

$$\frac{CI_i^M}{CI_i^D+CI_i^M}=\frac{IMP_i}{IMP_i+X_i-EXP_i} \quad (31)$$

Ping (2005) has verified this assumption. Although OECD computes imported inputs' share on the basis of custom data, it also relies on this assumption when the data are not available. As a result, for more than 1/4 of the sectors, difference of VS shares

[26] Gross product equals gross output minus export.

between OECD and NBS is less than 0.002. For the rest, the variation over 1997-2002 is similar. For some sectors such as machinery & equipment, motor vehicles, results with the two databases are equivalent. They are good reasons to believe in the robustness of this assumption and of the related methodology. It is feasible to extend OECD table to 2007 with adjustment by NBS 2007 table.

Table 2-4 VS share: total economy and manufacturing sector

		(1)	(2)	(3)	(4)
Sector	year	Fukasaku	OECD table	NBS table 48 sectors	Adjustment by (2) and (3)
Total	-1995	0,1549	0,1624		0,1569
	-1997		0,1536	0,1458	0,1529
	-2000	0,1959	0,1978		0,1908
	-2002		0,2004	0,1941	0,2012
	-2005	0,2743	0,2734		0,2664
	-2007			0,2483	0,2554[27]
Manufacturing	-1995	0,1658	0,1740		0,1642
	-1997		0,1714	0,1613	0,1616
	-2000	0,2139	0,2159		0,2061
	-2002		0,2313	0,2217	0,2215
	-2005	0,3039	0,3030		0,2932
	-2007			0,2683	0,2782

Fukasaku (2011) computed the VS share with OECD data and IDE-JETRO tables. His main findings are showed in column (1) of Table 2-4. We calculate the average gap between

[27] Besides of calculation according to Equation (15) and Equation (16), we also use other method of adjustment. We assume the growth rate of gap between OECD and NBS is the same during 1995-2007, which is estimated by the gap in 1997 and the gap in 2002. Then VS share in 2007 for total economy was 0,2534 instead of 0,2554 in Table 2-4; That for manufacturing was 0,2774 instead of 0,2782. These two methods both engender a decline of the VS share over 2005-2007, however it is still an estimation that needs to be proved by the coming OECD IO table 2007.

OECD and NBS for each sector in 1997 and 2002, then plus NBS VS share for 2007 (Equation 32). For other years, we estimate VS share according to Equation (33). $VSS_{i,oecd,t}$ is the VS share of sector i at year of t measured by OECD. The adjusted VS share is showed in column (4).

During 1995-2005, the aggregate VS share of Chinese export increased by 11%. In the manufacturing sector, it increased by nearly 13% over this decade. It means that the domestic value added of Chinese export decreased. However, in 2007 VS share seems to diminish.

$$\frac{(VSS_{i,oecd}-VSS_{i,nbs})_{1997}+(VSS_{i,oecd}-VSS_{i,nbs})_{2002}}{2}+VSS_{i,nbs,2007} \quad (32)$$

$$VSS_{i,oecd,t}-\frac{(VSS_{i,oecd}-VSS_{i,nbs})_{1997}+(VSS_{i,oecd}-VSS_{i,nbs})_{2002}}{2} \quad (33)$$

3.2.1 by technology level

The VS share by technology level is presented in Table 2-5 and Table 2-6. Table 2-5 highlights the results of the comparison that separates manufacturing into two technology levels. The technology levels are unified according to Appendix 2. For high- and medium-high-tech levels, NBS underestimates by 2% the VS share relative to OECD. As for low- and medium-low-tech levels, there is no large difference.

Over the 1995-2005 decade, China's sophisticated sectors' exports needed more imported inputs than low-skilled one. For instance, in 2005, 1000$ of Chinese exports in sophisticated sectors needed 372$ of imported inputs, while 1000$ of Chinese low-skilled exports needed 213$. Meanwhile, the needs of imported inputs for China's high-skilled exports increased faster than that for low-skilled exports. The former rose by 16% over 1995-2005, while the later rose by only 6%. China's sophisticated exports depend more on imports from other countries and this dependence has increased more rapidly than the foreign input dependence of low-qualified exports.

During 2005-2007, China's VS share of both high-skilled and low-skilled exports declined by 2%. It means that China's foreign value added in its exports has decreased and that the local content of exports has increased. China has relied less on foreign countries than before.

Table 2-6 illustrates the variations of VS share for four technology levels. Between 1995 and 2007, the dependence of Chinese exports on imports increased. Especially for high-tech exports, the VS share has grown by 30% during the decade of 1995-2005. Besides, the higher the technology level, the higher the reliance on imported inputs. China's structural changes were not satisfactory.

Table 2-5 VS share at two technology levels

	Fukasaku		OECD table		NBS table 48 sectors	
	High-Tech Mid H-Tech	Low-Tech Mid L-Tech	High-Tech Mid H-Tech	Low-Tech Mid L-Tech	High-Tech Mid H-Tech	Low-Tech Mid L-Tech
1995	0,1876	0,1547	**0,2148**	**0,1504**		
1997			**0,2274**	**0,1398**	0,2073	0,1353
2000	0,2735	0,1715	**0,2741**	**0,1730**		
2002			**0,2998**	**0,1765**	0,2793	0,1746
2005	0,3751	0,2157	**0,3721(16%)**	**0,2129(6%)**		
2007			**0,3509**	**0,1982**	0,3305	0,1950

Table 2-6 VS share at four technology levels

	OUR calculation with NBS table				OUR calculation with NBS table and OECD			
	Low-tech	Mid L-T	Mid H-T	High-tech	Low-tech	Mid L-T	Mid H-T	High-tech
1995					**0,1472**	**0,1587**	**0,2152**	**0,1999**
1997	0,1259	0,1596	0,187	0,2527	**0,1286**	**0,1686**	**0,1966**	**0,2967**
2000					**0,1656**	**0,1914**	**0,2104**	**0,3603**
2002	0,1699	0,1884	0,2267	0,3411	**0,1682**	**0,2005**	**0,2265**	**0,3849**
2005					**0,1948(5%)**	**0,2639(11%)**	**0,2948(8%)**	**0,4841(30%)**
2007	0,1694	0,2381	0,2837	0,3861	**0,1699**	**0,2486**	**0,2905**	**0,4300**

3.2.2 by sector of manufacturing

Figure 2-7 presents the VS share of manufacturing sectors in 1997, 2002 and 2007 estimated with NBS IO table. The five-year growth rates are showed in Table 2-7. Figure 2-8 illustrates manufacturing VS share calculated by OECD for 1995, 2000 and 2005. Their growth rates are showed in Table 2-8. Indeed, the measurement by OECD table provides the same trend over 1997-2002-2007 as NBS, thus we do not present this variation.

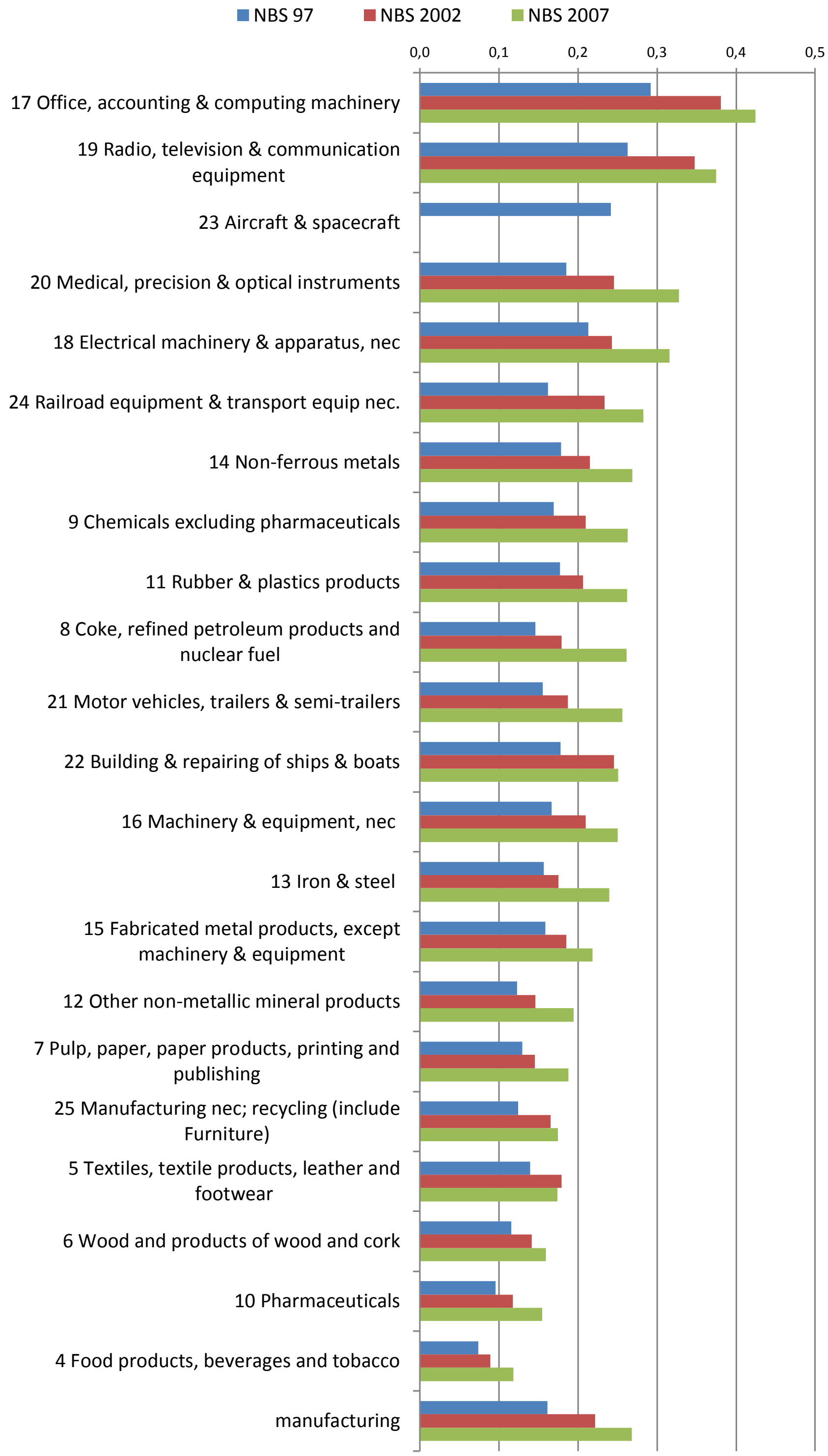
In Figure 2-7, the six largest VS shares belong to sophisticated sectors. The VS share increased in nearly all sectors during 1997-2007 except the sector of Textile, which decreased by 7% from 2002 to 2007 (Table 2-7). Figure 2-8 shows the same phenomena, except the sector of Iron and steel, all the sectors needing large VS share are sophisticated sectors.

The VS share of high-tech sectors, including sector 10, 17, 19, 20, 23, has continued to rise during 1995-2007. Among them, sector 17 (office accounting computing machinery) and sector 19 (radio, television and communication equipment) were the sectors that needed the higher share of imported inputs, up to 40% of the production for export.

The VS share of medium-high-tech sectors, including sector 9, 16, 18, 21, 22, 24, was generally 20%-30%. It went down over 1995-2000, i.e. China increased the local content of medium-high-tech exports. Unfortunately, the VS share has increased again since then. Sector 18 (electrical machinery and apparatus) needed the most imported inputs among them. Its VS share also decreased from 1995 to 2000 and re-increased to 30% in recent years. Besides, sector 21 (motor, vehicle and trailers) increased its local content during 95-97, 00-02, but it decreased in the other years.

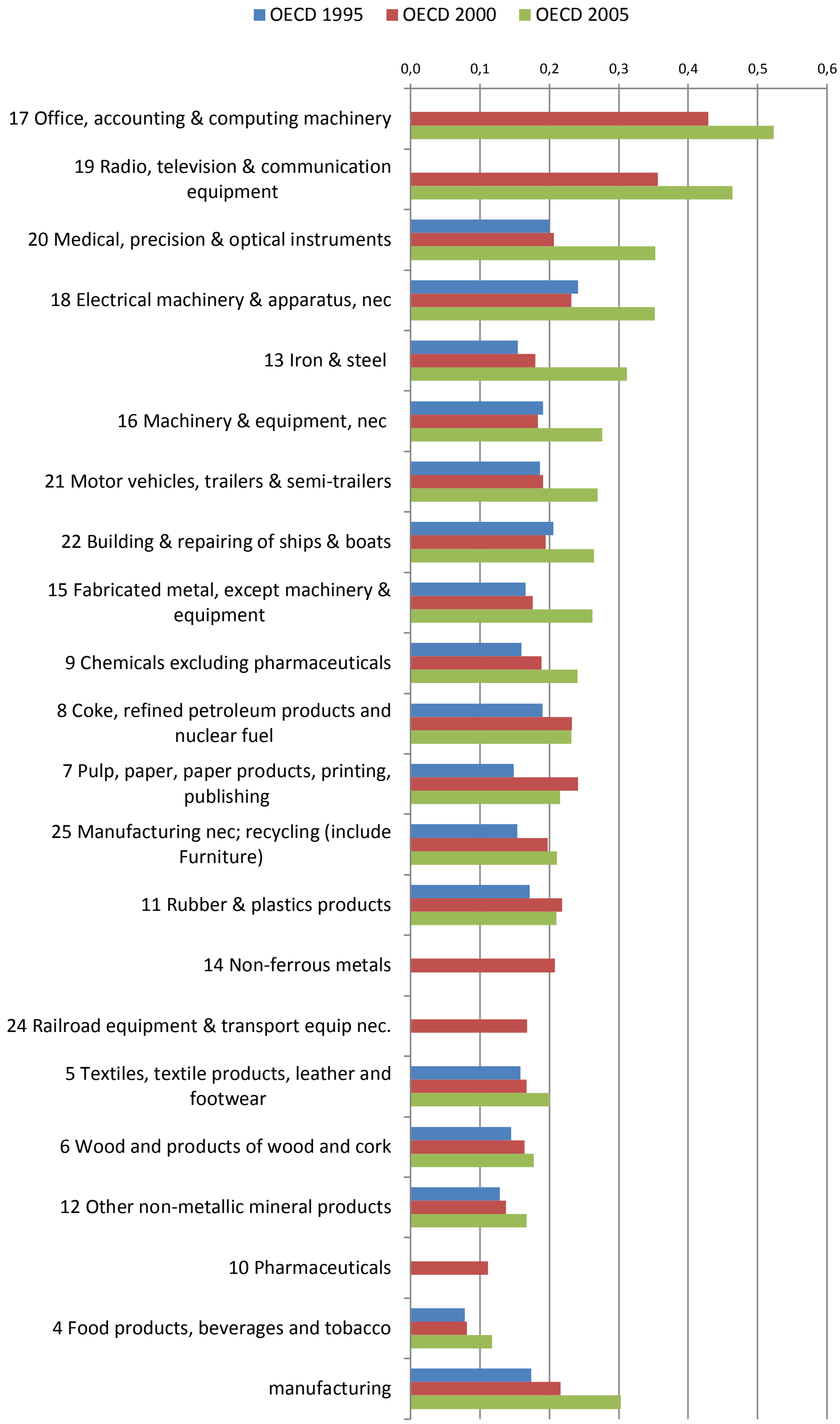
The foreign value added of the low-tech and medium-low-tech sectors generally did not change much, except for a few, such as sector 7 (paper products), sector 8 (coke, petroleum, nuclear) and sector 11 (rubber, plastics). The VS share increased the most among all the manufacturing sectors over 1995-2000 and decreased the most over 2000-2005. That means that China has enhanced the local content of the export in recent years only for low-skilled sectors. The foreign value added of sector 13 (iron and steel) jumped 73% over 2000-2005 and 36% over 2002-2007. Sector 5 (Textile) was the only sector for which the foreign content of export has decreased during 2002-2007.

Figure 2-7 Changes of Vertical Specialization Share, NBS 48 sectors 1997-2007 (manufacturing)



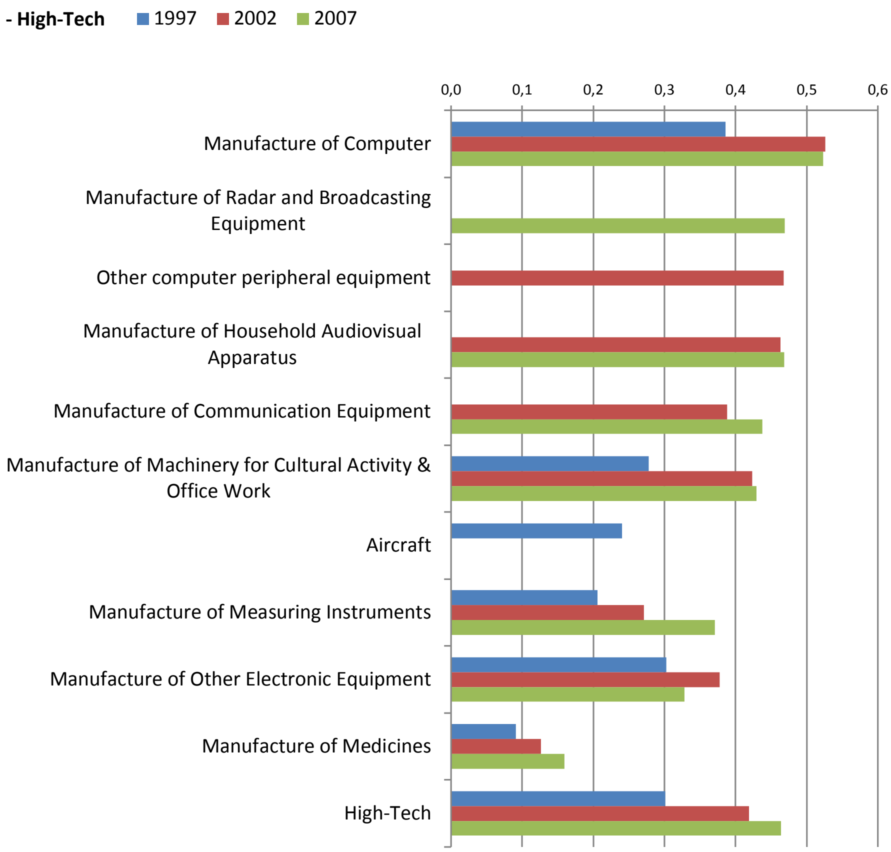
Source: NBS 48 sectors, author's own calculation

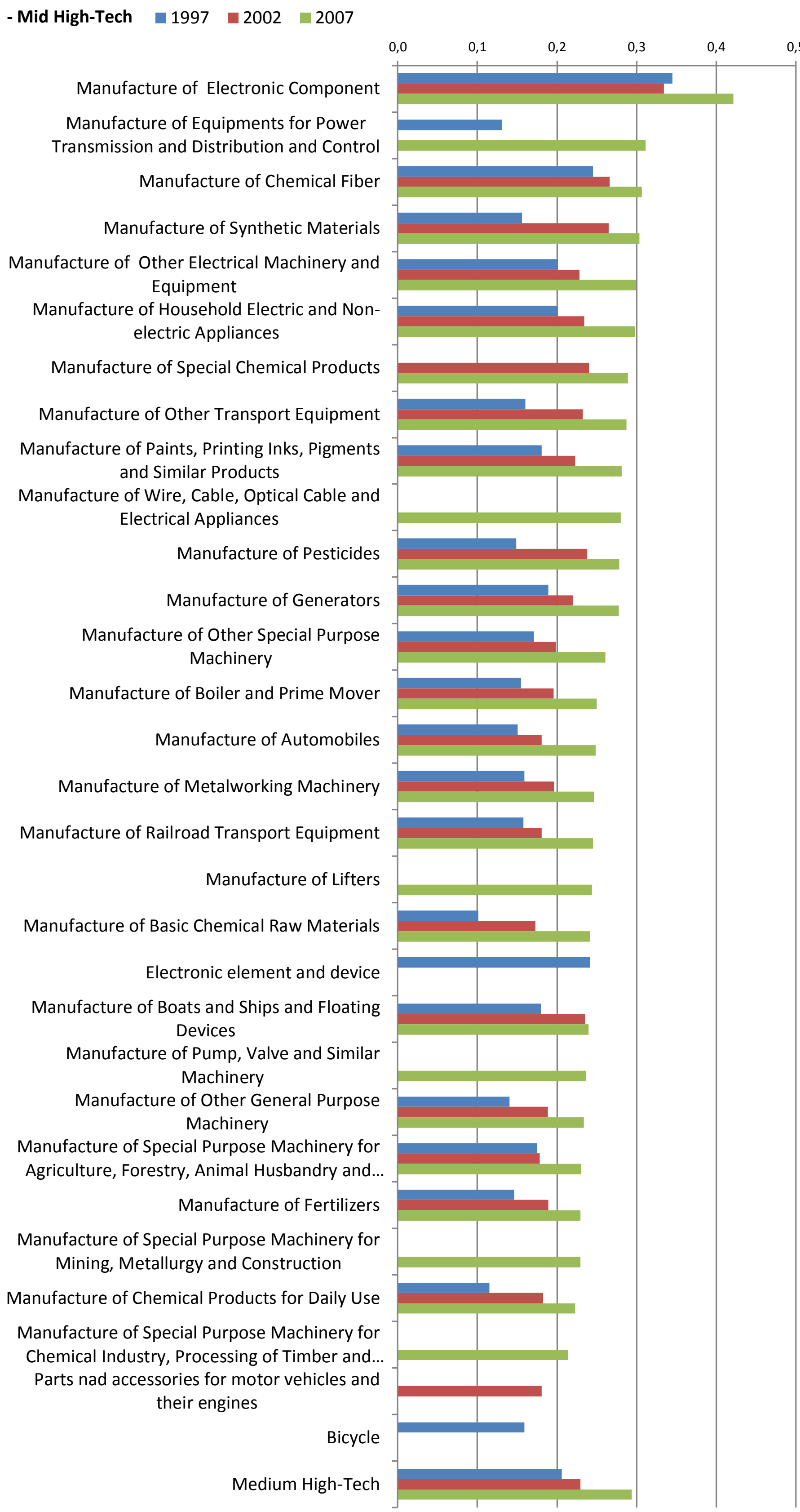
Figure 2-8 Changes of Vertical Specialization Share, OECD 48 sectors 1995-2005 (manufacturing)

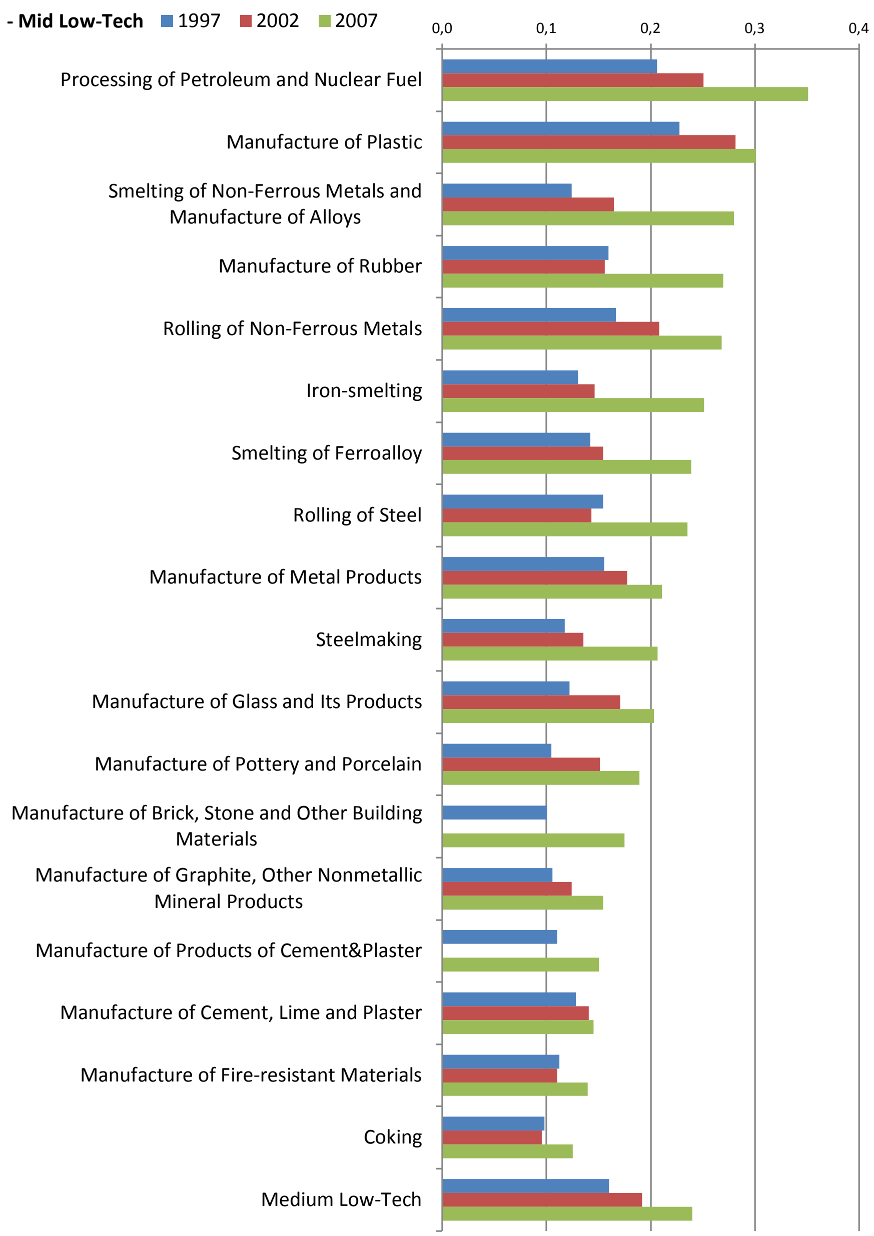


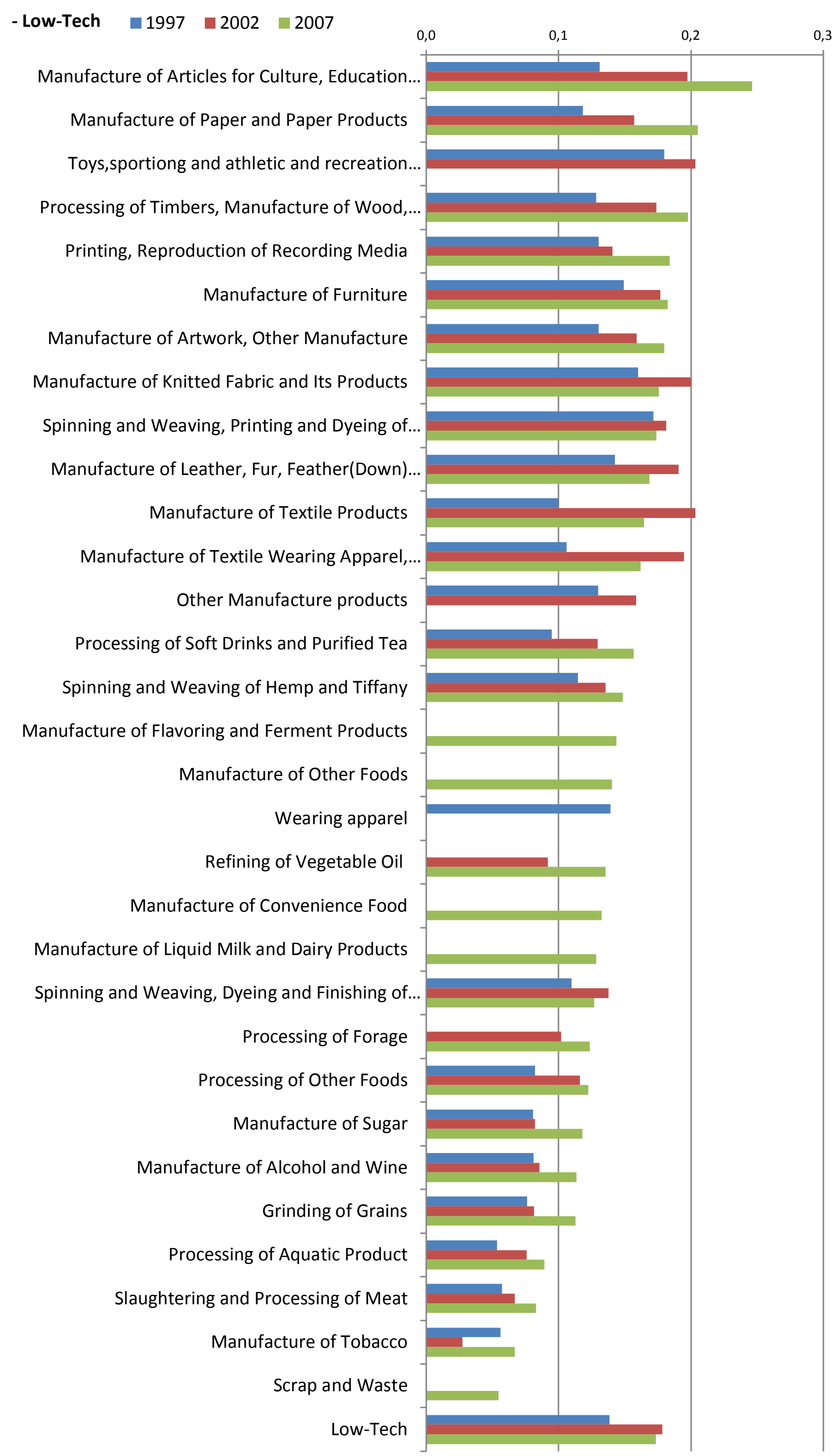
Source: OECD, author's own calculation, VS 2007 is an estimation adjusted by average gap of OECD and NBS (1997 and 2002).

Figure 2-9 Changes of Vertical Specialization Share, NBS135sectors 1997-2007 - High-Tech (manufacturing)




- Mid High-Tech
1997
2002
2007
0,0
0,1
0,2
0,3
0,4
0,5
Manufacture of Electronic Component
Manufacture of Equipments for Power Transmission and Distribution and Control
Manufacture of Chemical Fiber
Manufacture of Synthetic Materials
Manufacture of Other Electrical Machinery and Equipment
Manufacture of Household Electric and Non-electric Appliances
Manufacture of Special Chemical Products
Manufacture of Other Transport Equipment
Manufacture of Paints, Printing Inks, Pigments and Similar Products
Manufacture of Wire, Cable, Optical Cable and Electrical Appliances
Manufacture of Pesticides
Manufacture of Generators
Manufacture of Other Special Purpose Machinery
Manufacture of Boiler and Prime Mover
Manufacture of Automobiles
Manufacture of Metalworking Machinery
Manufacture of Railroad Transport Equipment
Manufacture of Lifters
Manufacture of Basic Chemical Raw Materials
Electronic element and device
Manufacture of Boats and Ships and Floating Devices
Manufacture of Pump, Valve and Similar Machinery
Manufacture of Other General Purpose Machinery
Manufacture of Special Purpose Machinery for Agriculture, Forestry, Animal Husbandry and…
Manufacture of Fertilizers
Manufacture of Special Purpose Machinery for Mining, Metallurgy and Construction
Manufacture of Chemical Products for Daily Use
Manufacture of Special Purpose Machinery for Chemical Industry, Processing of Timber and…
Parts nad accessories for motor vehicles and their engines
Bicycle
Medium High-Tech


- Mid Low-Tech
1997
2002
2007
0,0
0,1
0,2
0,3
0,4
Processing of Petroleum and Nuclear Fuel
Manufacture of Plastic
Smelting of Non-Ferrous Metals and Manufacture of Alloys
Manufacture of Rubber
Rolling of Non-Ferrous Metals
Iron-smelting
Smelting of Ferroalloy
Rolling of Steel
Manufacture of Metal Products
Steelmaking
Manufacture of Glass and Its Products
Manufacture of Pottery and Porcelain
Manufacture of Brick, Stone and Other Building Materials
Manufacture of Graphite, Other Nonmetallic Mineral Products
Manufacture of Products of Cement&Plaster
Manufacture of Cement, Lime and Plaster
Manufacture of Fire-resistant Materials
Coking
Medium Low-Tech



Source: NBS 48 sectors, author’s own calculation

Figure 2-9 measures VS share based on NBS 135 sectors table. VS share increased in nearly all the high- and medium-high-tech sectors, except for computer manufacturing, electronic equipment (VS share decreased a little from 2002-2007) and electronic components (VS share decreased from 1997-2002, after then re-increased).

As for low- and medium-low-tech levels, the foreign value added of coking, rubber, fire-resistant materials, steel and tobacco decreased during 1997-2002. Over 2002-2007, the foreign value added of textile, Knitted fabric, textile wearing apparel, leather, fur and feather also decreased.

The sectors that increased the local content of export in the recent years are the sectors of low- and medium-low-tech levels. For sophisticated sectors, only the medium-high-tech sector of electronic component has increased its domestic value added. China's pattern of structural changes has clear weaknesses. If China wants to develop further the sophisticated sectors, the local content of export must increase.

Table 2-7 Growth rate of VS share by industry over 1997-2002, 2002-2007 (NBS IO table)

	1997-2002		2002-2007
(24)Railroad equipment & transport equip nec.	44,07	(8)Coke, refined petroleum products, nuclear fuel	45,89
(22)Building & repairing of ships & boats	37,97	(21)Motor vehicles, trailers & semi-trailers	36,85
(25)Manufacturing nec; recycling (include Furniture)	33,64	(13)Iron & steel	36,37
(20)Medical, precision & optical instruments	32,60	(20)Medical, precision & optical instruments	33,54
(19)Radio, television & communication equipment	32,36	(12)Other non-metallic mineral products	32,83
(17)Office, accounting & computing machinery	30,49	(4)Food products, beverages and tobacco	32,67
(5)Textiles, textile products, leather and footwear	28,51	(10)Pharmaceuticals	32,02
(16)Machinery & equipment, nec	26,15	(18)Electrical machinery & apparatus, nec	29,92
(9)Chemicals excluding pharmaceuticals	23,75	(7)Pulp, paper, paper products, printing, publishing	29,28
(10)Pharmaceuticals	22,83	(11)Rubber & plastics products	27,20
(8)Coke, refined petroleum products, nuclear fuel	22,79	(9)Chemicals excluding pharmaceuticals	25,24
(6)Wood and products of wood and cork	22,41	(14)Non-ferrous metals	24,95
(4)Food products, beverages and tobacco	20,64	(24)Railroad equipment & transport equip nec.	20,89
(14)Non-ferrous metals	20,44	(16)Machinery & equipment, nec	19,36
(21)Motor vehicles, trailers & semi-trailers	20,35	(15)Fabricated metal, except machinery & equipment	17,68

(12)Other non-metallic mineral products	18,97	(6)Wood and products of wood and cork	12,30
(15)Fabricated metal, except machinery & equipment	17,08	(17)Office, accounting & computing machinery	11,49
(11)Rubber & plastics products	16,58	(19)Radio, television & communication equipment	7,79
(18)Electrical machinery & apparatus, nec	13,98	(25)Manufacturing nec; recycling (include Furniture)	5,45
(7)Pulp, paper, paper products, printing, publishing	12,09	(22)Building & repairing of ships & boats	2,34
(13)Iron & steel	11,93	(5)Textiles, textile products, leather and footwear	-7,08
manufacturing	37,47	manufacturing	21,01

Table 2-8 Growth rate of VS share over 1995-2000, 2000-2005 (by OECD IO table)

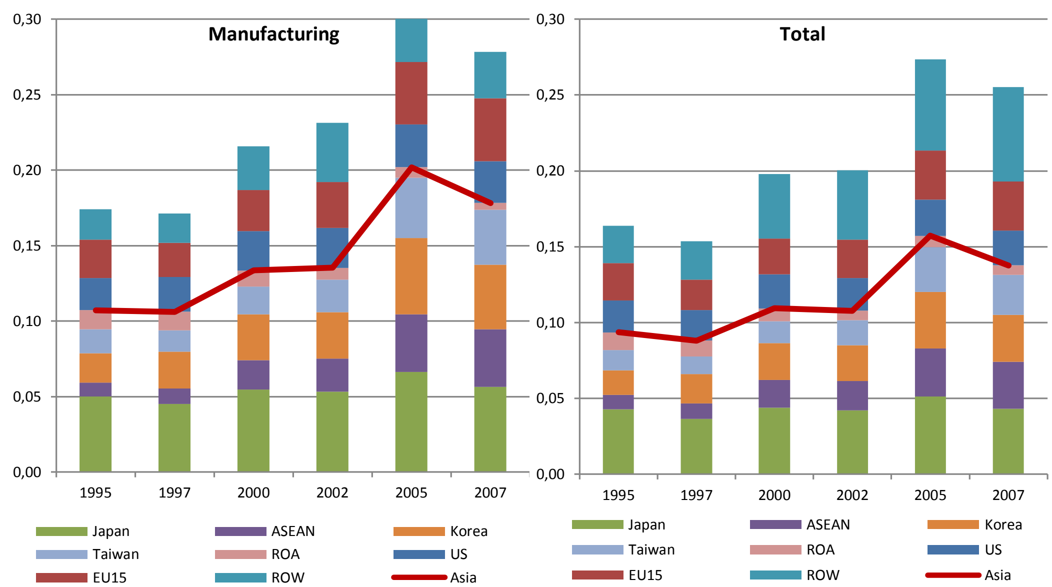
	1995-2000		2000-2005
(7)Pulp, paper, printing, publishing	62,10	(13)Iron & steel	72,88
(25)Manufacturing nec; recycling (include Furniture)	28,43	(20)Medical, precision &optical instruments	70,94
(11)Rubber & plastics products	27,57	(18)Electrical machinery & apparatus	51,99
(8)Coke, refined petroleum and nuclear fuel	22,16	(16)Machinery & equipment, nec	50,27
(9)Chemicals excluding pharmaceuticals	18,06	(15)Metal, except machinery & equipment	48,38
(13)Iron & steel	16,62	(4)Food products, beverages and tobacco	44,13
(6)Wood and products of wood and cork	13,55	(21)Motor vehicles, trailers & semi-trailers	41,17
(12)Other non-metallic mineral products	6,55	(22)Building & repairing of ships & boats	35,72
(15)Metal, except machinery & equipment	6,36	(19)Radio, television & communication equipment	30,32
(5)Textiles, textile products, leather and footwear	5,65	(9)Chemicals excluding pharmaceuticals	27,25
(4)Food products, beverages and tobacco	4,05	(17)Office, accounting, computing machinery	21,89
(20)Medical, precision & optical instruments	3,24	(12)Other non-metallic mineral products	21,43
(21)Motor vehicles, trailers & semi-trailers	2,29	(5)Textiles, textile products, leather, footwear	20,09
(16)Machinery & equipment, nec	-3,68	(6)Wood and products of wood and cork	7,87
(18)Electrical machinery & apparatus, nec	-4,21	(25)Manufacturing; recycling (include Furniture)	7,06
(22)Building & repairing of ships & boats	-5,61	(8)Coke, refined petroleum and nuclear fuel	-0,33
(17)Office, accounting & computing machinery		(11)Rubber & plastics products	-3,78
(19)Radio, television & communication equipment		(7)Pulp, paper, printing, publishing	-10,78
manufacturing	24,07	manufacturing	40,34

3.3 Combination of input-output table and trade data, and further findings

The trade data come now from CHELEM-CIN under ISIC Rev.3 classification. VS share are supposed to be the same among different partner countries, from which China imports. Ping (2005) and Miroudot (2009) also use this hypothesis in their studies. The share of imported inputs from country *k* in the production for Chinese export is written in Equation (34). IMP_{ik} is Chinese import of sector *i* from country *k*. IMP_i is Chinese total import of sector *i*.

$$VSS_i^k = VSS_i \frac{IMP_{ik}}{IMP_i} \qquad (34)$$

Figure 2-10 China's Vertical Specialization share by Source country



Source: OECD, NBS, CHELEM-CIN, author's own calculation

Figure 2-10 shows the share of intermediate inputs imported from other partners[28]. Generally speaking, China's manufacturing production for export needs more imported inputs than other production.

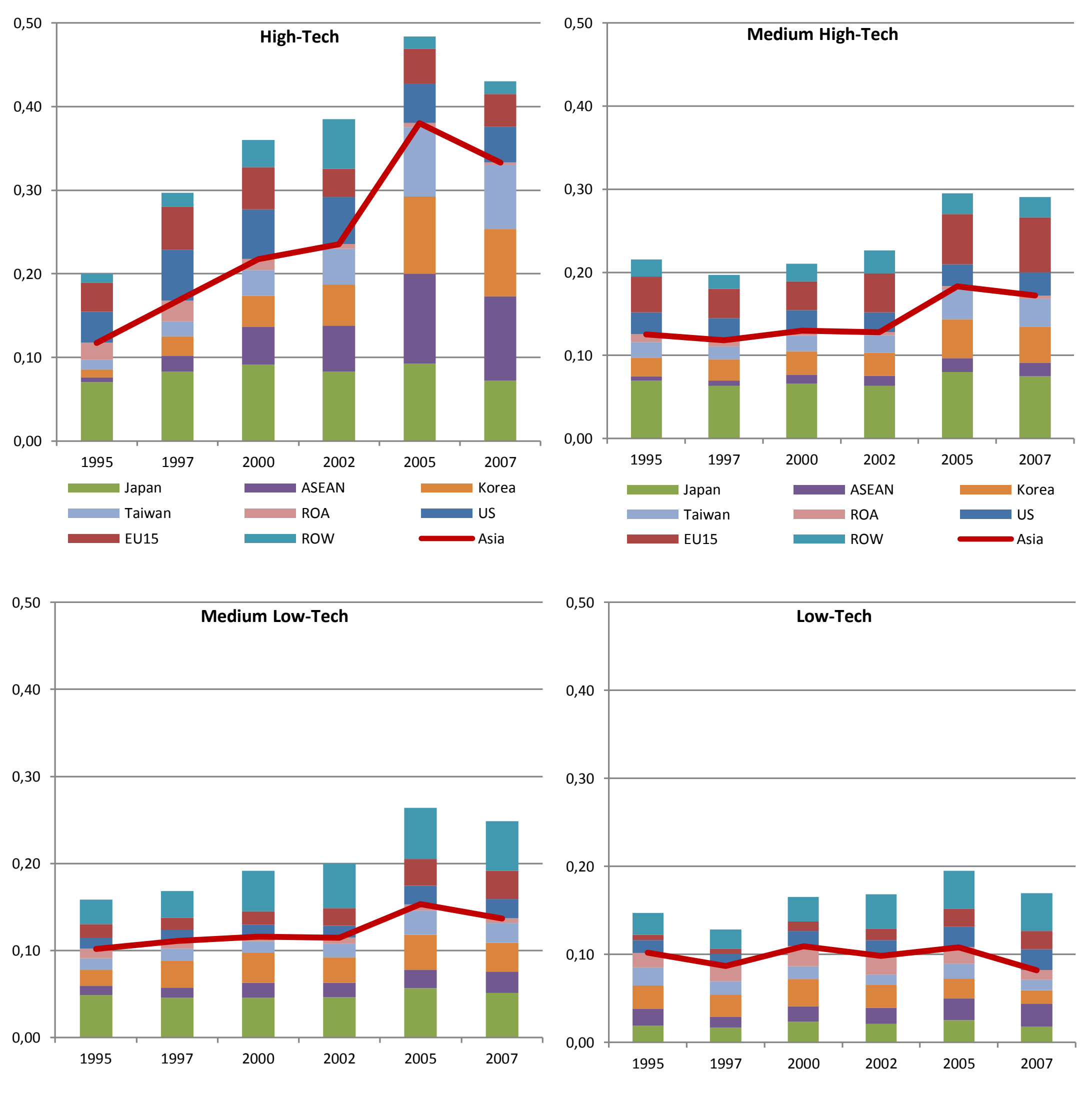
At the outset, the United States, Japan and European industrialised countries were the main source of Chinese import. They accounted for more than half of Chinese vertical

[28] EU15= 15 countries of European Union, France, Germany, Italy, Netherland, British Isles, Denmark, Finland, Sweden, Austria, Spain, Greece, Portugal, Belgium and Luxembourg. ASAEN= Singapore, Thailand, Malaysia, Philippine, Indonesia, Vietnam… ROA= Rest of the Asian countries, such as Hong Kong, India, Pakistan…Thus Asia= Japan, Korea, Taiwan, ASEAN and ROA. ROW= Rest of the World excluding US, EU 15, Asia.

specialization. Yet, their variations were relatively stable. US's share did not vary over times. Japan and European export of intermediate inputs did not much progress. Their shares in Chinese inputs' import fell below their half the level of 2007.

On the contrary, ASEAN economies and Asian new industrialized countries have emerged quickly. During 1995-2005, the imported inputs from Korea rose by 3% in Chinese manufacturing export. For Taiwan it rose by 2.4%. These two countries contributed for 43% of Chinese overall increase of VS share (Table 2-9).

Figure 2-11 China's Vertical Specialization by Source country and tech level



Source: OECD, NBS, CHELEM-CIN, author's own calculation

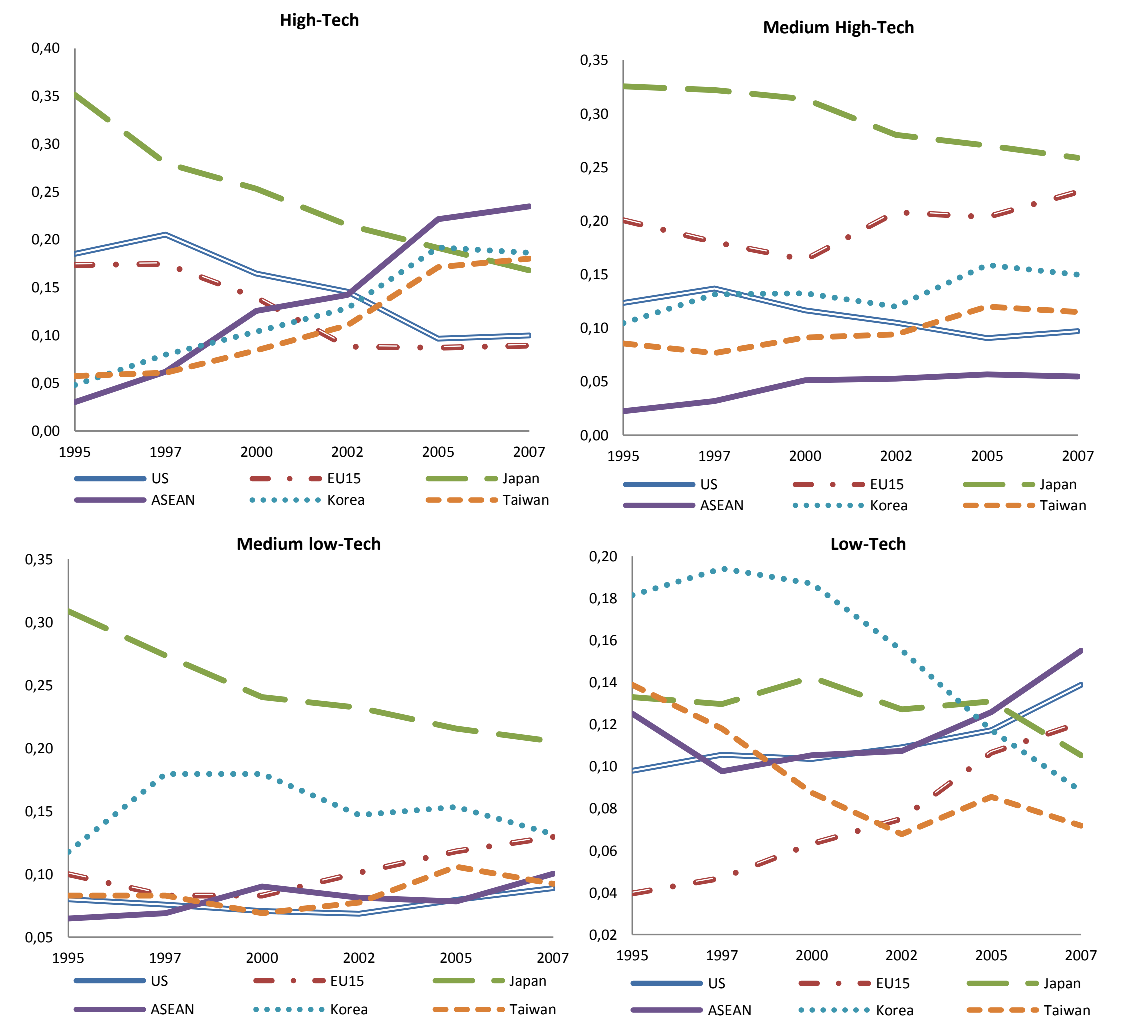
When considering technology levels, ASEAN countries' exports of high-tech intermediate inputs for Chinese exports increased quickly, so did Korea and Taiwan.

These three economies contributed to 90% to China's high-tech VS growth. While US, Europe and Japan did not change much.

For the export of medium-high-tech and medium-low-tech intermediate inputs, Korea, Taiwan and Europe increased faster than other economies and contributed the most to Chinese VS increase.

It is interesting to note that, for China's rising low-tech vertical specialization, Europe increased its share the most rapidly and had the highest contribution, while the contribution of Korea and Taiwan went down. Besides, the biggest contributor appears to be also the rest countries of the world (ROW) like Latin America.

Figure 2-12 shares in China's import by source country and tech level



Source: OECD, NBS, CHELEM-CIN, author's own calculation

Figure 2-12 illustrates the evolution of each country's share in Chinese overall imports. There are four types of evolution. (1) The share decreased for all technology levels, such as in Japan. (2) The share increased for all technology levels, such as in ASEAN countries. (3) The share decreased for high-tech level while it increased for other lower one, such as in Europe and the United States. (4) The share increased for sophisticated sectors (high- and medium-high-tech level) while it decreased for other lower one, such as in Korea and Taiwan. This is coherent with the conclusion from Figure 2-11.

In total, Asian new industrialized economies (NIE[29]) and ASEAN countries' contributions increased rapidly, especially for high-tech products. The structure of China's vertical specialisation with Korea and Taiwan shifted from low-tech to high-tech. The traditional three sources of inputs' import, US, Japan and Europe, had relatively stable performance. Asia is the largest contributor of Chinese VS of manufacturing, especially for high-tech (92%) and medium-high-tech (73%). For VS of low-tech, Europe and Latin America contributed the most.

Table 2-9 contribution of each country to Chinese VS share's variation 1995-2007

	Manufacturing	Total	High-Tech	Mid H-T	Mid L-T	Low-Tech
US	0,053	0,025	0,034	0,002	0,079	0,177
EU15	0,126	0,072	0,026	0,212	0,145	0,314
Japan	0,125	0,076	0,079	0,122	0,075	0,124
ASEAN	0,226	0,204	0,355	0,151	0,099	0,129
Korea	0,239	0,190	0,293	0,306	0,207	-0,081
Taiwan	0,189	0,150	0,251	0,213	0,140	-0,079
ROA	-0,046	-0,039	-0,054	-0,065	-0,033	0,041
ROW	0,087	0,323	0,015	0,059	0,288	0,375
NIE	0,412	0,309	0,560	0,457	0,280	-0,190
Asia	0,734	0,581	0,924	0,726	0,488	0,134
World	1	1	1	1	1	1

[29] NIE in this paper concerns the first generation of new industrialized economies, including Korea, Taiwan, Hong Kong and Singapore.

4. Empirical study

4.1 Data and methodology

The data of the estimation in this section come from two sources: (1) The data of relative labour cost, labour productivity and the export over 1970-2012 are based on our calculations of chapter 1. The data of vertical specialization over 1995-2012 are on the basis of this chapter's calculation. (2) The data of other variables over 1970-2012 derive from the EcoWin database and our study with Jetin (2012).

We firstly test the stability of each series. Table 2-10 reports the results from ADF Fisher unit root tests[30]. All the series have not unit root and are stationary. Then we establish three equations for estimation.

Table 2-10 Panel unit root test (Augmented Dickey-Fuller test)

variable	t-Statistic	Prob.
Δln(EXP)	-4.53***	0.0055
Δln(RProd)	-3.60**	0.0471
Δln(RW)	-4.94***	0.0039
Δln(E)	-4.86***	0.0027
Δln(Px)	-4.67***	0.0047
Δln(Pm)	-5.53***	0.0006
Δln(P/Pm)	-5.64***	0.0005
Δln(Px/Pm)	-4.11***	0.0165
Δln(Y)	-3.03**	0.0430
Δln(Ywp)	-5.51***	0.0005
Δln(CIM)	-3.71*	0.0676

Note: Null hypothesis: unit root and non-stationary

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

Equation (35) based on Bruno Jetin (2012) study explains China's imported inputs of production for export (*CIM*) by domestic demand (*Y*), foreign demand [31](Y_{wp}), real

[30] We also use IPS unit root test and results, available on request, are similar to those reported below.

effective exchange rate (*E*) and price deflator, including export price deflator (P_x), import price deflator (P_m) and inflation price (*P*).

Equation (36) explains China's total export by macroeconomic approach by relative labor cost compared with China's main trade partners (*RW*), relative labor productivity (*RProd*), foreign demand, price deflator and foreign content. Because the relative labor cost and productivity are already converted into U.S. dollar, we do not use the variable of exchange rate in this equation for avoiding the autocorrelation.

Equation (37) does panel data estimation to re-estimate the relationship between China's export and foreign content. The HAUSMAN test was used to select a preferable model between fixed effects (FE) and random effects (RE). Since HAUSMAN test statistic under RE model is not significant at 5% [32]and the adjusted R-squared is only 0.03, the FE model was selected. EXP_{it} is China's export of sector *i* in time *t*, CIM_{it} is China's intermediate inputs' import of sector *i* in time *t*, λ is unobserved common effect, γ_i is sector-effect, μ_t is unobserved time-effect, and ε_{it} is the error term.

$$\Delta ln(CIM)=\lambda+\alpha_1\Delta ln(Y)+\alpha_2\Delta ln(Ywp)+\alpha_3\Delta ln(E)+\alpha_4\Delta ln(Price)+\varepsilon_{it} \quad (35)$$

$$\Delta ln(EXP)=\lambda+\alpha_1\Delta ln(RW)+\alpha_2\Delta ln(RProd)+\alpha_3\Delta ln(Ywp)+\alpha_4\Delta ln(Price)+\alpha_5\Delta ln(CIM)+\varepsilon_{it} \quad (36)$$

$$\Delta ln(EXP_{it})=\lambda+\gamma_i+\mu_t+\alpha_1\Delta ln(CIM_{it,t-1})+\alpha_3\Delta ln(E_t)+\alpha_4\Delta ln(RW_{it})+\alpha_5\Delta ln(RProd_{it})+\varepsilon_{it} \quad (37)$$

4.2 Results

Table 2-11 reports the estimated results of Equation (35). Column (1) and (2) have too high DW coefficient thus column (3) (4) (5) are preferable. The coefficients are similar in these columns. Since intermediate inputs' import is just for export, it does not depend on domestic demand. On the contrary, foreign demand (Y_{wp}) and export price deflator (P_x) have positive effect on foreign content (*CIM*). Besides, a 10% appreciation of yuan leads to a 8.9% decrease of the foreign value added embodied in export (*CIM*). Because an appreciation will reduce China's export, the needs of imported inputs for the export will absolutely go down. Different from the effect on ordinary import, the import price (P_m) has a positive effect on intermediate inputs' import. This table reveals the correlations between *CIM* and other variables, which permits us to improve the following estimation. To avoid the autocorrelation among explicative variables, it is

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[31] Foreign demand is calculated by the real trade weighted GDP of nearly all countries of rest of the world, converted to U.S. dollar by PPP exchange rate.
[32] Probability of HAUSMAN test under RE model is 0.0624.

better not to use foreign demand (Y_{wp}), exchange rate (E) and price (P_x and P_m) when *CIM* is included.

Table 2-11 Δln(CIM)

	(1)	(2)	(3)	(4)	(5)
constant	0.01	0.04*	0.06	0.04	0.03
	(0.43)	(2.19)	(0.82)	(0.37)	(0.31)
Δln(Y)	0.28	-0.19	-0.27	-0.11	0.16
	(0.99)	(-0.98)	(-0.37)	(-0.31)	(0.17)
Δln(Ywp)	1.21***	1.18***	1.11**	1.03***	0.69
	(8.12)	(10.37)	(2.68)	(5.16)	(1.53)
Δln(E)	-0.65**	-0.67***	-0.89**	-0.66***	-0.67**
	(-6.32)	(-8.85)	(-3.86)	(-4.89)	(-2.51)
Δln(Px)	0.66***	0.33**	0.70*		
	(6.15)	(3.36)	(2.33)		
Δln(Pm)		0.65***		0.83***	
		(6.41)		(5.44)	
Δln(P/Pm)	-0.54**				-0.49*
	(-4.37)				(-2.20)
AR (1)	-0.83**	-0.95***		-0.71**	
	(-3.06)	(-4.83)		(-2.67)	
adjusted R^2	0.93	0.96	0.63	0.88	0.64
DW	2.78	2.94	2.23	2.28	2.29

Note: *** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

In Table 2-12 concerning Equation (36), it is showed that the higher the labor productivity and the foreign demand, the higher the export. Meanwhile, an increase of labor compensation and of export price will reduce export. China's export expansion benefited from cost advantages and price competitiveness during the recent years. Yet the imported input (*CIM*) has no significant impact on the export, which is opposite to our proposition. Explanation is that Equation (36) analyzes the overall economy's export. The imported input has different effects for each sector. When all the sectors are taken together, its effects become biased. This explanation is demonstrated below.

Table 2-12 Δln(EXP)

	(1)	(2)	(3)	(4)
constant	0.16**	0.08*	0.22**	0.20*
	(2.70)	(1.85)	(2.87)	(2.21)
Δln(RW)	-1.07***	-0.55***	-0.95*	-0.95
	(-3.76)	(-4.89)	(-1.92)	(-1.45)
Δln(RProd)	1.66***	1.35***	0.84**	1.11***
	(3.41)	(3.21)	(2.64)	(5.83)
Δln(Ywp)	0.60	1.00**		
	(1.22)	(2.16)		
Δln(Px)	-0.62**			
	(-2.48)			
Δln(Px/Pm)		-1.01***		
		(-3.46)		
Δln(CIM)			-0.18	-0.19
			(-0.47)	(-0.40)
MA(1)		0.96***		-1.00***
		(32.89)		(-6.66)
adjusted R^2	0.56	0.73	0.48	0.69
DW	1.74	1.75	2.52	1.83

Note: *** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

Table 2-13 illustrates the results of Equation (37), which uses a panel data estimation of each sector. Column (1) shows the result of overall economy's estimation. Column (2) concentrates on manufacturing sectors. Column (3) and Column (4) add variables of real effective exchange rate or relative labor cost and productivity as well.

All the coefficients of vertical specialization's variation (*Δln(CIM)*) have the expected signs and are statistically significant. Generally, intermediate inputs' import has a positive impact on Chinese export progression. When the real effective exchange rate or relative labor cost is taken into consideration (in Column 3 and Column 4), the positive effect of the inputs' import on China's export is more important than that estimated without variables of exchange rate or relative cost.

In column (1), a 10% raise of imported inputs leads to 9.5% increase of Chinese exports. When considering technology levels, the effect is lower for low-skilled sectors (9.6% and 8.3%[33]), while it is bigger for high-skilled one (11.8% and 24.2%[34]). Besides, the effect became more significant during the 1997-2007 decade. The coefficient rose from 9.9% to 55.4%[35].

Column (2) shows that the general effect of vertical specialization on China's manufacturing export is higher than that on overall economy. A 10% raise of imported inputs (*CIM*) leads to 13.7% increase of manufacturing exports. This indicates the robustness of previous inference that Chinese manufacturing export relies more on imported intermediate inputs compared with overall export. The higher the technology level, the higher the dependence on intermediate inputs' import and this dependence has increased over time.

[33] For low-tech (LT), it is 0.95 (coefficient of CIM) + 0.01 (constant_LT)=0.96.
For medium-low-tech (MLT), it is 0.95 (coefficient of CIM)-0.12 (constant_MLT)=0.83.
[34] For medium-high-tech (MHT), it is 0.95 (coefficient of CIM) + 0.23 (constant_MHT)=1.18.
For high-tech (HT), it is 0.95 (coefficient of CIM)+1.47 (constant_HT)=2.42.
[35] In 1997, it is 0.95 (coefficient of CIM)+0.04 (constant_1997)=0.99.
In 2007, it is 0.95 (coefficient of CIM)+4.59 (constant_2007)=5.54.

Table 2-13 Δln(EXP)

	(1) total	(2) manufacture	(3) total	(4) manufacture
constant	0.30***	n.s.	-7.54**	-7.51**
	(4.59)		(-3.35)	(-3.84)
Δln(CIM)	0.95**	1.37***	27.56*	27.42**
	(2.45)	(3.01)	(2.72)	(3.12)
Δln(CIM_{-1})	n.s.		21.21**	21.15**
			(3.18)	(3.65)
Δln(E)			22.32*	22.22*
			(2.82)	(3.23)
Δln(RProd)	n.s.			
Δln(RW)	n.s.			
constant_ LT	0.01	-0.28		
constant_ MLT	-0.12	-0.51		
constant_ MHT	0.23	0.21		
constant_ HT	1.47	0.39		
Constant_1997	0.04	0.14		
Constant_2007	4.59	4.93		
Cross-section fixed effects	yes	yes	yes	no
Period fixed effects	yes	yes	no	no
observation	187	133	193	193
adjusted R^2	0.91	0.89	0.74	0.80
DW	3.24	2.21	1.90	1.89

Note: N.S. stands for not significant

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level.

5. Conclusion

China's structural change succeeded during the 1994-2004 decade with a clear technological shift. The high-tech export's share in total export increased rapidly while the low-tech export's share diminished. Nevertheless, from 2004 the growth of the former stopped, even dropped and the later continued to decrease as before. China was recently more and more specialized in medium-low qualified sectors, which are based on national resource.

The results calculated with OECD table and NBS table are equivalent. We have reason to believe in the robustness of the assumption and of the methodology. The clear technology scissors difference over 1994-2004 was implemented in the context of decreasing domestic value added. Chinese exports depend more on imports than before. The higher the technology level, the higher the need of imported inputs and the lower the domestic value added. During the recent years, 2002-2007, China's local content has declined in nearly all the high qualified sectors' export, except for electronic component. The sectors that increased the local content of export are the sectors at low- and medium-low-technology levels. Therefore, China's pattern of structural changes might be fragile. To pursue the development of sophisticated sectors, the local content of export must increase.

Empirical study confirms that China benefited from cost advantages and price competitiveness. Its structural change over 1995-2012, i.e. the increasing specialization on sophisticated sectors, has been based on the growth of intermediate inputs' import. This positive correlation was higher for high-skilled sectors. Chinese manufacturing exports' change has increaslingly relied on foreign inputs content, relatively to the domestic production. The estimation results indicate that the foreign content, also named the share of vertical specialization, does not depend on domestic demand. On contrary, foreign demand, export price and import price deflator have positive effect on it. Besides, an appreciation of the national currency reduces the need of imported inputs for exports.

Initially, the United States, Japan and European industrialised countries were the main sources of Chinese import of intermediate inputs. Asian new industrialized economies and ASEAN countries' contributions have rapidly increased, especially for high-tech products. They have already occupied the largest share in China's high-tech inputs' import. The structure of China's vertical specialisation with Korea and Taiwan shifted from low-tech to high-tech. In this sense, China's increasing vertical specialization share stimulates other countries' structural change of export. Asia has been the largest beneficiary of Chinese vertical specialization in sophisticated sectors. Europe and Latin America profited much from Chinese low-skilled sectors' vertical specialization. Their relationship with China will be studied in the next chapter.

Chapter III

Impact of China's rising exports on world trade

ABSTRACT

The last chapter exams the impacts of China's specialization change. It set up China's input-output tables and shows that China gains less than before from a unit of export. This chapter re-establishes the regional input-output tables between China and its representative trade partners. It indicates that Chinese rising exports promoted other countries' export progression. The impacts of Chinese exports at different technology levels were not the same across sectors and countries. Most countries, including Germany, Korea and ASEAN members, profited more from China's sophisticated exports than from the exports of low technological products. Since China was more and more specialized in sophisticated sectors, the beneficiaries of China's high- and medium-high-technology exports gained much. In contrast, the countries that profited from China's low- and medium-low-technology exports gained less than the former, and sometimes they even lost. The regional input-output table illustrates also the amount of their gains or losses.

Key words: China, regional input-output table, vertical specialization, trade data

1. Introduction

As China's global market share of exports increased, its impact on world trade, especially in the Asian region has been widely discussed.

Among these discussions, different points of view and aspects lead to different conclusions. On one hand, China's trade expansion has reduced other countries' exports. This exclusion effect is obvious for the countries with similar export structures, while the effect is not clear for countries with trade complementarity with China. On the other hand, China's export also stimulates other economies' exports. China's production and exports need primary products and intermediate inputs. Since China's export has increased over time, its demand of import of these goods from other countries has simultaneously grown.

The question is whether the crowding out effect or the promotion effect dominates China's impact on world trade. Ianchovichina (2003) used multinational and multi-sector model of internal trade to assess China's impact. He found that China's export of Textile had a negative impact on ASEAN4 countries. Differently, China's export of electronics and highly qualified textile had a positive impact on Japan and New Industrialized Economies. Eichengreen (2004) estimated China's impact on a given country in the third market of import. China's export of consumption goods always had a large exclusion impact, while that of capital goods had a promotion impact on other countries. China's export also facilitated intra-regional liberal trade. It had a positive effect on nearly all the Asian countries, including the capital goods' exporters (such as Japan and Korea) and primary natural resource goods' exporters (such as Indonesia). Meanwhile, for some low-income Asian countries like Vietnam, Cambodia, Pakistan, China's impact was not significant.

As we know, China's export evolves over time. The new growth pattern, especially the change of export structure, will generate new impacts. It is not possible to evaluate the whole impact for all the sectors. Thus the existing papers mainly concentrate on certain representative sectors. Guo and D'Diaye (2009) analyzed the steel sector, naval and machinery instruments. When the production capacity of competitors has increased, the export price of these sectors has decreased. Therefore the country must compensate for the loss due to the price reduction, such as improving the export of other new branches. Adrian Wood (2009) studied China's impact by examining the sectoral structure of export and of output. He built an H-O model based on such variables as education, labor and natural resource. He found that China's manufacturing needed more labor resource with a basic education level than other labor-intensive industries, while it needed less natural resource than the later.

Athnkorala (2006) thought that the traditional trade data based on horizontal trade would lead to biased conclusion. He compared the parts and components (P&C) with final goods by determinant, trend and growth pattern. His analysis showed that the export of parts and components increased faster than the export of final products. Their degree of dependence on other countries was higher than the later. China's export of P & C did not have any exclusion effect on other economies. On contrary, it promoted intra-regional vertical trade. Yet the impact on extra-regional trade is not significant.

Xing (2008) concentrated on China's ICT[36] exports as China was the largest exporter of ICT products in 2008. The effect of China firstly differs across competitors. For instance, Chinese effect was positive on Indonesia while negative on Singapore and Philippines. Secondly, Chinese effect differs across markets. For Thailand as example, Chinese rising ICT exports had a positive effect on that of Thailand in the Japanese market while negative in the US market. By contrast, for Korea, China had a positive effect on Korea in the US market while negative in the Japanese market. Thirdly, Chinese effect varies across products. He took Malaysia as example. The impact of China on Malaysia's export of electronic machinery was positive while that of official machinery was inversely negative.

This chapter provides new outputs in the debate on Chinese impact on world export. In section 2, we estimate the relationship between China and 12 other representative countries by using bilateral trade data. Whether China has a crowding out effect or a promotion effect on the given country will be assessed trough a panel estimation. Section 3 focuses on Chinese promotion effect on world export. We combine Chinese input-output table with the trade data and set up the regional input-output tables from 1995 to 2012. There has been little research using this method. Firstly, it is hard to collect and adjust the data, especially Chinese data. Secondly, the basic assumptions of this method still need to be further verified. However, the regional input-output table can illustrate clearly the impact of Chinese rising exports on the exports of each country. Section 4 investigates Chinese impacts by sector and by country. Section 5 gives the conclusions.

[36] ICT products are classified in SITC 75, 76 and 77.

2. Measuring China's impact by trade data

2.1 Simple estimation of export market share

The bilateral trade data derive from the CEPII CHELEM database. We used them to calculate the export market share of China and other countries then estimate the Equation (38) with these variables. *EXP* is export. *W* is world trade. *i* represents the country. $(EXP/W)_i$ is the market share of country *i*. $RULC_i$ is relative unit labor cost of country *i* that we calculated in the first chapter.

$$\Delta ln(EXP/W)_i = \alpha + \beta_1 \Delta ln(EXP/W)_{CN} + \beta_2 \Delta ln(EXP/W)_{i,-1} + \beta \Delta ln(RULC_i) + \ldots + \varepsilon_t \quad (38)$$

According to the Unit root test, all the variables in the equation are stationary. We firstly do a pooled estimation. We do not illustrate all the countries' estimation results but we only show the representative economies' results. Besides, as the export structure of different market is not the same, we also distinguish different importing markets for the estimation as what has done by Xing (2008). There are mainly three markets for manufacturing and for the overall economy: US, Japan and the world market as well.

As the results of pooled estimation illustrated in Table 3-0.1, the adjusted R^2 are mainly inferior to 0.5. It means that the estimation results are mostly not satisfied. When looking at the R^2 superior to 0.5, we still obtain some findings.

The impact of Chinese exports differs across markets, countries and products. In the world importing market, Chinese rising exports over 1970-2012 crowded out that of Germany. Chinese manufacturing export growth also had a crowding out effect on that of Italy. Differently in US importing market, China's overall export growth promoted Italy and Mexico's exports. In Japanese importing market, Chinese increasing exports also facilitated that of US (in Japanese manufacturing imports) and Indonesia (in Japanese overall imports).

However, the Durbin Watson statistics of Germany, Italy and Indonesia's estimations all indicate the existence of autocorrelation. Thus the previous findings need to be proved and we turn to the dated panel regression. We firstly perform Hausman Test in order to determine whether to choose fixed effect or random effect for analysis. The results are displayed in the table Table 3-0.2.

The estimating results of dated panel regression are showed in Table 3-0.3. Considering the significances of coefficients, R^2 and Durbin-Watson statistics, we obtain the following conclusions. Chinese exports, total and manufacturing, have no significant effect on other countries' export share both on the world market and on the US market.

On the Japanese market, Chinese rising exports during 1970-2012 stimulated exports from the US, Indonesia, India and Mexico, while they crowded out exports from France, Italy and Spain.

Compared with the results of previous pooled estimates, only the Chinese promotion effects on US and Indonesia' exports to Japan are confirmed. We do not yet clarify the Chinese impact on other countries exports. Indeed, the trades of different sectors vary diversely over time. As indicated in the tables above, the estimating results of manufacturing exports and total exports are not the same. If we study disaggregated sectors, the results would vary.

2.2 Disaggregated study of Chinese exports by sector and by importing country

In chapter 2, we have investigated China's change of exports to the world at 4 technology levels. In this chapter, we study it by disaggregated sector and by market with two indices of measurement. The growth rate of Chinese exports to different markets *p* is calculated in Equation (39). The contribution of each country *P* to Chinese export growth is calculated in Equation (40).

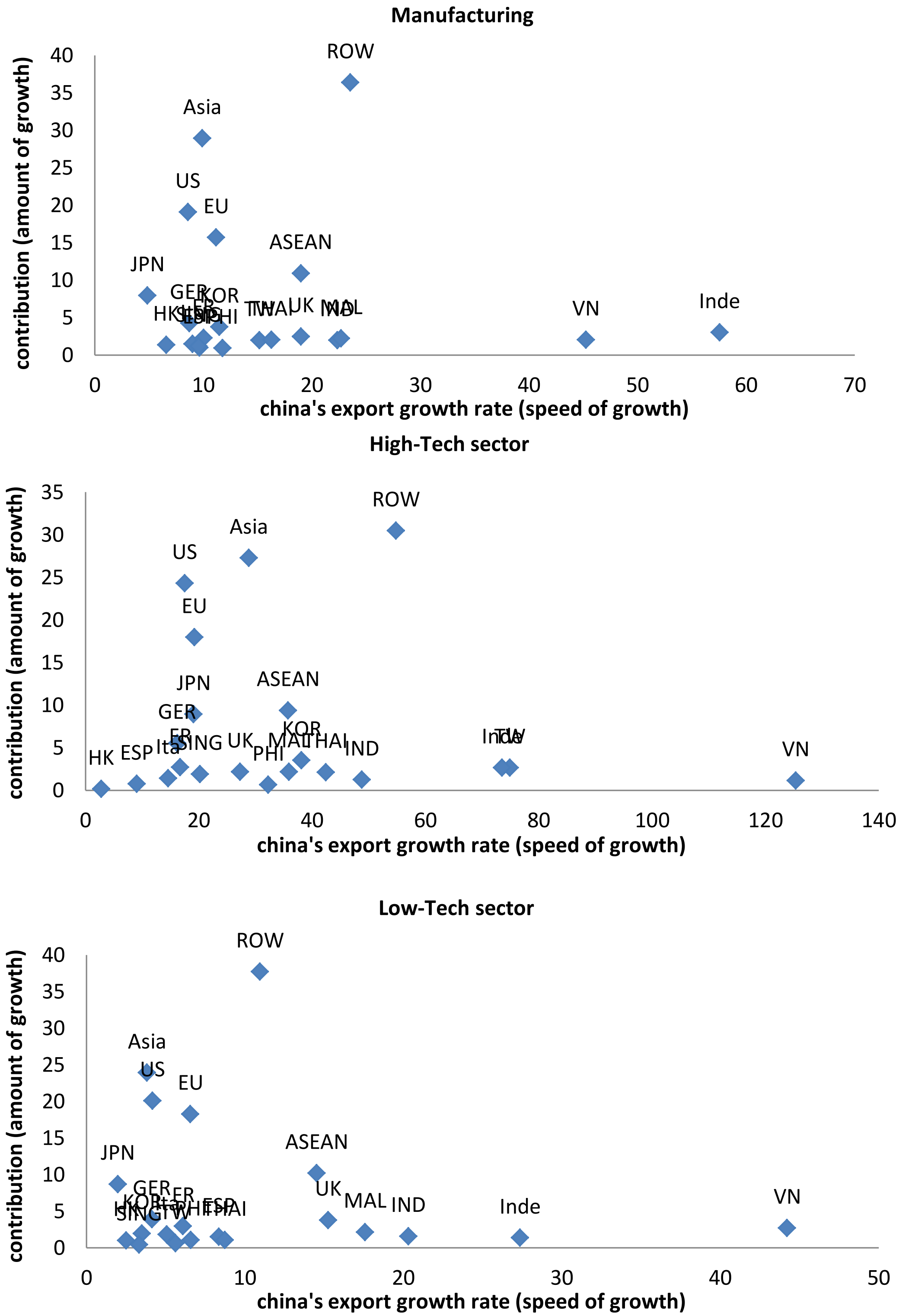
$$(EXP_{cn\rightarrow p,2012} - EXP_{cn\rightarrow p,1995})/EXP_{cn\rightarrow p,1995} \qquad (39)$$

$$(EXP_{cn\rightarrow p,2012} - EXP_{cn\rightarrow p,1995})/(EXP_{cn\rightarrow world,2012} - EXP_{cn\rightarrow world,1995}) \qquad (40)$$

Where $EXP_{cn\rightarrow p,2012}$ is the export of China to the country p in 2012. $EXP_{cn\rightarrow p,1995}$ is the export of China to the country *p* in 1995 and $EXP_{cn\rightarrow world,2012}$ represents the export of China to the world in 2012.

[Table 3-1] [Table 3-2]

Figure 3-1 growth rate of Chinese exports to different markets and contributions of them (1995-2012)



2.2.1 Growth rate of Chinese exports to each country over 1995-2012

When regarding the growth of Chinese exports by technology level, the High-Tech exports[37] over 1995-2012 increased the most (26.1% and 18.8%) among all the technology levels in all the importing markets. For High-Tech sectors, Chinese exports of motor vehicles and office accounting computing machinery increased the fastest, respectively by 52% and 35% during 1995 and 2012.

When looking at the importing market, China's manufacturing and total exports to European Union[38] increased the most over 1995-2012. The manufacturing exports rose by 11.2% and the overall exports rose by 10.8% during this period. For High-Tech products, the growth rate of China's exports to European Union (19.2%) was higher than that to US (17.5%) but lower than that to Asia (28.8%). However, European imports of some sophisticated sectors from China increased much faster than that of other regions. Take the fastest growing sector of building repairing of ships and boats [39] for example. EU's imports from China increased by 356.8% during 1995-2012 while Asian imports increased by only 9.6%. Another example is the sector of Motor Vehicles trailers and semi-trailers. EU's imports from China rose by 152.2% over 1995-2012 while that of Asia rose by 21.7%.

Nearly all the European countries enhanced the imports of ships and boats and Motor Vehicles from China, except for France. It is interesting to note that the fastest growing sector of France's imports from China was Aircraft and spacecraft, which is also the most competitive sector for France's exports. We will give the explication in next section. United Kingdom's imports from China rose by 27.3% over these years. This speed was much faster than that of US and other European countries. That is why European overall growth rate of imports from China was higher than that of US. In fact, US' imports from China rose still faster than that of many European countries, especially its imports of office accounting computing machinery.

Asia's manufacturing and overall imports from China increased a little faster than that of the US, while more slowly than that of EU. However Asia was the biggest importing

[37] High-Tech (HT) products here include the goods at High-Tech level and Medium-High-Tech level.

[38] European Union 15 countries comprised: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom.

[39] Whether the sector of building, repairing of ships and boats is highly qualified or lowly qualified is a controversial issue. According to OECD classification, it is Medium-High-Tech sector. Yet according to CHELEM classification, it is Medium-Low-Tech sector. In this paper uses CHELEM classification for China's analysis. The description of this sector as Medium-Low-Tech product is closer to Chinese reality than another one. Nevertheless, for European Union, we still think this sector as Medium-High-Tech product based on its unit value of export (calculated by BACI CEPII).

market for China's High-Tech exports. The Sectors of Machinery and equipment, Office accounting computing machinery, Radio television communication equipment, Medical precision optical instruments and Aircraft Spacecraft were the 5 sectors whose imports from China increased the fastest over 1995-2012. They are all High-Tech products. Hence, China's shift of export specialization towards more sophisticated sectors benefited from Asian imports and regional economy.

India is one of the most outstanding importing countries in Asian region. Its imports of sophisticated products from China raised quite quickly, especially the imports of Ships and boats (50685%[40]), Aircraft & Spacecraft (19021%), Motor vehicles (813%), Railroad transport equipment (523%). The growth of other sophisticated imports also cannot be ignored, such as that of Office accounting computing machinery (281%), Electrical machinery & apparatus (184%), Radio television & communication equipment (143%). Besides, Indian imports of lowly qualified products also increased quickly. For instance, Indian imports of Wood & cork products from China rose by 520% over 1995-2012 and that of fabricated metal products rose by 311%.

Korean manufacturing and overall imports from China increased quickly, so did Taiwan. Among all the technology levels, Chinese High-Tech exports to them rose the most quickly. The growth rate over 1995-2012 of Chinese High-Tech exports to Korea reached 38.1% and that to Taiwan was up to 74.9%. In Korean market, China's export of ships & boats (1064%[41]), motor vehicles (417.3%), medical precision optical instruments (56.7%), machinery & equipment (53.9%) increased the fastest. They are all High-Tech sectors. In Taiwan, China's fastest growing sectors of exports were motor vehicles (427%), radio television & communication equipment (84%), office accounting computing machinery (83.8%), medical precision optical instruments (79.4%) and railroad transport equipment (37.2%). They are also the High-Tech sectors. In conclusion, Korea and Taiwan boosted Chinese structural shift towards higher qualified sectors.

Hong Kong, as a part of China for now, had a low growth speed of High-Tech imports from China, noting only 2.8% over 1995-2012. Indeed, its growth rate during 1995-2011 was up to 87.9%. As showed in Table 3-2, Hong Kong's High-Tech imports from China reduced greatly between 2011 and 2012. Its imports of office accounting computing machinery, electrical machinery & apparent and radio televisions & communication equipment all declined by 1% per year. The growth rates of these sectors were thus very different between 1995-2011 calculation and 1995-2012 calculation. On contrary, Hong Kong's Low-Tech imports from China increased over 2011-2012. Its imports of non-

[40] It is the growth rate over 1995-2012.
[41] It is the growth rate over 1995-2012.

ferrous metals and iron & steel from China rose by 5.4% and 0.6% respectively over this year.

Japan was the traditional largest importing market in Asia. However, its total import from China rose by only 4.3% over 1995-2012. Its manufacturing import from China over this period rose also by around 4%. This speed of raise was the lowest in the world. Among all the sectors, Japanese imports of motor vehicles from China increased the fastest. Its growth rate of overall High-Tech imports from China attained 19.1% over 1995-2012. This speed was still lower than that of Asia. Yet it was equal to that of European Union and higher than that of US. As for lowly qualified sectors, Japanese Low-Tech imports from China rose the most slowly over the world during 1995-2012.

ASEAN countries' growth of imports from China was quicker than Asian average speed. This group of countries was the fastest growing importing market in the world for China's overall exports, except for India. Their large amounts of increasing imports concentrated on sophisticated sectors. Different from other regions, their imports of some low-tech sectors also increased a lot. For instance, In Indonesian market, China's exports of coke, refined petroleum products, nuclear fuel increased by 140% and that of rubber & plastics products increased by 72.7% over 1995-2012. In Thailand and Malaysia, the rise of Chinese exports of rubber & plastics products was also distinguish. Vietnam's imports from China raised the fastest among all the countries. Firstly, its imports of sophisticated sectors, such as office accounting computing machinery and Radio television & communication equipment, expanded largely over 1995-2012. Furthermore, Vietnam's lowly qualified imports of coke, refined petroleum products, nuclear fuel and fabricated metal products were also revealed a great increase.

The group of Rest of the World (ROW) comprises Latin America, Arab world, East Europe… Its growth rate of imports from China reached 54.8% over1995-2012. Its High-Tech imports rose the fastest among all the technological levels. All the sophisticated sectors had a significant growth of import from China, especially office accounting computing machinery and motor vehicles. These two sectors' imports from China both doubled during 1995-2012. Besides, ROW's Low-Tech imports such as iron & steel and non-ferrous metals' imports also show us a high growth.

2.2.2 Contribution of each country to Chinese rising exports over 1995-2012

[Table 3-3]

Table 3-3 illustrates the contributions of each country to Chinese export growth. In general, the contributions were similar between China's manufacturing and overall exports. US, Japan, Germany, Korea and India were the 5 biggest contributors to China's manufacturing and overall rising exports. For Chinese High-Tech export growth, they were still the 5 biggest contributors. Besides, France and Taiwan also contributed much to Chinese High-Tech export growth. Their contribution rates were as large as that of India.

For US' imports from China, although the speed of growth was not as high as that of Europe and Asia, the amount of growth was much huger than the later. Its contribution rate for China's overall export growth attained 19.1% while that of the second largest contributor Japan was only 7.9%.

For Japan's imports from China, in spite of its lowest speed of growth in the world, it still accounted for a large share of Chinese overall exports. The growth of Germany and Korea's imports from China represented 4.3% and 3.8% of Chinese rising exports.

As the fastest expanding importing market, India also contributed much to Chinese export growth. Its contribution rate for Chinese Medium-High-Tech export growth was 4.8%, which is as large as that of Korea (4.7%). Yet, another fastest growing market, ASEAN countries, did not contribute much even though their growth rates were much higher than other economies.

It is worth noting that in Asia, Indian largest contributing sector for Chinese rising exports was Pharmaceutical, which is highly qualified. By contrast, other Asian countries' largest contributing sectors for Chinese export growth were always the lowly qualified sectors. For Japan and Malaysia, the biggest contributing sector was the sector of food, beverage and tobacco. For Singapore, Indonesia, Philippines and Vietnam, it was the sector of coke, refined petroleum products, nuclear fuel. For Korea and Thailand, it was the sector of iron & steel. For Hong Kong and Taiwan, it was the sector of non-ferrous metals. For Asia as a whole, the biggest contributing sectors were non-ferrous metals and coke, refined petroleum products. In short, other Asian countries' (excluding India) lowly qualified imports contributed more to Chinese rising exports than highly qualified ones.

Whereas for US and European Union, as same as India, their largest contributing sector was always highly qualified. Therefore, China's exports of sophisticated sectors to Asian countries still need to be enhanced.

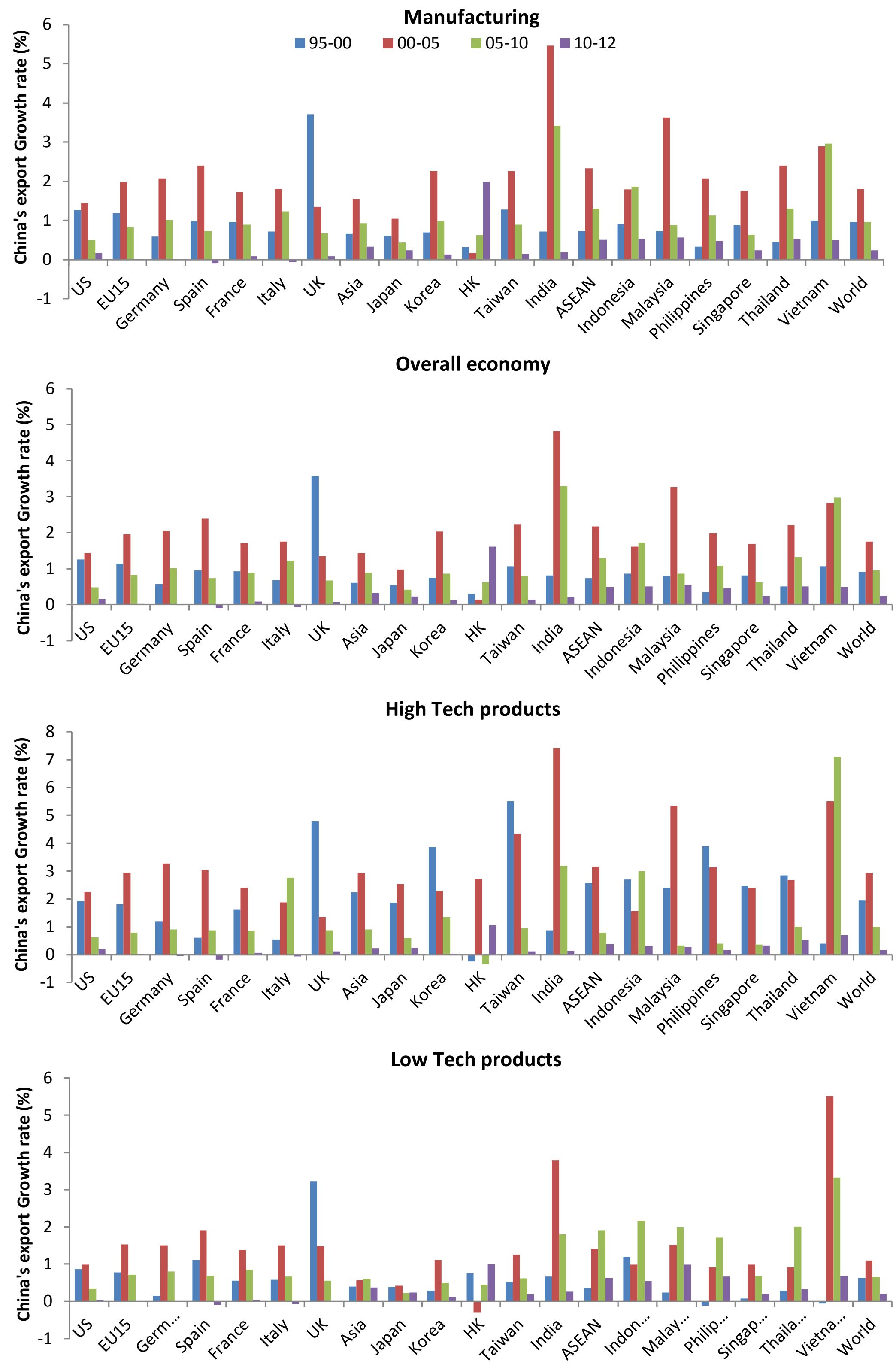
2.2.3 five-year growth rate of Chinese exports to each country

We have already shaded lights on Chinese export growth over 1995-2012. In Figure 3-2, we investigate the 5-year growth rate of Chinese exports, i.e. 1995-2000, 2000-2005, 2005-2010, plus 2010-2012. This study permits to know the variations of growth speed every five years rather than the level of overall growth during 1995-2012.

For overall economy and manufacturing, Chinese exports increased the fastest between 2000 and 2005, except the exports to Hong Kong, UK and Vietnam. In Hong Kong, Chinese exports to it increased the most slowly over 2000-2005. In UK, Chinese exports expanded the most quickly over 1995-2000, instead of 2000-2005. Its growth speed has been lower and lower since 1995. On contrary, Chinese exports to Vietnam rose faster and faster. As said in last section, during 1995-2012, China's exports to UK increased much faster than that to other European countries. As showed in Figure 3-2, UK's speed of growth of imports from China was higher than that of other European countries over 1995-2000. Yet the speed reduced over time and recently it was lower than that of other European countries.

Chinese manufacturing and overall exports to Asia over 1995-2012 rose a little faster than US and more slowly than European Union. When studying the 5-year growth rate illustrated in Figure 3-2, its speed of growth over 1995-2000 was lower than both US and European Union. During 2000-2005, Asian growth of imports from China became quicker than US but still slower than that of European Union. Since 2005, Asian 5-year growth rate has been higher than that of both US and EU. In short, Chinese manufacturing and overall exports to Asia expanded the most quickly in the world from 2005.

Figure 3-2 five-year growth rate of Chinese Exports to each country



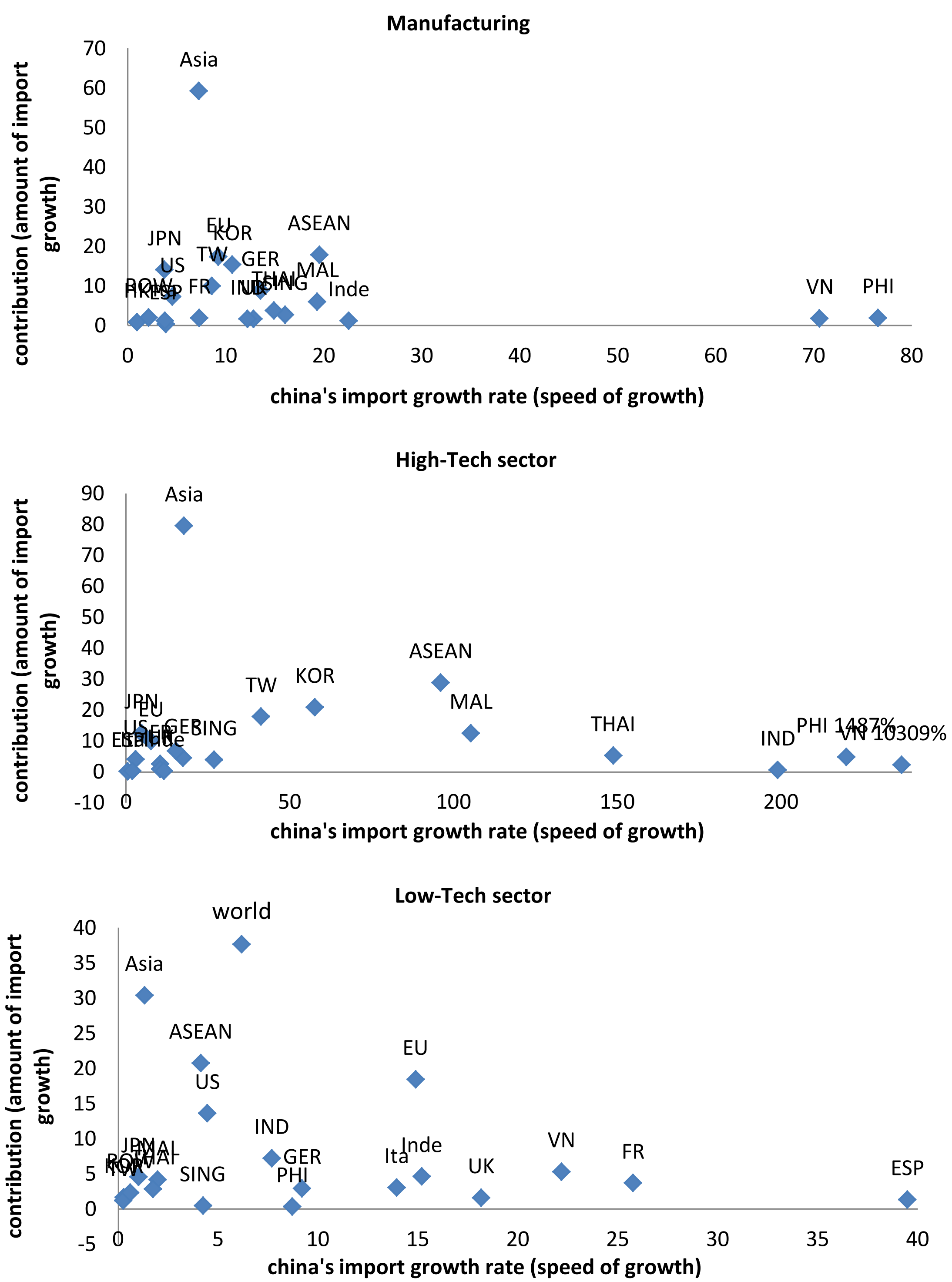
The fastest growing importing market was ASEAN countries, including Malaysia, Philippines, Thailand and Vietnam. They showed an extraordinary growth speed, especially over 2000-2005. The growth rates were all higher than the world average level. Besides, Indian speeds of growth over 2000-2005 and 2005-2010 were both the highest over the world. Its import growth played an essential and important role in Chinese export development. Korea and Taiwan's growth rates of 1995-2000 were higher than the world average level. Yet those of 2000-2005 were lower than the world average level. Japan's 5-year growth rates were all lower than the world average level. It is why Japanese speed of growth over 1995-2012 was not as high as that of other Asian countries.

For High-Tech products, Chinese exports increased the fastest mainly between 2000 and 2005, except the exports to two groups of countries. The first group comprises UK, Korea, Taiwan, Philippines, Singapore and Thailand. Their growth speeds of High-Tech imports from China slowed down over time. The second group comprises Italy and Vietnam. Their growth speeds of High-Tech imports from China accelerated oppositely. Furthermore, although ASEAN countries' High-Tech imports from China increased the fastest in the world during 1995-2012, most of these countries' growth rates (except Vietnam) diminished over time.

For Low-Tech products, the growth of UK's imports from China decelerated as what happened in High-Tech level. Whereas in contrast, the growth speeds of some ASEAN countries' Low-Tech imports from China increased, such as Malaysia, the Philippines and Thailand. It was on contrary from ASEAN's change of High-Tech imports. India and Vietnam were still the two most outstanding importing markets.

2.3 Disaggregated study of Chinese imports by sector and by exporting country

Figure 3-3 growth rate of Chinese imports from different markets and contributions of them (1995-2012)



[Table 3-4]

2.3.1 Growth rate of Chinese imports from each country over 1995-2012

As Figure 3-3 pictured, for manufacturing and overall economy, China's imports from most countries, (US, European Union excluding Germany, Japan, Korea…) increased less quickly than Chinese exports to them. Yet for Germany and some ASEAN countries (Singapore, the Philippines and Vietnam), Chinese imports from them rose more quickly than the exports.

For Low-Tech products, China's imports from US, European Union, Philippines, Singapore increased more quickly than Chinese exports to these markets. The fastest rising sectors of Chinese imports from US, Germany and Spain were always the sectors of natural resource, such as Iron & Steel and Coke, refined petroleum products, nuclear fuel. Differently in Chinese imports from France, Italy and UK, the alimentary sectors, such as Food products, beverages and tobacco, expanded the most rapidly.

In terms of High-Tech products, Chinese import growth over 1995-2012 was generally less rapid than the export growth, except for ASEAN countries and Korea. It is interesting to find that China's imports from ASEAN countries rose faster than its exports to them. The five fastest increasing sectors of Chinese imports from ASEAN economies were radio television & communication equipment (107.9%[42]), office accounting computing machinery (100.7%), medical precision optical instruments (53.7%), electrical machinery & apparatus (42%), motor vehicles, trailers & semi-trailers (39.2%). They are all sophisticated sectors and Chinese imports of these sectors from ASEAN over 1995-2012 rose all faster than the exports (in Table 3-1).

Among ASEAN countries, in Indonesia and the Philippines, the five fastest increasing sectors of Chinese imports were the same sophisticated sectors that we just mentioned in last paragraph. In Singapore, apart from these sectors, Chinese imports of chemicals and aircraft & spacecraft were also distinguished. Nevertheless, the growth rates of Chinese imports from Singapore were not as high as that from other ASEAN countries.

For Thailand and Malaysia, the 5 fastest increasing sectors comprised 3 highly qualified sectors and 2 lowly qualified ones. Apart from the 3 highly qualified sectors (office accounting computing machinery, radio television & communication equipment and medical precision optical instruments), Chinese imports of 2 lowly qualified sectors also rose quickly. These 2 sectors were wood & cork products and non-ferrous metals for

[42] 107.9% is the growth rate of Chinese import of this sector from ASEAN over 1995-2012.

Thailand; coke, refined petroleum products, nuclear fuel and non-metallic mineral products for Malaysia. They are all lowly qualified and natural resource sectors.

Vietnam's exports of all the sectors to China rose the fastest among ASEAN economies. Take High-Tech sector for example. Chinese import from Vietnam increased by 10309% over 1995-2012 while that from ASEAN countries as a whole rose by 96.2%. Chinese High-Tech imports of office accounting computing machinery (239112%), radio television & communication equipment (78795%), medical precision optical instruments (748978%), electrical machinery & apparatus (4604%) all showed an extraordinary growth. This import growth was extremely faster than that of Chinese exports to Vietnam. When studying Lowly qualified sectors, Chinese imports of natural resource based products, such as fabricated metal products (4425%), coke, refined petroleum products, nuclear fuel (3878%), non-metallic mineral products (2537%) also showed a great growth. In addition, Chinese imports of Textile, leather and footwear from Vietnam also increased much faster than that from other countries. The growth rate of Chinese imports of this sector was 729%, while that of exports was 93%.

In the rest countries of Asia, including Japan, Korea, Hong Kong, Taiwan and India, Chinese High-Tech imports from them rose less rapidly than the exports to them. There is only one exception. Chinese High-Tech imports from Korea rose faster than the exports to it. However, when looking at particular sector, Chinese imports of only two sectors (medical precision optical instruments and aircraft & Spacecraft) from Korea rose faster than the exports. Other sectors' imports from Korea all rose less (or the same) rapidly than the exports as what happened in other countries.

Chinese High-Tech imports from ROW (the rest of the world), including Latin America, Arab world, East Europe…increased faster than that from US and European Union, but less quickly than that from Asia. Chinese imports of Pharmaceuticals from ROW increased the fastest among all the High-Tech sectors. They rose by 39% over 1995-2012. Indeed, among the 5 fastest increasing sectors of Chinese imports from ROW, 4 sectors are lowly qualified excluding Pharmaceuticals. Chinese Low-Tech imports of wood and cork products rose by 66% during this period. This percentage was even larger than that of Pharmaceuticals. Other 3 lowly qualified sectors were non-ferrous metals (36%), coke, refined petroleum products, nuclear fuel (33%) and other manufacturing sectors including furniture, recycling (21%). Chinese imports of these sectors also showed a rapid growth and the growth was also less rapid than that of exports.

2.3.2 Contribution of each country to Chinese rising imports over 1995-2012

[Table 3-5]

When studying the contributions of each country to Chinese import growth showed in Table 3-5, Asia was the largest winner of Chinese import development. China's rising imports from Asia accounted for nearly 60% of Chinese manufacturing import growth and 80% of Chinese High-Tech import growth from 1995 to 2012. If more detailed, for the sectors of Office accounting computing machinery and the radio television & communication equipment, Asian increasing exports to China accounted for more than 90% of China's import growth. Meanwhile, the 6 biggest contributors of Chinese High-Tech import growth were all Asian countries, including Korea (20.8%[43]), Taiwan (17.7%), Japan (12.5%), Malaysia (12.4%), Thailand (5.2%) and the Philippines (4.7%).

ASEAN countries' rising exports to China occupied 28.8% of Chinese High-Tech import growth and 68.9% of that of office accounting computing machinery. It is the region from where Chinese imports rose quite quickly and more quickly than Chinese exports. The contributions were huge simultaneously.

Among all the manufacturing sectors, Malaysia contributed the most to Chinese rising imports of office accounting computing machinery (19.2%), radio television & communication equipment (12.2%). Thailand and the Philippines contributed the most to Chinese import growth of office accounting computing machinery (30% for Thailand and 18.2% for the Philippines). Singapore contributed the most to Chinese import growth of railroad transport equipment (14.9%), ships and boats (13.5%). Indonesia did not contribute much as other ASEAN countries. Its increasing exports to China represented only 0.5% of Chinese rising High-Tech imports.

Vietnam and India's exports to China rose quiet quickly, even the most quickly in some sophisticated sectors in the world. However, their contributions were not as big as that of other Asian countries. The contribution rates were 2.2% for Vietnam and 0.2% for India. The biggest contributing sector of these two countries was the sector of textile, leather and footwear with a contribution rate nearly 14%. Indian exports of other manufacturing products including furniture, recycling also contributed highly to Chinese import growth of this sector. Its contribution rate reached 17.9%.

As for other regions like US and European Union, the contributions of pharmaceuticals and aircraft & spacecraft should be mentioned. For pharmaceuticals, European Union's rising exports to China accounted for more than the half of Chinese import growth. US's

[43] It is the contribution rate over 1995-2012.

contribution rate was also more than 10.5%, near to Asian overall contribution rate (11%). Besides, Germany's contribution rate was 13.8%, UK 9.7% and France 6.5%. For aircraft & spacecraft, only French growth of exports to China occupied 50% of Chinese import growth and that of Germany occupied 32.1%. US and other European countries did not contribute much.

When regarding Chinese growth of Medium-High-Tech and Medium-Low-Tech imports, its imports from Asia still represented more than the half of Chinese overall import growth. For Chinese rising imports of robber & plastics products, non-metallic mineral products, medical precision optical instruments, Asia's contribution rate attained more than 70%. However, for Chinese imports of Building and repairing of Ships and boats, Asian and US's contributions were both inferior to zero. The biggest contributor to Chinese import growth of this sector was Germany, whose contribution rate went up to 238.9%. Thanks to Germany, European Union's overall contribution rate reached up to 151% although other European countries all had negative contribution ratios. Besides, Germany also contributed highly to Chinese rising import of machinery & equipment.

At last, for Low-Tech sectors, US was the largest beneficiary of Chinese rising imports, especially for the sector of Pulp, paper, printing publishing (23.8%[44]) and Food, beverage, tobacco (13%). China's import growth from Rest of the world (ROW) also concentrated on the Low-Tech sectors such as Wood & cork products (55.3%), Non-ferrous metals (46.4%), Food, beverage, tobacco (39%), Coke, refined petroleum products, nuclear fuel (38.7%), pulp, paper, printing publishing (37.3%) and Textile, leather and footwear (31.4%).

2.3.3 five-year growth rate of Chinese imports from each country

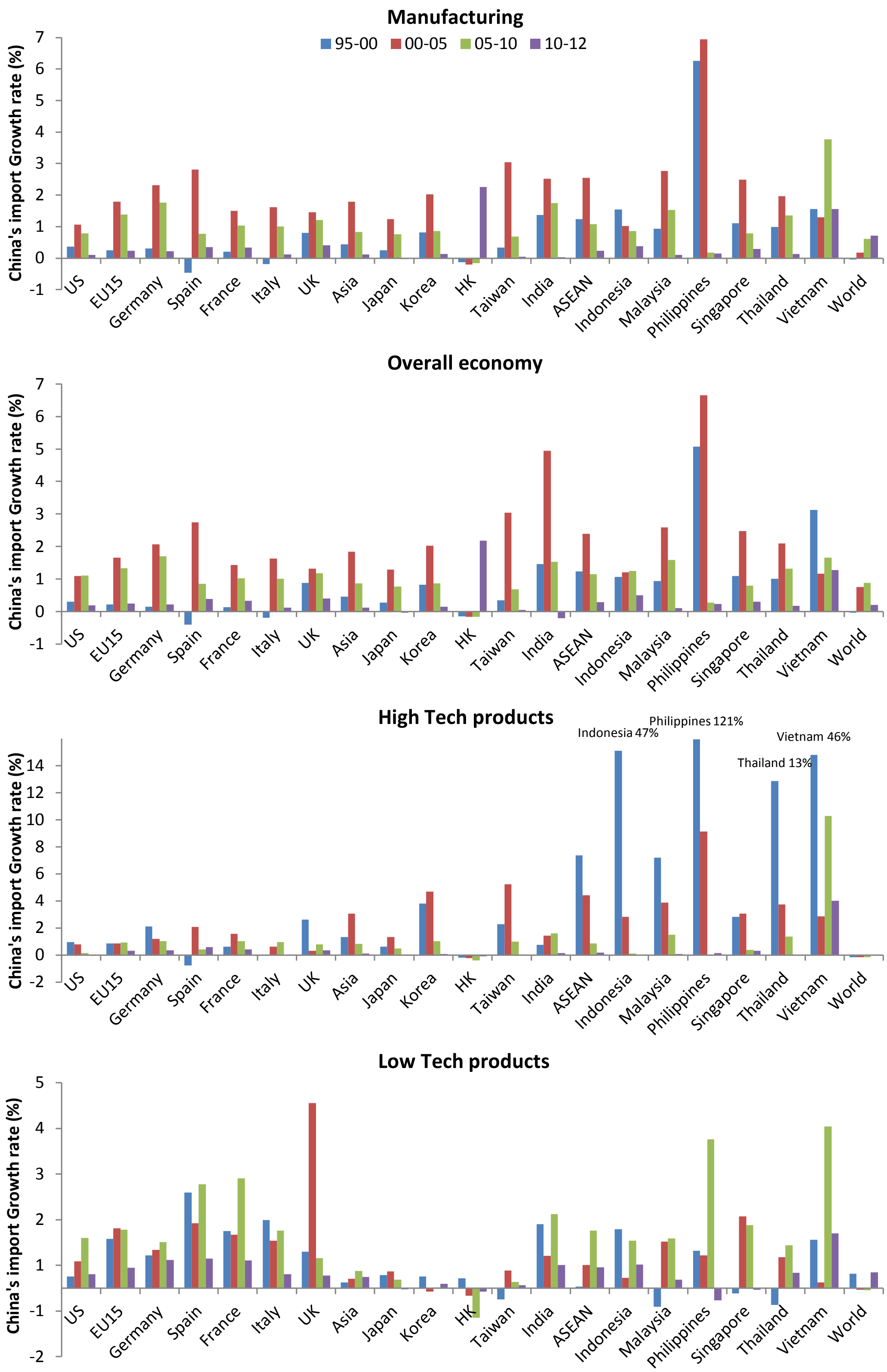
Figure 3-4 shows the five-year growth rate of Chinese imports from each country. As same as the variation of Chinese exports, its imports also increased the fastest between 2000 and 2005, except for the imports from Hong Kong, the world, Indonesia and Vietnam. It is interesting to find that Chinese imports from Hong Kong have decreased over time until 2010-2012. On contrary, Chinese imports from the world increased and the growth accelerated over 1995-2012. For Indonesia, Chinese growth speeds of manufacturing imports diminished while that of overall imports increased oppositely. Chinese manufacturing imports from Vietnam raised the fastest over 2005-2010 but its total imports raised the fastest over 1995-2000.

[44] It is the contribution rate.

For High-Tech products, the growth rates of Chinese imports from European Union (except Germany) and India were not as high as that from other countries. Yet their growth speeds increased over time. Chinese imports from US, Germany, Hong Kong and ASEAN countries rose quickly but their growth speeds slowed down, especially for the Philippines and Indonesia. At outset (1995-2000) the growth rates of Chinese High-Tech imports from the Philippines and Indonesia were both much higher than that from the rest of the world, noting correspondingly 121% and 47%. However, their growth rates have decreased to nearly zero until 2012. Besides, the growth speeds of Chinese imports from Vietnam, Malaysia and Thailand also decreased largely. Vietnam's exports to China varied as a wave. At beginning (1995-2000), they increased as quickly as that of Indonesia. During the next five years (2000-2005), the speed of growth decreased to 2%. Then they re-increased to 9% during 2005-2010. Recently, Vietnam has become the fastest growing exporting country of High-Tech products to China.

Chinese Low-Tech imports were revealed a controversial variation. The growth speeds of Chinese Low-Tech imports from US, Germany, ASEAN countries and Asia as a whole increased over time.

Figure 3-4 five-year growth rate of Chinese Imports from each market



3. Measuring China's impact by regional input-output table

3.1 Methodology and data

This chapter sets up input-output tables by using the data from OECD and China's National Bureau of Statistics (NBS). Table 3-6 represents the formal input-output table that we calculated in last chapter. Table 3-7 represents of regional matrix of imported input coefficient for Chinese manufacturing exports that we establish in this chapter. Since the standard input-output table (Table 3-6) has been already introduced in last chapter, here lists directly the important elements and the final methodology of computing vertical specialization share of export and the foreign value added.

[Table 3-6]

The vertical calculations based on Table 3-6 are showed as follows:

$CI^D_{ij}+ CI^M_{ij}+VA_j=X_j$

$a_{ij}= CI^D_{ij}/X_j$

$b_{ij}= CI^M_{ij}/X_j$

$c_j=VA_j/X_j$

$$A^D=\begin{pmatrix} a_{11}\ a_{12} \dots a_{1n} \\ \dots \\ \dots \\ a_{n1}\ a_{n2} \dots a_{nn} \end{pmatrix} \quad A^M=\begin{pmatrix} b_{11}\ b_{12} \dots b_{1n} \\ \dots \\ \dots \\ b_{n1}\ b_{n2} \dots b_{nn} \end{pmatrix} \quad A^V=(c_1\ c_2 \dots c_n)$$

$u=diag(1, 1,\dots,1)$

$$uA^D+uA^M+A^V=u \tag{41}$$

Where CI^D_{ij} denotes domestically produced inputs of sector *i* for producing sector *j*, CI^M_{ij} denotes imported inputs of sector *i* for producing sector *j*, VA_j denotes value added in production of sector *j*. Dividing them separately by Total Input of sector *j* (X_j) obtains domestic input coefficient (a_{ij}), imported input coefficient (b_{ij}) and value added ratio (c_j). A^D is n×n direct input matrix of domestic production of inputs, A^M is n×n matrix of imported inputs, A^V is 1×n value added matrix, *u* is the unit matrix (1 × n diagonal matrix).

Equation (41) illustrates the vertical balance, which is used for testing if the matrix' calculations are correct or not. EXP_i denotes export of sector *i*. *EXP* is n×1 export matrix.

$$VSS_i = uA^M(I-A^D)^{-1} \tag{42}$$

$$VSS_t = uA^M(I-A^D)^{-1} * (EXP_i/EXP_t) \tag{43}$$

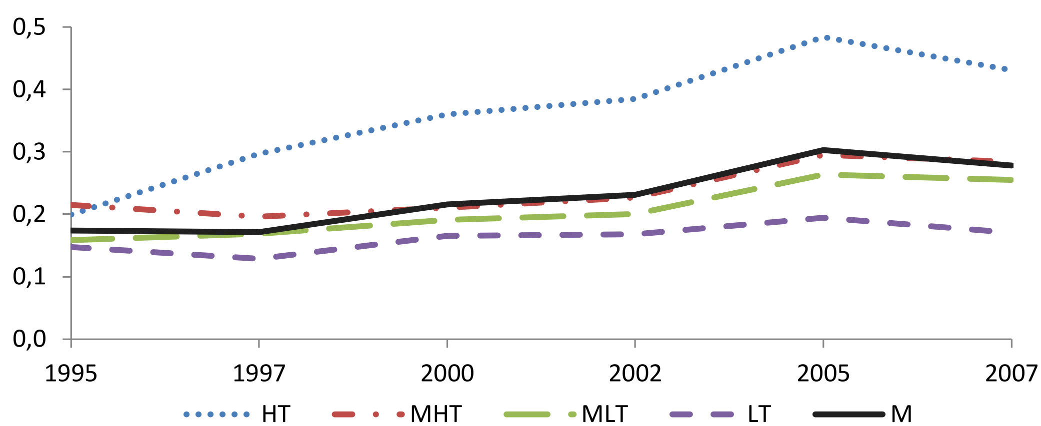
The final methodology of computing vertical specialization share is defined in Equation (42) and Equation (43). VSS_i is vertical specialization share in the production for export of sector *i*. VSS_t is the share of vertical specialization in Chinese total export. $(I-A^D)^{-1}$ is the well-known Leontief inverse matrix. EXP_i denotes the export of sector *i*. EXP_t is Chinese overall export in the year of *t*.

The horizontal calculations of input-output table obtain the methodology of computing domestic and foreign value added share. *DVA* denotes domestic value added. *FVA* denotes the foreign value added. According to Equation (45), the foreign value added (FVA) is equal to the share of vertical specialization (VSS) in Equation (42). They are showed in Figure 3-5.

$$DVA = A^V(I-A^D)^{-1} \tag{44}$$

$$FVA = u - DVA = uA^M(I-A^D)^{-1} \tag{45}$$

Figure 3-5 Foreign Value Added (vertical speciazation share)



In Figure 3-5, *HT* represents the High-Tech level. *MHT* represents the Medium-High-Tech level. *MLT* represents the Medium-Low-Tech level and *LT* represents the Low-Tech level. The foreign value added of Chinese exports at all technology levels increased from 1995 to 2012. China imported more intermediate inputs for its exports during this period. Among 4 technology levels, Chinese need of High-Tech import for export rose the most quickly, while that of Low-Tech one rose the most slowly. The higher technology level, the more imported inputs China needed.

Consequently, when talking about the impacts of China's structural change of export on the rest of the world, its import of intermediate inputs from other countries should been taken into account. For instance, when China exported 10 dollars of High-Tech products in 1995, it should firstly import 2 dollars for this export. In 2007, China should import about 4.5 dollars for this export. It indicates that Chinese High-Tech export of 10 dollars in 2007 promoted world export of 4.5 dollars, which was 2.5 dollars higher than that in 1995. Therefore, the import of intermediate inputs, another saying, the foreign value added is an important measurement of relationship between Chinese export change and that of the rest of the world. The regional input-output table permits to obtain these indexes of measurement.

[Table 3-7]

Table 3-7 lists the regional matrix of imported Input coefficient for Chinese manufacturing exports. The line of year comprises the year of 1995, 1997, 2000, 2002, 2005, 2007 and 2012. The latest input-output table of China is the 2007 I-O table established by Chinese Bureau of Statistics (NBS). In this chapter, we set up the regional matrix of 2012 by combining the input-output table of 2007 with the trade data of 2012.

As this section focuses on China's manufacturing export, the line of sector comprises 22 sectors of manufacturing illustrated in Appendix 2. Besides, four technology levels are also enumerated in the line of sector. They are High-Tech (HT), Medium-High-Tech (MHT), Medium-Low-Tech (MLT) and Low-Tech (LT). Finally, the overall manufacturing imported intermediate inputs (CI^M) are calculated by the sum of CI^M of all the 22 manufacturing sectors or by the sum of CI^M of all the four technology levels.

The column of Market represents the countries and regions that import products from China. These importing markets are denoted by p in Table 3-7 and they comprise:

1) US
2) European Union 15 countries: such as Germany, Spain, France, Italy and UK.
3) Asia: such as Japan, Korea, Hong Kong, Taiwan, India and ASEAN countries including Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam.
4) ROW: the rest of the world excluding US, EU and Asia.
5) World market

The column of Exporter represents the countries and regions that export intermediate inputs to China. These exporting economies are denoted by *k* in Table 3-7 and they comprise the same countries and regions as the column of Market above.

$CI_{k,j}^{M,p}$ denotes the intermediate inputs imported from country *k* for China's export of sector *j* to market *p*. For instance, $CI_{US,1}^{M,US}$ denotes the intermediate inputs imported from US for China's export of sector 1 to US market. $CI_{EU,2}^{M,W}$ denotes the intermediate inputs imported from European Union for China's export of sector 2 to the world market.

The measurement of $CI_{k,j}^{M,p}$ needs to combine the input-output table with trade data. We firstly evaluate sector *i*'s intermediate inputs imported from country *k* and used for industry *j*'s production ($CI_{k,ij}^{M}$).

$$CI_{k,ij}^{M}=(CI_{ij}^{M}/CI_{i}^{M})*CI_{cn\leftarrow k,i}^{M}=\alpha_j*CI_{cn\leftarrow k,i}^{M} \quad (46)$$

$$CI_{k,ij}^{M}=(CI_{ij}^{M}/IMP_i)*IMP_{cn\leftarrow k,i}=\beta_j*IMP_{cn\leftarrow k,i} \quad (47)$$

There are two methods of calculation. First method is defined in Equation (46). α_j is the share of imported inputs of sector *i* used for industry *j*'s production (CI_{ij}^{M}) in *i*'s overall imported inputs (CI_{i}^{M}). $CI_{cn\leftarrow k,i}^{M}$ is Chinese intermediate inputs of sector *i* imported from country *k*. α_j multiplied by $CI_{cn\leftarrow k,i}^{M}$ allows to obtain the final index ($CI_{k,ij}^{M}$).

[Table 3-8]

Combining trade data with I-O table is a tough job. The trade statistics of Chinese intermediate inputs of sector *i* imported from country *k* ($CI_{cn\leftarrow k,i}^{M}$) are recorded in UN Comtrade database with Broad Economic Category (BEC) Classification. As showed in Table 3-8, UN BEC classification distinguishes intermediate use from final use. However, it is formatted according to product, while the classification of OECD I-O table is according to industry. Furthermore, BEC classification reports only 9 sectors for intermediate use and 12 sectors for final use, while OECD I-O table comprises 48 industries on the basis of both intermediate and final uses. NBS I-O table that we used in last chapter even reported 135 sectors for the year of 2007. Hence BEC classification is much more aggregated than that of I-O table.

Database	Classification	According to	Number of sectors
UN Comtrade	BEC	Product (main use)	9 and 12
OECD	ISIC	industry	48
NBS	Its own	industry	124 and 135

There are plenty of researchers who convert BEC classification into I-O table classification for measuring vertical specialization. Yet they cannot fully match each other. Especially when the correspondence is blurry, the conclusion by combining them is not as robust as expectation.

Therefore, the second method should be introduced. It is defined in Equation (47). β_j is the share of imported inputs of sector *i* used for industry *j*'s production (CI_{ij}^{M}) in *i*'s overall imports (IMP_i). We multiply this coefficient by Chinese overall imports of sector *i* from country *k* ($IMP_{cn\leftarrow k,i}$) and obtain the final index ($CI_{k,ij}^{M}$). The statistics of import are found in Chelem-CIN database of CEPII. They are compiled according to ISIC rev.3 classification. Table 3-9 reveals the correspondence between OECD I-O table and ISIC rev.3. Considering the sectors' harmony and data's availability, we choose the second method.

[Table 3-9]

However there are two inevitable weaknesses. Firstly, both two methods encounter the frangibility of data congruity even though the second method solves the problem of classification's difference. The trade statistics recorded in UN Comtrade and Chelem-CIN are compiled by consumer price or trade price, while I-O table is based on producer price. As we use import statistics from Chelem-CIN instead of I-O table, this may bring a bias of calculation.

The second weakness derives from the assumption of study. We assume that the share of imported inputs of sector *i* used for industry *j*'s production in total import of sector *i* (β_j) is the same across Chinese trade partners. For instance, in 1995 Chinese imported inputs of Iron & Steel for Machinery & equipment's production occupied 20% of Chinese overall import of Iron & Steel from the world. This percentage is the same for Chinese imports from US, Japan, ASEAN countries... Whereas in reality, β_j is not the same across them. This assumption consequently brings errors of measurement.

Besides, Chelem-CIN database does not distinguish the intermediate use from final use. All this will lead to a larger variance of residual and of coefficient when using $CI_{k,ij}^{M}$ as dependent variable for regression. This chapter highlights the evolution of China's imports from other countries for Chinese export rather than the exact value. We will not use $CI_{k,ij}^{M}$ for econometric estimation. Thus the errors are accredited.

$$m_{k,i}=IMP_{cn\leftarrow k,i}/IMP_i \quad (48)$$

$$M=\begin{pmatrix} m_{us,1} & m_{us,2} \ldots & m_{us,n} \\ m_{eu,1} & m_{eu,2} \ldots & m_{eu,n} \\ & \ldots & \\ m_{w,1} & m_{w,2} \ldots & m_{w,n} \end{pmatrix} = \begin{pmatrix} m_{us,1} & m_{us,2} \ldots & m_{us,n} \\ m_{eu,1} & m_{eu,2} \ldots & m_{eu,n} \\ \ldots & & \\ 1 & 1 \quad \ldots & 1 \end{pmatrix}$$

$$VS_{pki}=CI_{k,i}^{M,p}=\frac{CI_{k,ij}^{M}}{X_j}EXP_{cn\to p,i}=\frac{\frac{CI_{ij}^{M}}{IMP_i}IMP_{cn\leftarrow k,i}}{X_j}EXP_{cn\to p,i}=\frac{IMP_{cn\leftarrow k,i}}{IMP_i}\frac{CI_{ij}^{M}}{X_j}EXP_{cn\to p,i}$$

$$=MA^{M}(I-A^{D})^{-1}EXP_{cn\to p,i} \quad (49)$$

$$VSS_{pki}=\frac{VS_{pki}}{EXP_{cn\to p,t}}=MA^{M}(I-A^{D})^{-1}\frac{EXP_{cn\to p,i}}{EXP_{cn\to p,t}} \quad (50)$$

Here $m_{k,i}$ is the share of China's import of sector *i* from country *k* ($IMP_{cn\leftarrow k,i}$) in China's total import of sector *i* from all over the world (IMP_i). *M* represents the matrix of the share of each country *k* for the sector *i* in the world ($m_{k,i}$). As $m_{w,n}$ is the share of the world in the world for sector *n*, it is equal to 1.

Referring to Equation (42) and Equation (43), we obtain Equation (49) and Equation (50). It is still assumed that the share of imported inputs of sector *i* used for industry *j*'s production in total import of sector *i* (β_j) is the same across Chinese trade partners. Equation (49) defines China's import of sector *i* from country *k* for Chinese export to market *p*. It is also named as China's vertical specialization of sector *i* imported from country *k* for export to market *p* (VS_{pki}). Equation (50) defines the share of vertical specialization in Chinese overall export (VSS_{pki}). EXP_i/EXP_m signifies the share of Chinese export of sector *i* to the world market in Chinese manufacturing export to the world. *p* here is the world market. This chapter studies Chinese manufacturing at four technology levels instead of the whole economy. Thus we use EXP_m instead of EXP_t as used in Equation (50).

[Table 3-10]

Indeed, both CEPII (Chelem-CIN) and OECD published the data of export. Different data bring different results of calculation. Table 3-10 illustrates their different results. The vertical specialization share of Chinese export (VSS) in Table 3-10 is computed as $VSS_{world,world,i}$ in Equation (50). Both *p* and *k* here denote the world. It is revealed that EXP_i/EXP_m is different between CEPII and OECD over all the years. Yet the results of VSS are always similar. As VSS is the final index that we use, the weaknesses mentioned previously are acceptable and this section will use Chelem-CIN database with no adjustment.

$$IMP_i^{'}=IMP_i-ERR_i \quad (51)$$

$$\beta_j=CI_{ij}^M/IMP_i^{'} \quad (52)$$

$$\mu_i=F_i^M/IMP_i^{'}=C_i^M/IMP_i^{'}+G_i^M/IMP_i^{'}+I_i^M/IMP_i^{'} \quad (53)$$

$$\beta_j+\mu_i=1$$

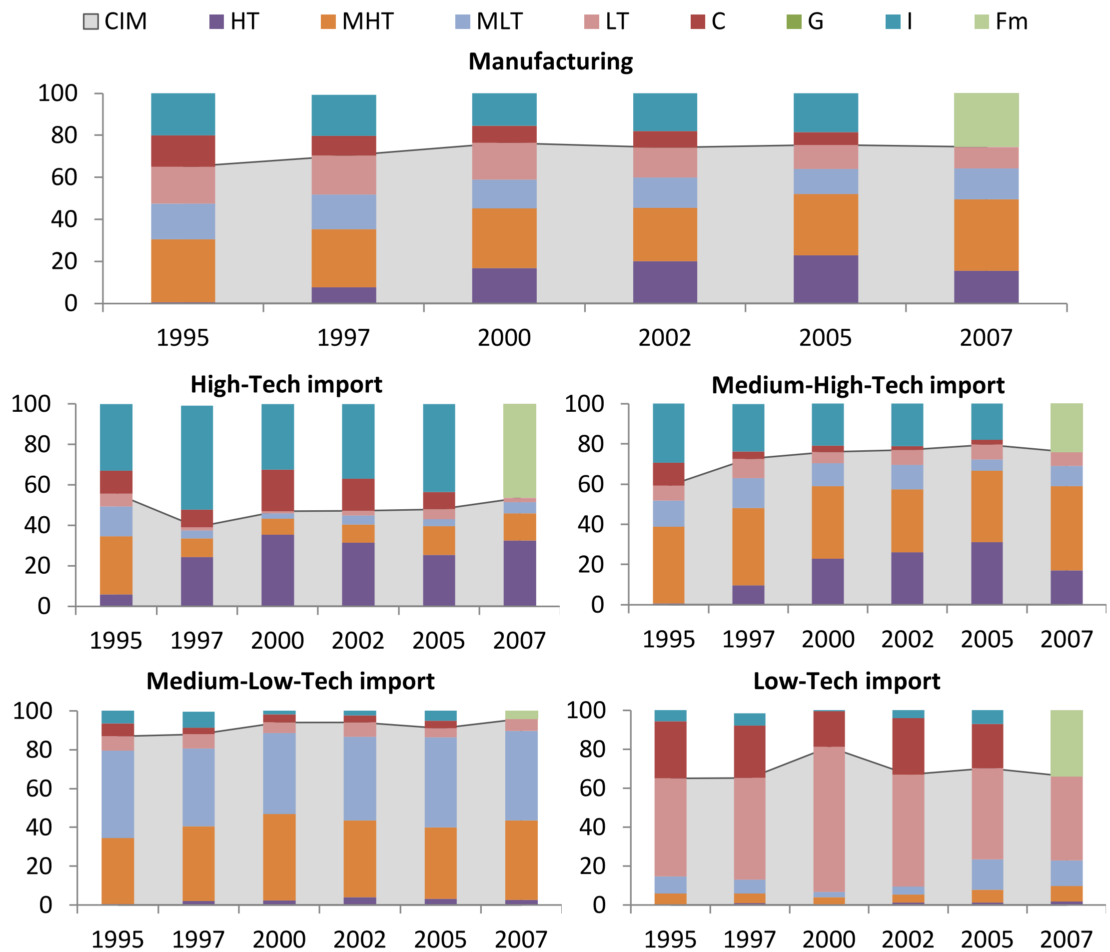
$IMP_i^{'}$ here is the nominal value of sector *i*'s import (IMP_i) minus its error term (ERR_i). We multiply Chinese imported inputs of sector *i* used for industry *j*'s production (CI_{ij}^M) by its total import of sector *i* ($IMP_i^{'}$) and obtain the coefficient β_j according to Equation (52). This coefficient allows estimating vertical specialization share of Chinese exports (VSS). F_i^M is the final use of sector *i*'s import. It is comprised of household consumption (C_i^M), Government expenditure (G_i^M) and Investment (I_i^M). The share of final use in the import is noted as μ_i in Equation (16). As the import ($IMP_i^{'}$) is the sum of intermediate consumption (CI_{ij}^M) and final use (F_i^M), $\beta_i+\mu_i=1$.

3.2 Elementary findings of Chinese regional input-output table

3.2.1 Intermediate and final uses of Chinese imports

[Table 3-11] [Table 3-12]

Figure 3-6 share of different uses in Chinese imports



Legend: CIM: overall intermediate use of Chinese imports.
HT: intermediate use of Chinese imports for High-Tech export. MHT: intermediate use of Chinese imports for Medium-High-Tech export. MLT: intermediate use of Chinese imports for Medium-Low-Tech export. LT: intermediate use of Chinese imports for Low-Tech export.
C: Household consumption of Chinese imports. G: Government expenditure of Chinese imports. I: Investment of Chinese imports. Fm: overall final use of Chinese imports

In China's manufacturing imports, the share of final uses all went down, especially during 1995-2000. Among the final uses, household consumption's share continued reducing. It declined by 9% (from 14.9% to 6.1%) over the decade of 1995-2005. The share of final investment also reduced from 1995 to 2000. Yet it began to rise a little from 2000. The share of government expenditure was so small that cannot be illustrated in the figure.

In contrast with the final uses, the share of intermediate uses in Chinese manufacturing imports rose by nearly 10% between 1995 and 2007 (from 64.9% to 74.4%). During the first five years (1995-2000), the increase was significant. Then it became stable. When taking technology levels into account, Chinese intermediate uses of manufacturing imports for lowly qualified production reduced over time, while that for highly qualified production ascended oppositely. Among these productions, the intermediate uses for High-Tech industries' production increased the most obviously from 0.6% in 1995 to 22.9% in 2005. Yet they went down to 15.5% over 2005-2007. The intermediate uses for Medium-High-Tech industries' production rose by only 4% (from 29.8% to 34%) during 1995-2007, which was relatively stable compared with other technology levels' variation. However, Chinese intermediate uses for Medium-High-Tech production accounted for the largest share of Chinese uses of manufacturing imports.

In China's High-Tech imports in 2007, 46.4% were used finally. At outset (1995-1997), the share of final uses increased. Chinese High-Tech imports were used more for the consumption and investment than before during these two years. From 1997, the share of final uses reduced and Chinese High-Tech imports were more and more used intermediately for production and export. Different from the uses of overall manufacturing imports, Chinese High-Tech imports used for household consumption and that for investment always varied oppositely. For instance, during 1997-2000, the share of household consumption went up largely, while that of investment diminished much simultaneously. From 2000, the former went down quickly while the later re-increased.

In the beginning, the share of Chinese intermediate uses of High-Tech imports decreased by 15% between 1995 and 1997. Since then, it has re-increased to 53.6% until 2007. As mentioned above in China, more and more High-Tech imports were used intermediately for the production. The most of intermediate uses were for High-Tech production. It accounted for 32.5% of Chinese uses of High-Tech imports in 2007. Besides, the share of intermediate use for Medium-High-Tech production also attained 13.4%. While that for Lowly qualified production was only 7.7%. Thus Chinese High-Tech imports were mainly used for highly qualified production. Yet compared with Chinese imports of other technology levels, the share of intermediate uses in High-Tech imports was the smallest.

In Chinese Medium-High-Tech imports, intermediate uses accounted for 76% and the share has continued rising until 2005. On contrary, the share of final uses in imports diminished from 41% to 24% over 1995-2007. The use for investment occupied the largest share of final uses. It continued reducing during 1995-2005. Besides, the final use for household consumption also declined in series. Among intermediate uses of Chinese Medium-High-Tech imports, the use for highly qualified production has increased greatly during 1995 and 2007 although it dropped a little over 2005-2007. The use for lowly qualified production was relatively stable and it declined a little over these years.

In China's Medium-Low-Tech imports, the share of intermediate uses rose from 87% in 1995 to 96% in 2007. It indicates that the most of Chinese Medium-Low-Tech imports were used intermediately for production rather than the consumption nor investment. The intermediate use for medium qualified production, including the use for Medium-High-Tech and Medium-Low-Tech production accounted for the largest share of Chinese Medium-Low-Tech imports, noting 79% in 1995 till 87% in 2007.

At last, 66% of China's Low-Tech imports were used intermediately for the production in 2007. The most of intermediate uses were for Low-Tech production. It is understandable that High-Tech imported inputs are mainly used for highly qualified production while Low-Tech inputs are usually used for lowly qualified production. Therefore, in 1995, only 0.1% of Chinese Low-Tech imports were used intermediately for High-Tech production, while 50.3% were for Low-Tech one. Until 2007, 1.7% of Chinese Low-Tech imports have been used for High-Tech production, while most have been for Low-Tech one.

When considering the final uses of Chinese Low-Tech imports, the use for household consumption occupied a larger share than that for investment. It was different from the final uses of other tech levels' imports. In 1995, the household consumption accounted for 29.4% of Chinese uses of Low-Tech imports. In spite of the decline during 1997-2000, the share of household consumption re-increased from 2000 to 2002. Recently, its share in Low-Tech imports still kept larger than that in other tech levels' imports. The final use for investment also diminished during 1997-2000. Its share in Chinese Low-Tech imports was only 0.3% in 2000. After then, it re-increased to around 5.6% in 2007.

To sum up, the most of China's manufacturing imports (at all technology levels) were used intermediately for production and export rather than final consumption nor investment. It is compatible with the consideration of China as a world factory. China imported plenty of intermediate inputs for its exports. Therefore, the estimation of China's imported inputs for exports is an important measurement of relationship between Chinese rising exports and the variations of world export.

3.2.2 Vertical specialization share of a unit of Chinese export

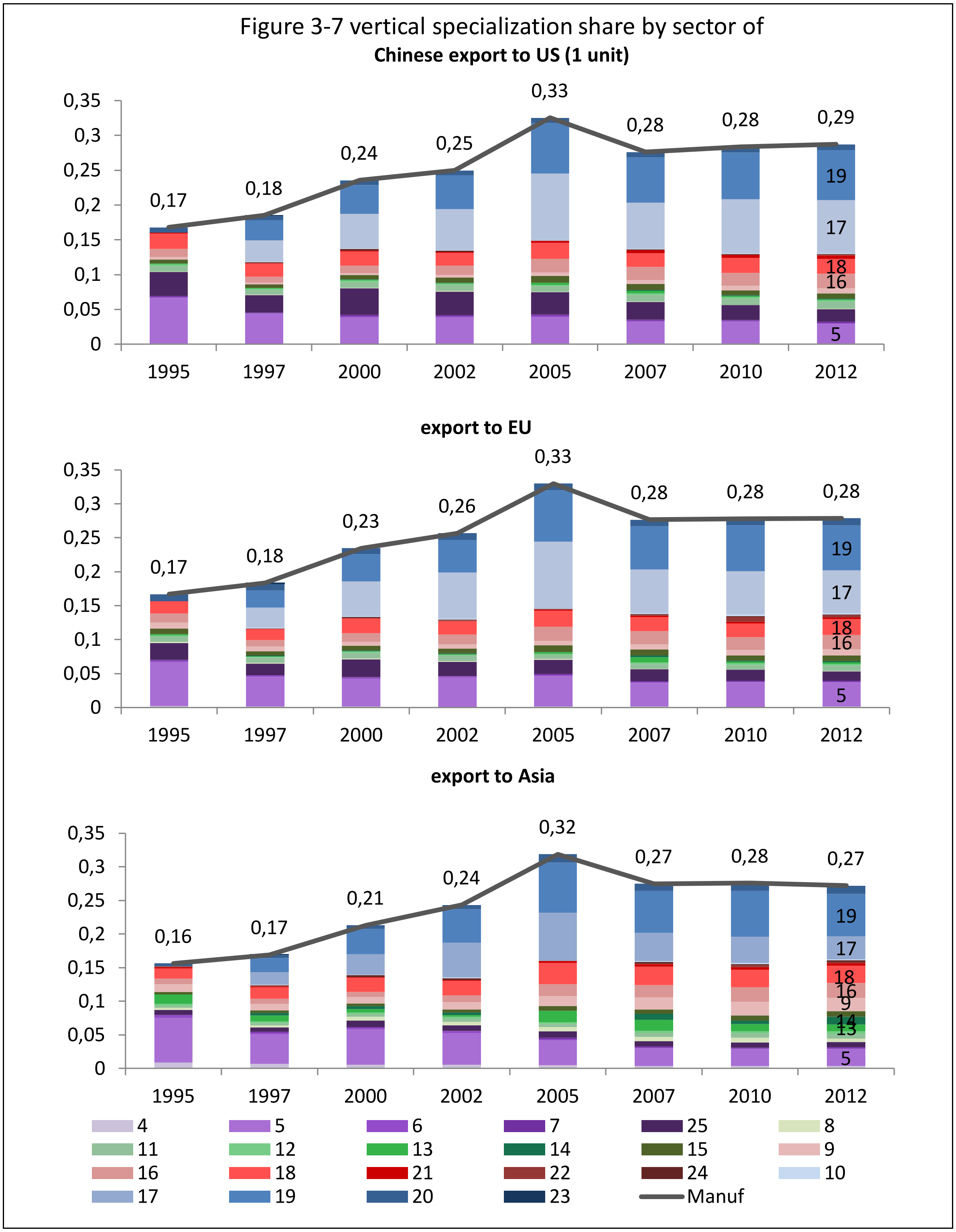


Figure 3-7 shows China's imports of intermediate inputs (also named vertical specialization) for a unit of manufacturing export to US, European Union and Asia. In other words, it shows the world export led by a unit of Chinese manufacturing export to these regions. For instance, in 1995, China imported 0.17$ for its manufacturing export of 1$ to US and in 2012, China imported 0.29$ for that. It signifies that Chinese imports of intermediate inputs for its manufacturing export of 1$ to US increased by 0.12$ over 1995-2007. In other words, Chinese export of 1$ to US in 2012 promoted more (0.12$) world export than that in 1995. As pictured in the figure, a unit of Chinese export to US, EU and Asia in 2012 all promoted more world export than before.

The codes (4 to 25) and their technology levels are defined by output industries (*j*) of I-O table in Appendix 2. For instance, the code of 5 represents the sector of textile, leather and footwear in I-O table. It belongs to Low-Tech sectors. Its value indicates the vertical specialization share of Chinese exports of textile, leather and footwear.

Due to the assumption of study in this chapter, the structure of world export led by China was similar across countries and regions. In general, a unit of Chinese High-Tech[45] export promoted more world export than before, while a unit of Low-Tech [46]export promoted less. Besides, world export led by a unit of Chinese Medium-High-Tech and Medium-Low-Tech export also rose over time but not as much as that by Chinese High-Tech one.

Figure3-8 illustrates the same index as Figure3-7 but by technology level for clearer comparison. As the figure showed, although the structure of world export led by China was similar across countries and regions, there were still some differences.

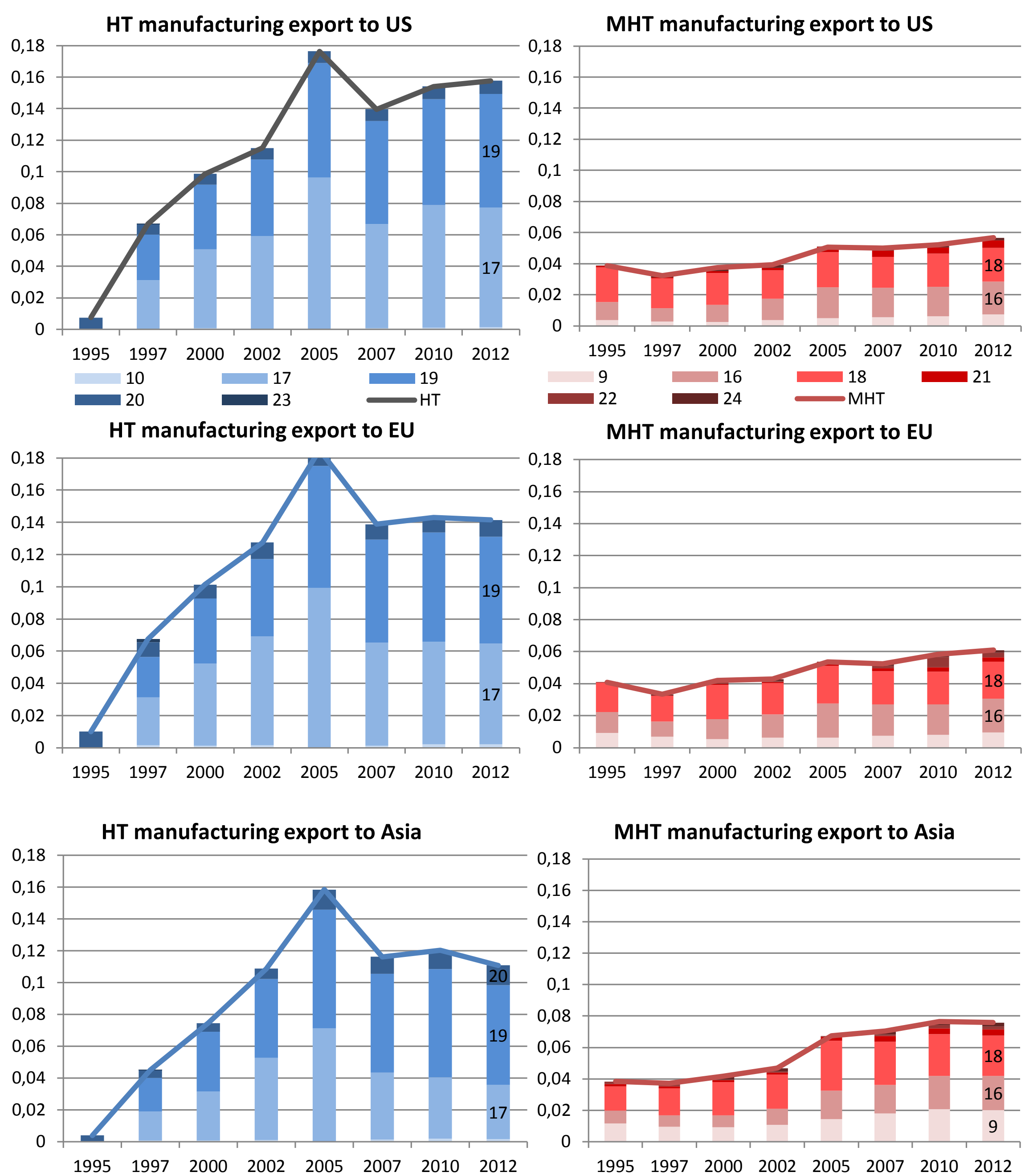
In 2012, a unit of Chinese High-Tech export promoted the most world export among four technology levels. Recently, a unit of High-Tech export to US needed more imported inputs than that to Europe and Asia. Indeed, in 2005, the vertical specialization (VS) share of a unit of Chinese High-Tech export to Europe was the largest among these three regions. The 100$ of High-Tech exports to European Union needed 18.5$ of imported inputs. While that to US needed 17.6$ and that to Asia needed only 15.9$.

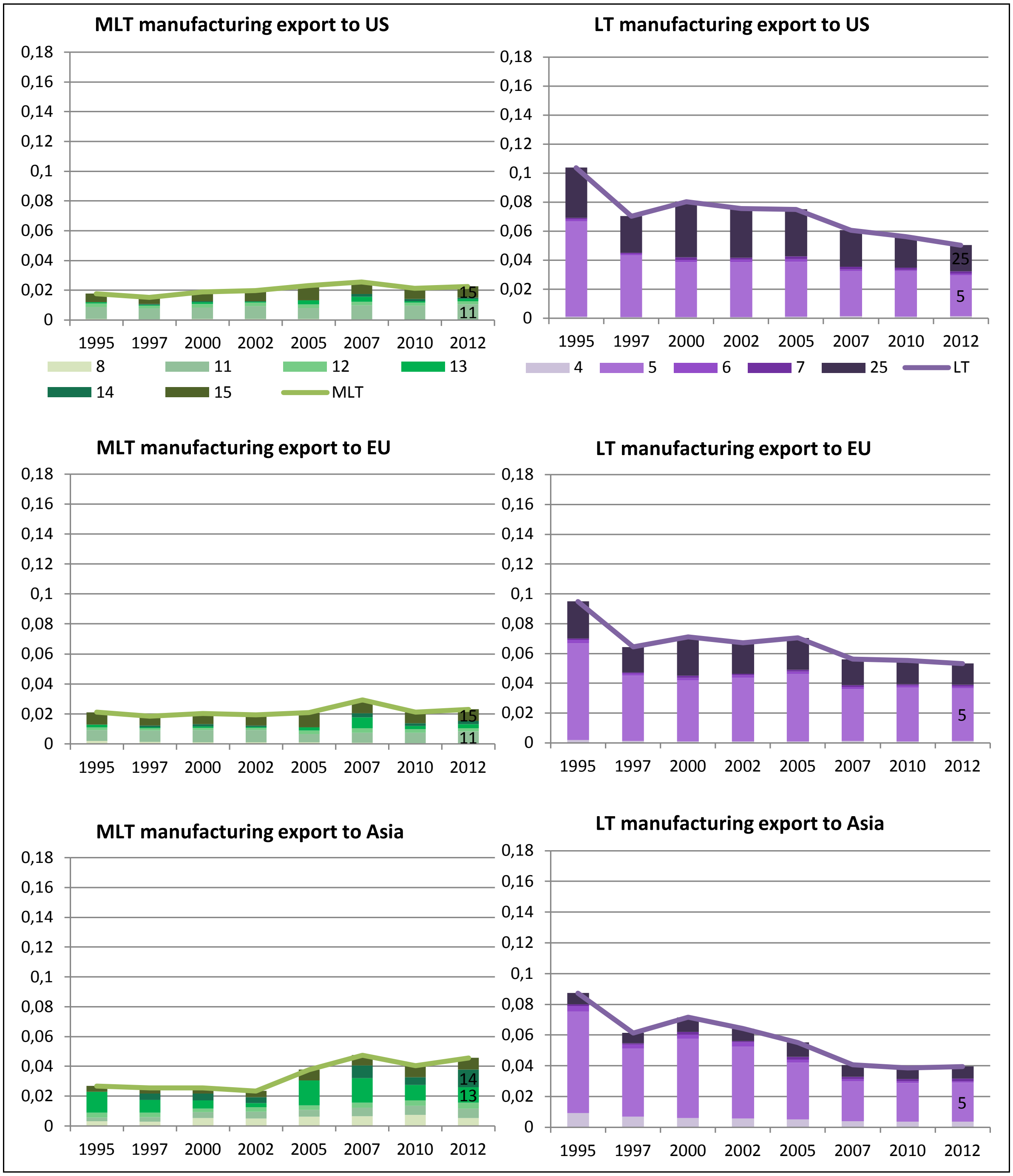
Over the decade of 1995-2005, the VS share of a unit of Chinese High-Tech export to all the regions climbed rapidly. Yet during 2007-2012, world export led by a unit of Chinese High-Tech export to US increased largely, while that to Europe raised only a little and that to Asia declined oppositely. In 2012, 100$ of Chinese High-Tech exports to US

[45] Sectors with code 10, 17, 19, 20, 23.
[46] Sectors with code 4, 5, 6, 7, 25.

promoted 16$ of world exports. This 100$ exports to Europe promoted 14$ of world exports and this to Asia promoted 11$. US replaced Europe. A unit of American High-Tech import from China promoted the most world export.

Figure 3-8 China's vertical specialization share of a unit of export by technology level





As mentioned above, Chinese need of imported inputs for a unit of High-Tech export to Asia was the least among the three regions. It declined the fastest over 2005-2012. Another saying, a unit of Chinese export to Asia promoted the least world export at that moment. In fact, a unit of Chinese export of Medical precision optical instruments (code 20) to Asia promoted more world export than that to US and Europe. Yet a unit of export of Office accounting computing machinery (code 17) and Radio television, communication equipment (code 19) to Asia promoted much less world export than the later. Since the sector of Office accounting computing machinery (code 17) and Radio television, communication equipment (code 19) accounted for larger share in a unit of Chinese export than other High-Tech industries, China's a unit of overall High-Tech export to Asia promoted less world export than US and Europe.

Different from High-Tech export, a unit of Chinese Medium-High-Tech export to Asia recently promoted more world export than that to US and Europe. In 1995, 100$ of exports to these regions all promoted 4$ of world exports. In 2012, 100$ of Chinese Medium-High-Tech exports to Asia needed importing 8$ of inputs from the world, while that to other two regions both needed 6$. China's need of imported inputs for a unit of Medium-High-Tech export has increased especially since 2002. The importing need for a unit of Medium-High-Tech export to Asia increased faster than that to US and Europe.

Among Medium-High-Tech industries, a unit of Chinese export of Electrical machinery and apparatus (code 18) and Machinery and equipment (code 16) needed the most imported inputs. Besides, the need for Chemical (excluding pharmaceuticals, code 9)'s export was also large. A unit of Chinese export of these industries to Asia all led more world export than other two regions.

As for Chinese lower technology export, its vertical specialization shares were always lower than that of High- and Medium-High-Tech one. The world export led by a unit of Chinese Medium-Low-Tech export increased but only a little. Chinese need of imported inputs for a unit of Medium-Low-Tech export to US and Europe stayed around the same level. Only that to Asia rose by 0.02 during 1995-2012. It means that 100$ of Chinese Medium-Low-Tech exports of to Asia promoted more world export of 2$ from 1995 to 2012. In 2012, a unit of Medium-Low-Tech export to Asia promoted more world export than US and Europe. Especially for the sectors of iron, steel and non-ferrous metals (code 13 and 14), a unit of Chinese export to Asia needed much more imports than other two regions.

Contrary to other tech levels' export whose needs of imported inputs increased over time, the need for a unit of Chinese Low-Tech export reduced from 1995 to 2012. At outset (in 1995), a unit of Chinese Low-Tech export to all the regions promoted much more world export than other tech levels' export. Its need of imported inputs decreased significantly over 1995-1997 and 2005-2007. Until 2012, it has promoted less world export than higher technology exports. Among the regions, a unit of Chinese Low-Tech export to US reduced the fastest. In 2012, a unit of Chinese Low-Tech export to Europe needed the most imports, while that to Asia needed the least.

It should be noted that the importing need for a unit of Chinese Low-Tech export of textile, leather and footwear (code 5) also declined. Yet in 2012, the world export led by a unit of Chinese export of this sector was just less than that by Chinese High-Tech export of office accounting computing machinery (code 17) and radio television, communication equipment (code 19). The importing need for a unit of textile's export was still larger than the rest of industries' needs, including highly qualified sectors and lowly qualified one.

To sum up, in recent years, a unit of Chinese high-technology export to all the regions promoted more world export than low-technology one. The need of imported inputs for a unit of Chinese High-Tech export rose quickly from 1995. A unit of Chinese High-Tech export to US promoted the most world export among the regions. Since 2005, Chinese imports for a unit of High-Tech export have declined. Only the High-Tech export to US re-increased the vertical specialization share from 2007.

Chinese Low-Tech export at outset (in 1995) promoted the most world export among the four technology levels. Yet its vertical specialization share declined over time. In 2012, a unit of Chinese Low-Tech export needed much less imported inputs than sophisticated one. Among the regions, a unit of US's Low-Tech import from China promoted the most world export. Only in 2012, a unit of European Low-Tech import promoted a little more world export than US. For Medium technology level (Medium-High-Tech and Medium-Low-Tech), Chinese export to Asia needed the most imported inputs among the regions.

The sectors whose export of China led the most world export were office accounting computing machinery, radio television, communication equipment (high-technology) and textile, leather and footwear (low-technology).

For the calculation of vertical specialization share (VSS), it should be noted that the share of imported intermediate inputs used for low-technology industries' production in Chinese overall manufacturing exports is not equal to the share of imported inputs in Chinese low-technology exports.

The share of imported inputs used for low-technology production in Chinese manufacturing exports (VSS_{MANUF}^{LT}) is defined in Equation (54). Its denominator here is the manufacturing exports (EXP_{MANUF}). Sector *i* comprises five Low-Tech sectors according to OECD input-output table's classification in Appendix 2.

The share of imported inputs in Chinese low-technology exports (VSS_{LT}) is defined in Equation (55), where the denominator is Low-technology exports (EXP_{LT}).

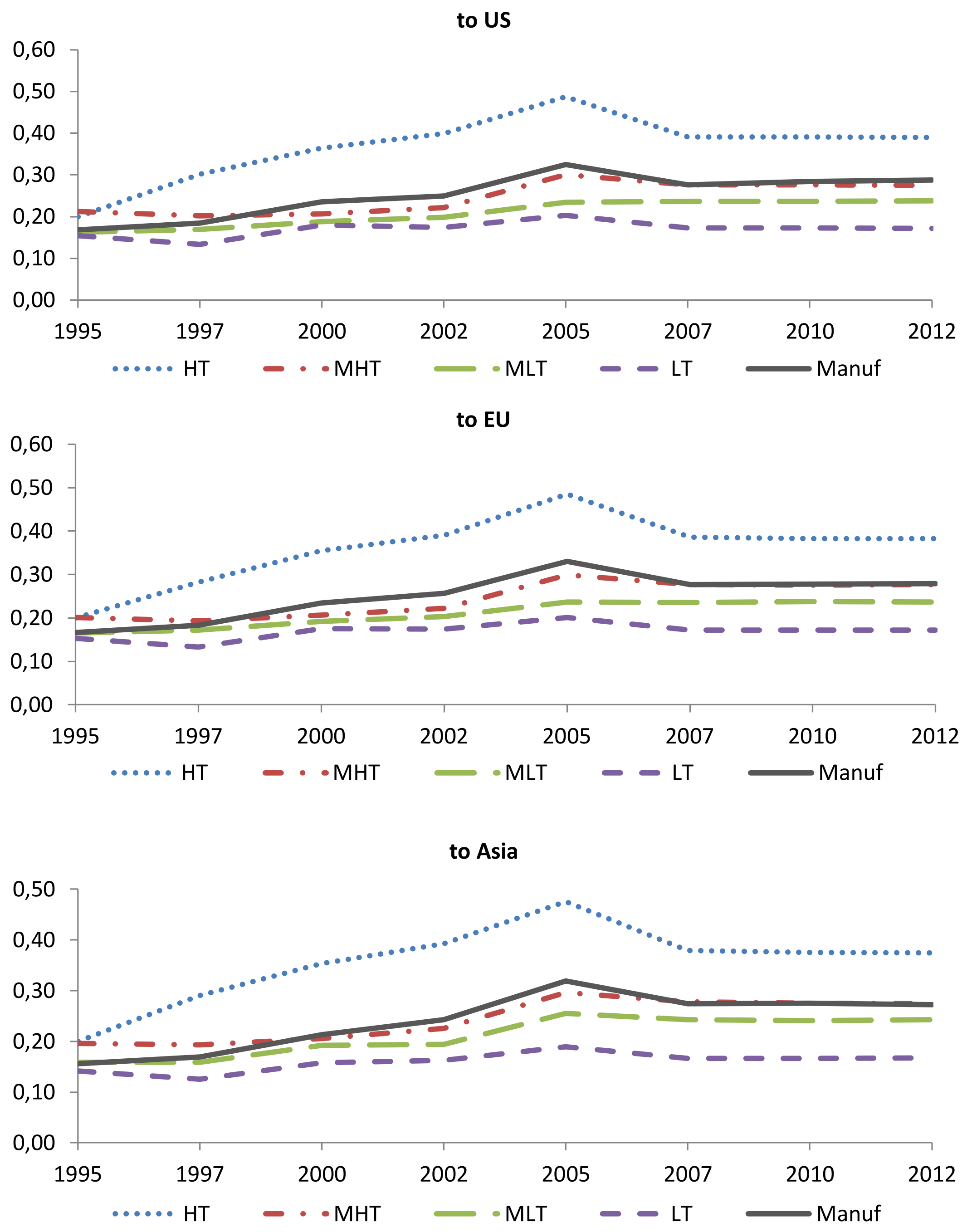
$$VSS_{MANUF}^{LT} = \sum_{i=1}^{5} (uA^M(I-A^D)^{-1} * (EXP_i/EXP_{MANUF})) \quad (54)$$

$$VSS_{LT} = \sum_{i=1}^{5} (uA^M(I-A^D)^{-1} * (EXP_i/EXP_{LT})) \quad (55)$$

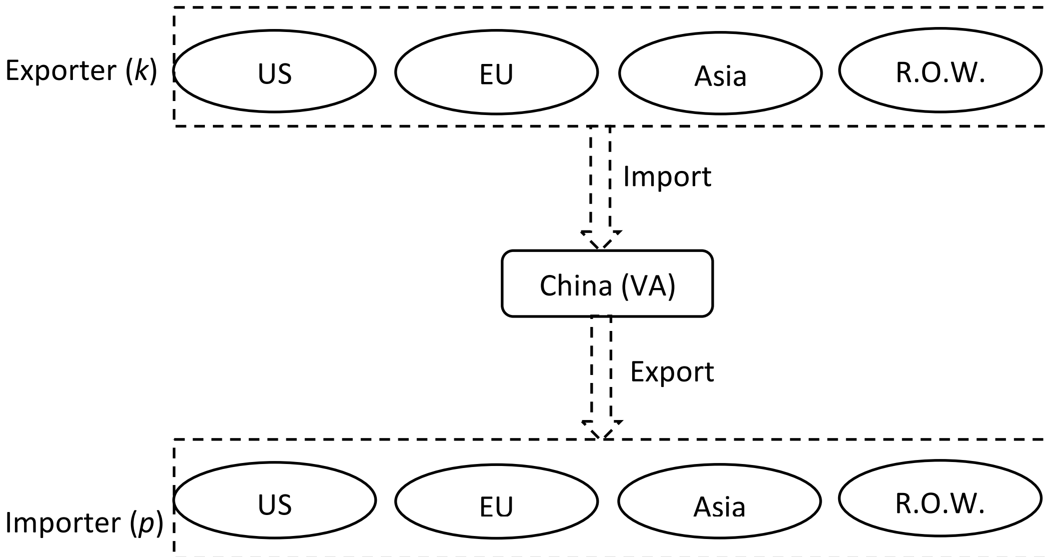
$$VS_{MANUF}^{LT} = \sum_{i=1}^{5} (uA^M(I-A^D)^{-1} * EXP_i) = VS_{LT} \quad (56)$$

As for vertical specialization share of exports at other technology levels, the same distinction should be also taken into account. This chapter focuses on the vertical specialization (VS) of Chinese exports rather than vertical specialization share (VSS) of a unit of export. Hence there is no difference between VS_{MANUF}^{LT} and VS_{LT} as showed in Equation (56). The index of VS is illustrated in Figure 3-9.

Figure 3-9 China’s vertical specialization of a unit of export

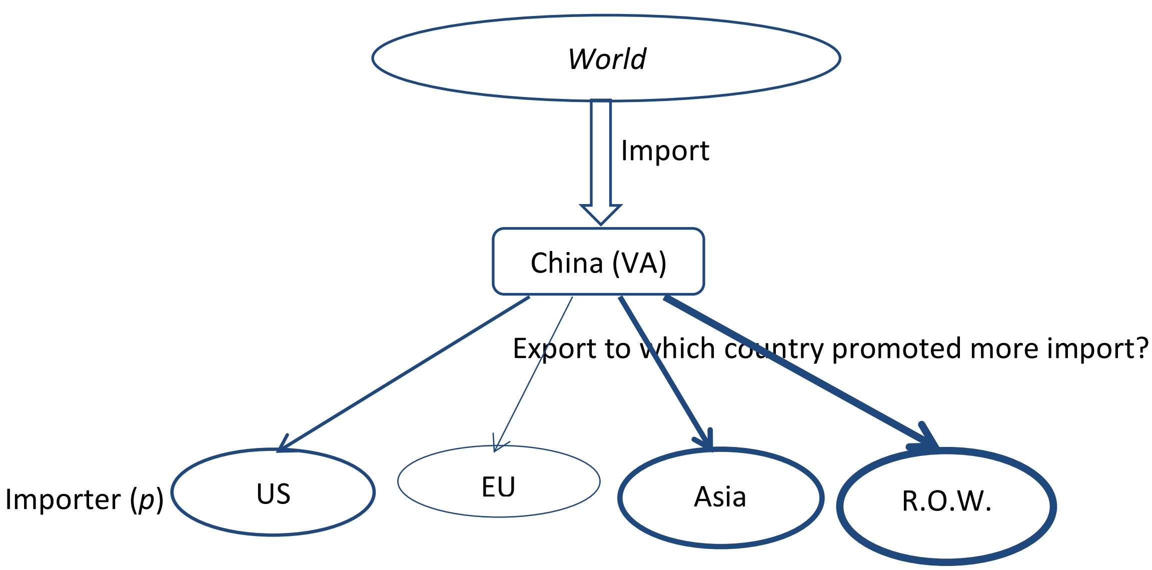


4. China's impact on world export by importer and by exporter



As concluded previously, China's imported inputs for its exports differed across countries and regions. The amounts of vertical specialization of exports are displayed in regional input-output table. This section uses the regional input-output table of 1995-2012 and investigates how much did China import from country *k* (exporter) for Chinese exports to country *p* (importer) over this period. The world here is divided into four groups: US, European Union, Asia and Rest of the world (R.O.W.). The impact of Chinese rising exports on world export will be studied by importer (*p*) and by exporter (*k*).

4.1 China's impact on world export by importer



We firstly talk about China's impact on world export by importer (*p*) and answer the question "China's exports to which country or region needed more imported inputs?" another saying, "China's exports to which country or region promoted more world export?" or "Which country or region's imports from China caused more Chinese imports? The process is pictured above.

Figure 3-10 world export led by Chinese manufacturing exports to each country

(billion dollars)

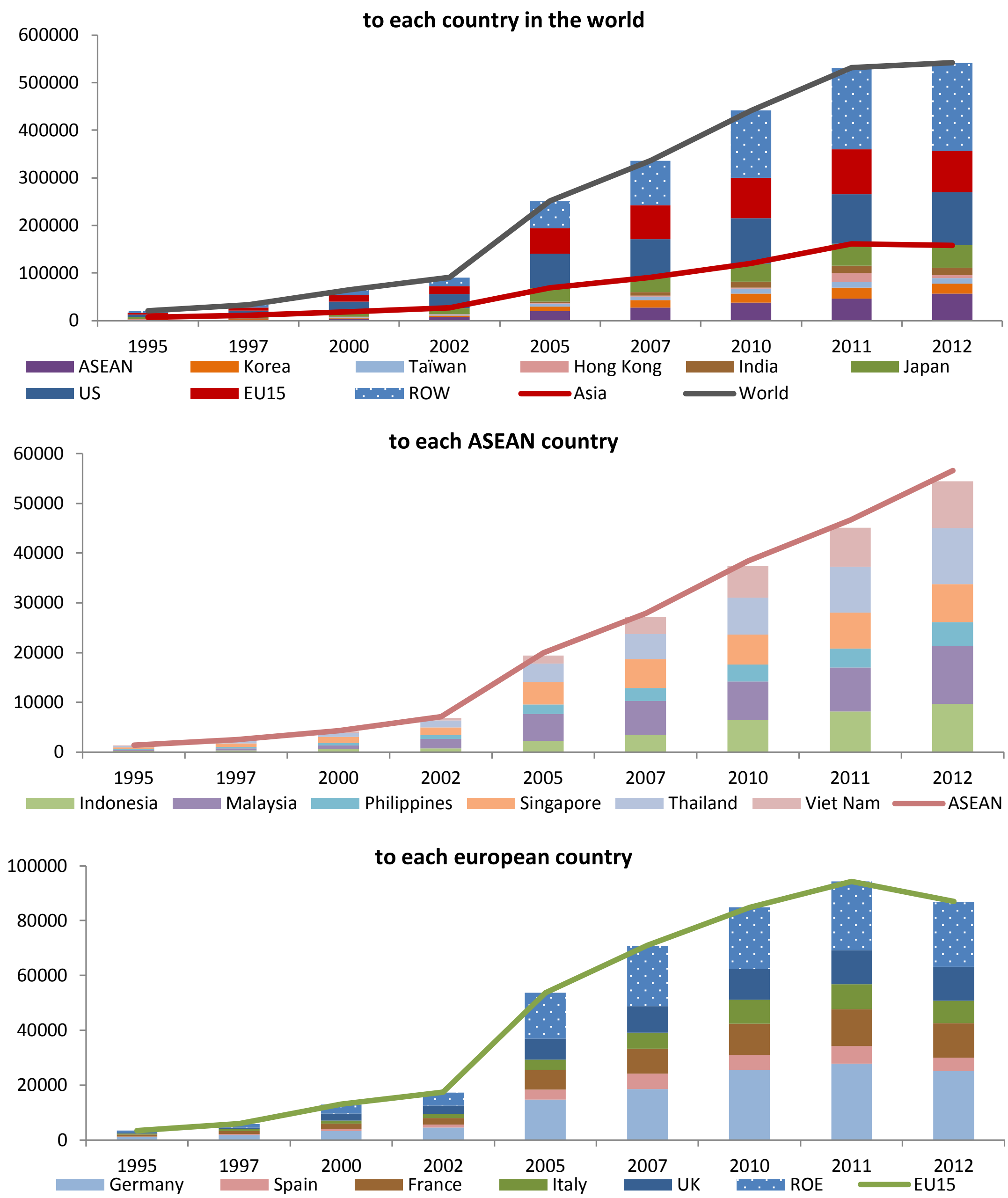


Figure 3-11 world export led by Chinese manufacturing exports to each country (%, 1995=100)

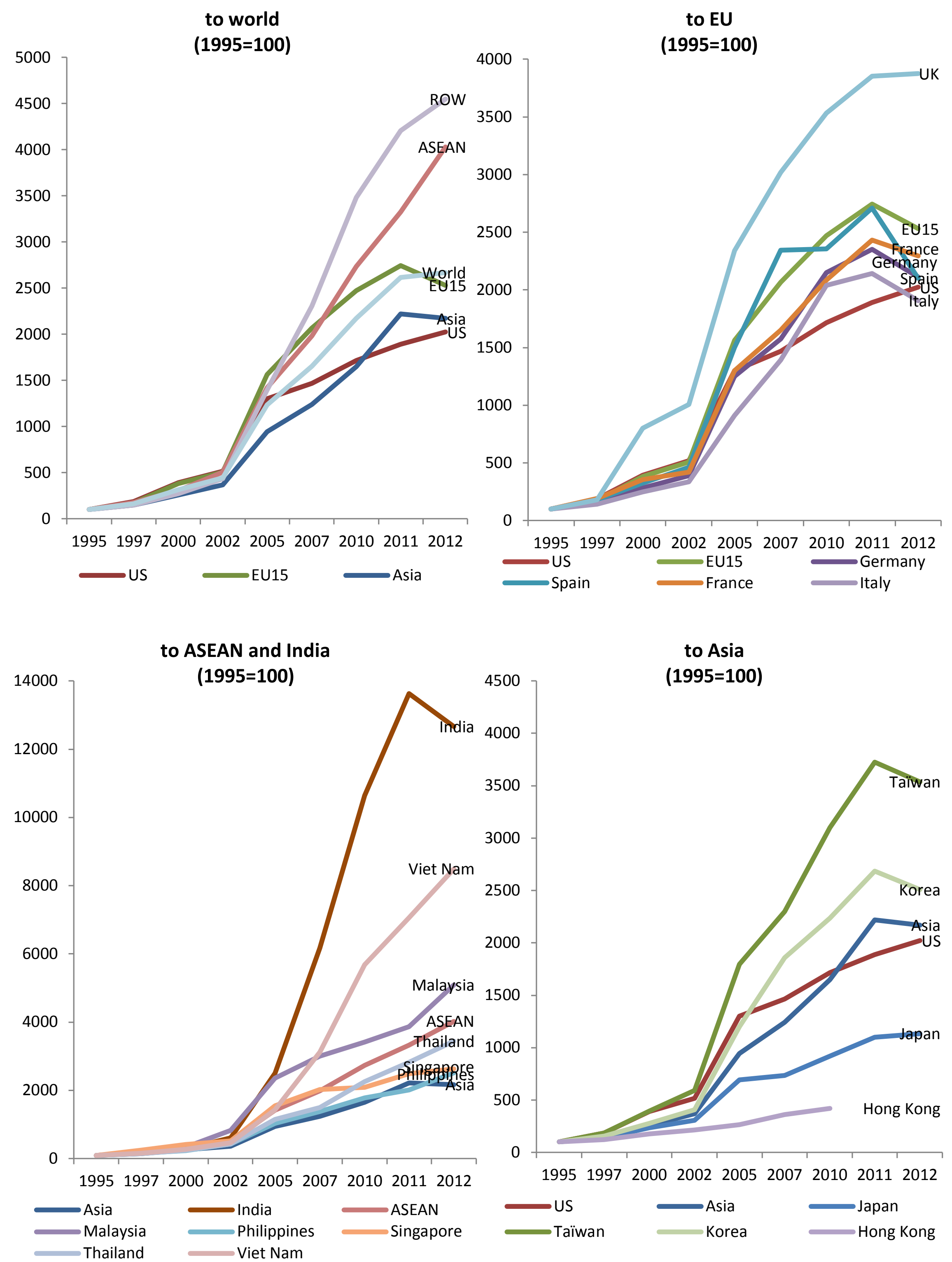


Figure 3-10 shows the world export led by China's exports to each country by level at billion dollars. Figure 3-11 shows that by growth rate relative to 1995 at percentage. The following table displays the shares of each importing country in the world measured by world export led by Chinese exports to them. The table also illustrates the growth rates of world export led by Chinese exports to these countries relative to 1995. The order is from high to low.

world export led by Chinese exports to each country					
Share in the world 1995 (%)		Share in the world 2012 (%)		Growth 1995-2012 1995=100 (%)	
Asia	35,89	ROW	34.14	India	12668
US	27,18	Asia	29.20	Viet Nam	8495
Japan	20,41	US	20.61	Malaysia	5094
ROW	20,02	EU15	16.05	ROW	4549
EU15	16,92	ASEAN	10.45	Indonesia	4333
ASEAN	6,92	Japan	8.69	ASEAN	4030
Germany	5,85	Germany	4.63	UK	3876
Korea	4,09	Korea	3.85	Taiwan	3537
France	2,72	India	2.86	Thailand	3438
Hong Kong	2,25	France	2.34	World	2667
Italy	2,10	UK	2.30	Singapore	2638
Taiwan	1,62	Taiwan	2.15	EU15	2531
Thailand	1,61	Malaysia	2.14	Philippines	2521
UK	1,58	Thailand	2.08	Korea	2509
Singapore	1,42	Indonesia	1.80	France	2294
Spain	1,15	Viet Nam	1.74	Asia	2170
Malaysia	1,12	Italy	1.50	Germany	2114
Indonesia	1,11	Singapore	1.41	Spain	2101
Philippines	0,93	Hong Kong	1.21	US	2023
India	0,60	Spain	0.91	Italy	1907
Viet Nam	0,55	Philippines	0.88	Hong Kong	1439
World	100	world	100	Japan	1135

When regarding the share of each country in the world by level, in 2012, more than 1/3 of China's imported inputs were used for Chinese exports to the group of Rest of the World (ROW); 29% for Chinese exports to Asia; 21% for Chinese exports to US and 16% for Chinese exports to European Union. It indicates that Chinese manufacturing exports to R.O.W. embodied the most imported inputs and promoted the most world export.

The impact of Chinese exports to the group of R.O.W. intensified quickly. Its world share rose by 14% over 1995-2012. In 1995, the world export led by Chinese exports to them was less than that led by Chinese exports to US and Japan. Yet in 2012, Chinese exports to R.O.W. already promoted more world export than the exports to Asia and US. Different from ROW, the impact of Chinese exports to overall Asia enlarged slowly. Asia's share in the world decreased from 36% in 1995 to 29% in 2012 (declined by 7%).

Among importing countries, although US's world share fell by nearly 7% during 1995-2012, Chinese exports to US in 2012 needed the most imported inputs and promoted the most world export. This conclusion is the same as that of last section. Therefore when we measure China's impact by exporter in next section, we will study Chinese exports to US firstly.

Excluding US, Chinese exports to Japan promoted the most world export in 2012 among Asian countries. Chinese exports to Germany promoted the most export among European Union. These two countries' share in the world both declined from 1995 to 2012. Japanese share decreased from 20% in 1995 to 8.7% in 2012. It decreased the fastest in the world and much faster than Germany's share, which decreased by only 1% during these years. However, Japan's imports from China in 2012 still embodied more imported inputs than Germany and it incited more world export. US and Japan were still the largest two importers whose imports from China promoted the most world export in 2012. In addition, it should be noted that among European countries, the impact of Chinese exports to UK on world export increased the most rapidly, even faster than that to Germany.

During 1995-2012, the impact of Chinese exports to India and Vietnam on world export has enlarged the fastest among all the countries. They rose by 12668% and 8495% respectively over this period. In 1995, Chinese exports to them promoted the least world export, representing only 1.2% of the world export led by Chinese manufacturing exports. Until 2012, India's share has attained 2.9%. Chinese exports to India promoted more world export than Chinese exports to nearly all European countries (excluding Germany). Among Asian region, the impact of Chinese exports to India was only smaller than that to Japan and Korea. Vietnam's share in the world increased to 1.7% in 2012. It was larger than the share of many European countries (Italy and Spain) and Asian countries (Singapore, Hong Kong and the Philippines).

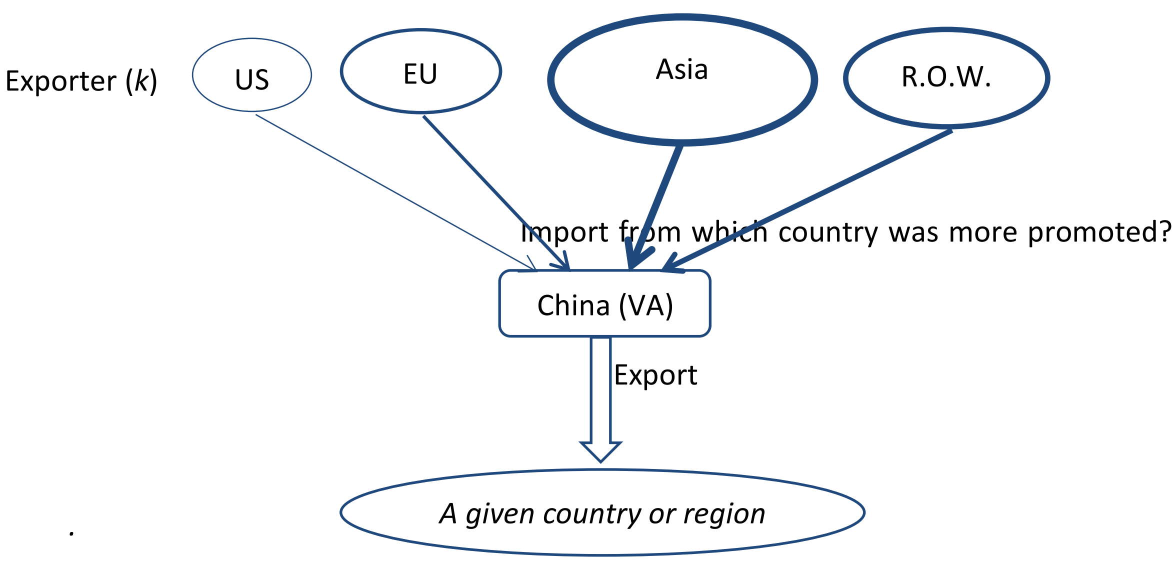
The world export led by Chinese exports to ASEAN countries also increased fast over 1995-2012. The fastest expanding importers (excluding India but including Vietnam, Malaysia and Indonesia) are nearly all ASEAN countries. Furthermore, Figure 3-11 illustrates that between 2011 and 2012, the world export led by Chinese exports to other countries mainly decreased or decelerated, except for US and ASEAN countries. The growth of Chinese imported inputs for the exports to some ASEAN countries such as Malaysia and Philippine even accelerated.

When taking technology levels into account, Chinese sophisticated exports to all the countries promoted more world export than low-technology ones. Firstly, a unit of Chinese high-technology export embodied more imported inputs than low-technology one. Secondly, Chinese sophisticated exports to most countries increased faster than its lower technology exports.

For Chinese sophisticated exports, its High-Tech exports generally promoted much more world export than Medium-High-Tech one. Nevertheless, for Chinese exports to India, Vietnam and Indonesia, whose impacts on world export enlarged the most quickly, Chinese High-Tech exports to them promoted less world export than Medium-High-Tech one.

In terms of Chinese low-technology exports, the Medium-Low-Tech exports to Asian countries (except Japan) led more world export than Low-Tech one. By contrast, Chinese Medium-Low-Tech exports to the rest of countries promoted less world export than Low-Tech one. Furthermore, Chinese Low-Tech exports to some European countries (UK, France and Spain) promoted even more world export than Medium-High-Tech one.

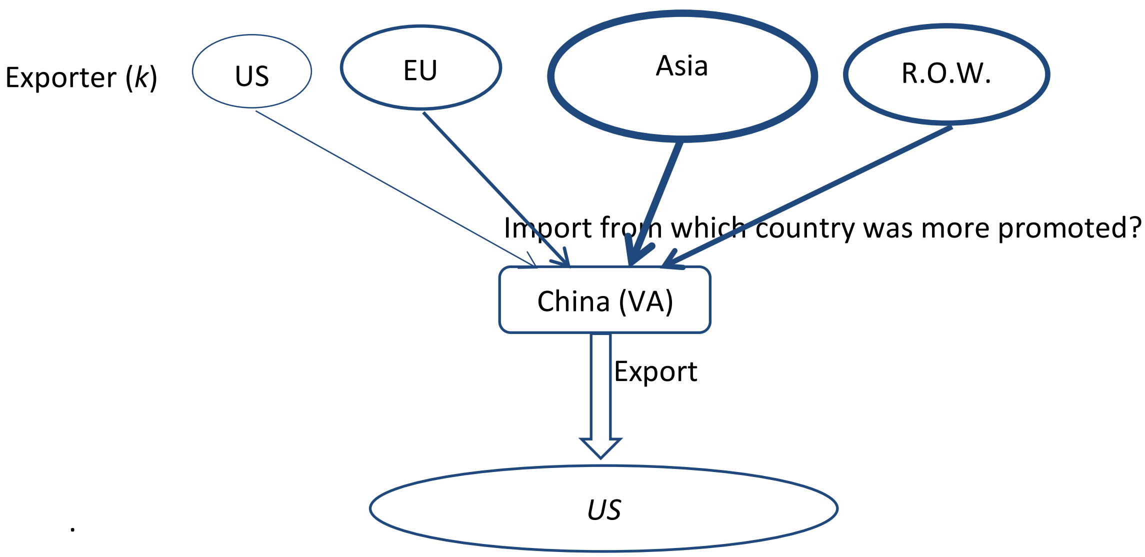
4.2 China's impact on world export by exporter



We secondly talk about China's impact on world export by exporter (k) and answer the question "China's exports to a given country or region needed more inputs imported from whom?" another saying, "which country or region profited more from China's exports to a given country or region?"

4.2.1 Impact of Chinese exports to US on world export

As concluded in last section, Chinese exports to US in 2012 promoted the most world export among all the countries. Thus we study the impact of Chinese exports to US firstly. The question to answer is "China's exports to US needed more inputs imported from which country or region?", in other words, "Which country or region profited more from China's exports to US?" The process is pictured below.



As the impact of Chinese exports to US on the world differs across technology levels, we analyze the impact at each technology level separately. In the following study, four technology levels will be mentioned, including High-Tech, Medium-High-Tech, Medium-Low-Tech and Low-Tech. Due to the availability of trade data and I-O tables, we research the impact of Chinese manufacturing exports during 1995-2012 rather than the impact of Chinese overall exports. The correspondence between manufacturing sectors and the technology levels is showed in Appendix 2.

4.2.1.1 Impact of Chinese overall manufacturing exports to US

Figure 3-12 each country's exports led by Chinese manufacturing exports to US (billion dollars)

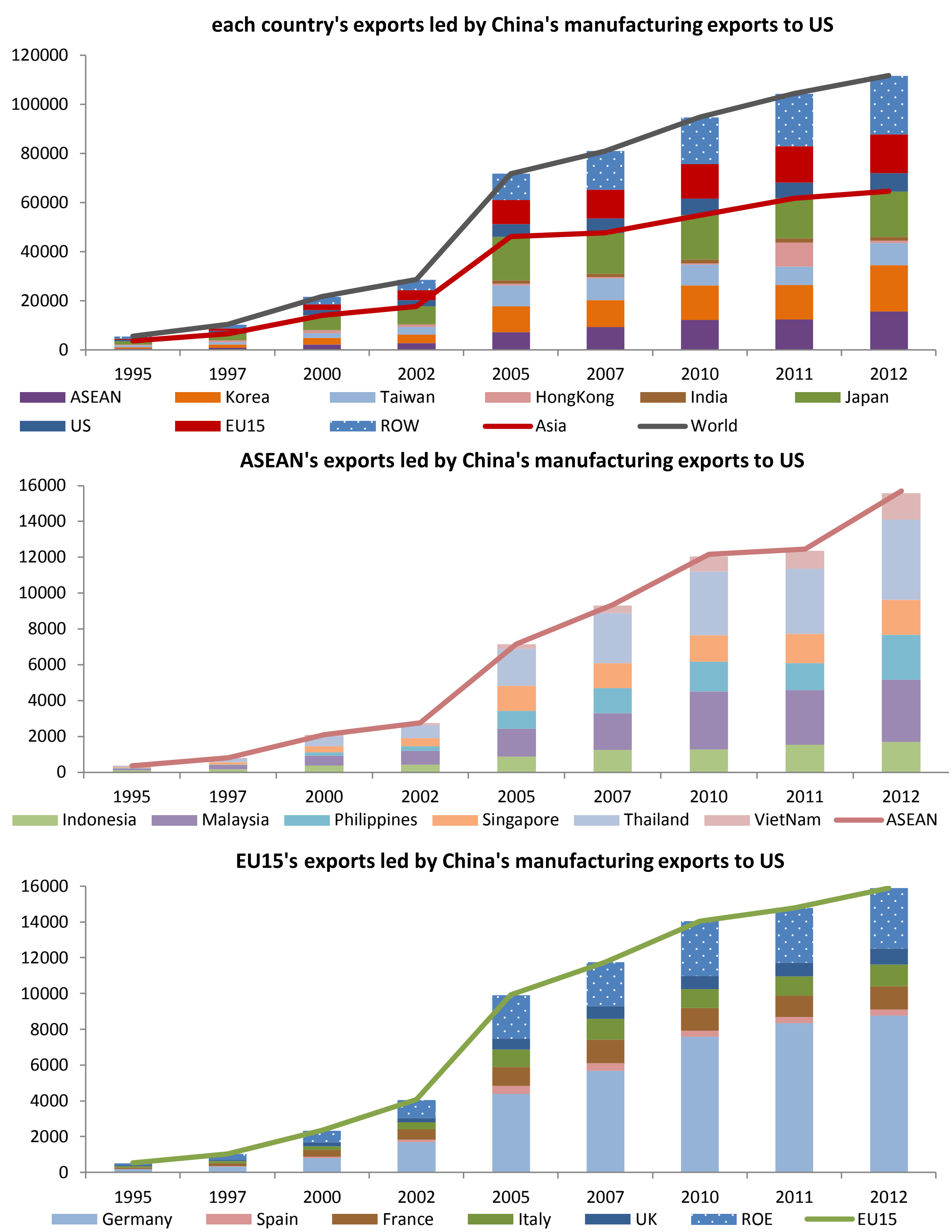
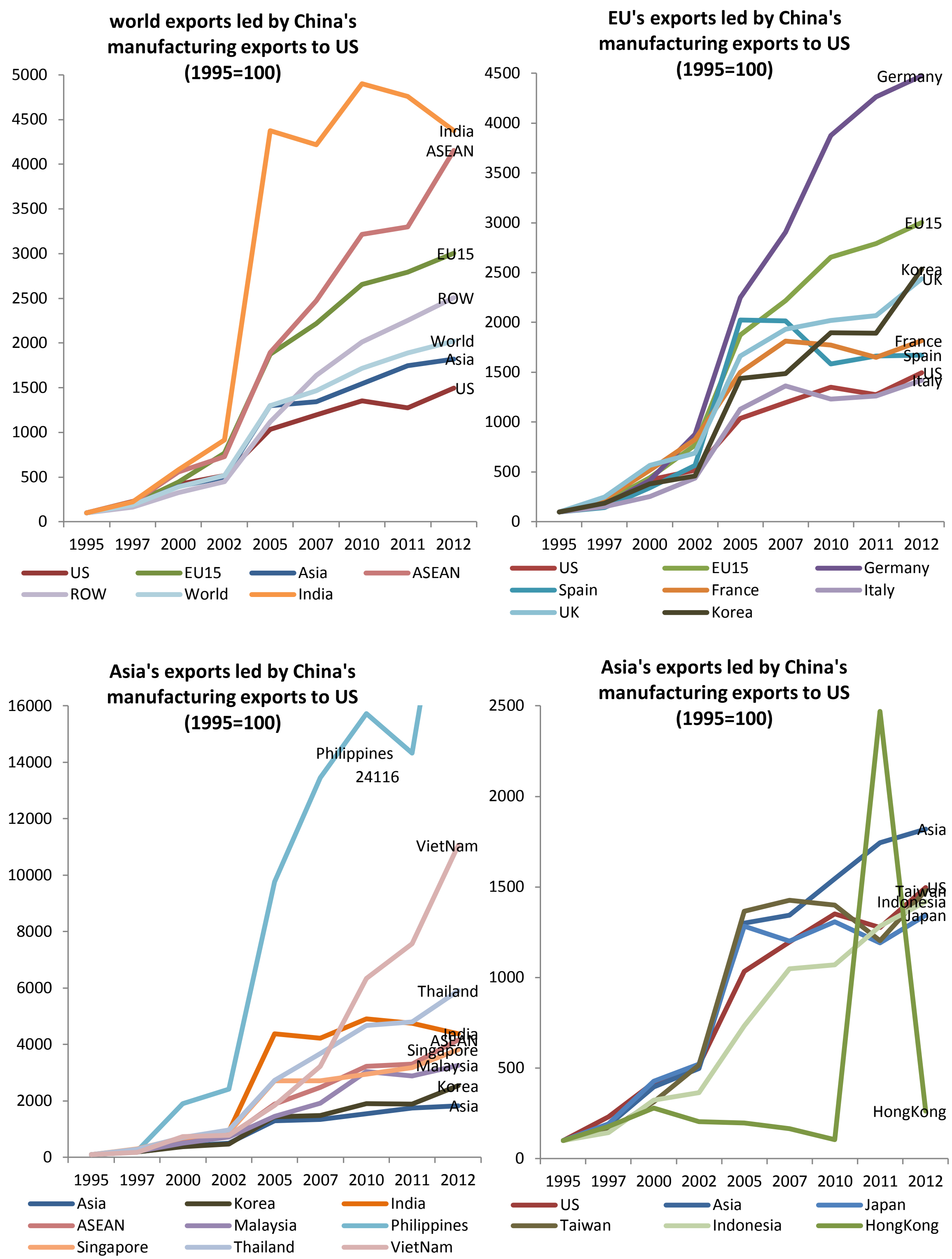


Figure 3-13 each country's exports led by Chinese manufacturing exports to US (%, 1995=100)



The impact of China's overall manufacturing exports to US on world export is showed by level (billion dollars) in Figure 3-12 and by growth rate relative to 1995 (percentage) in Figure 3-13. Table 3-13 shows the share of each country in the world measured by their exports led by Chinese manufacturing exports to US. Asia's exports to China for Chinese exports to US occupied more than the half of the world.

[Table 3-13] [Table 3-14]

each country's exports led by Chinese exports to US					
1995 (billion dollar)		2012 (billion dollar)		Growth 1995=100 (%)	
World	5520	World	111658	Philippines	24116
Asia	3543	Asia	64495	Viet Nam	11055
Japan	1377	ROW	23831	Thailand	5904
ROW	951	Korea	18761	Germany	4473
Korea	740	Japan	18521	India	4376
Taiwan	610	EU15	15896	ASEAN	4154
EU15	530	ASEAN	15699	Singapore	3813
US	497	Taiwan	9024	Malaysia	3252
Hong Kong	404	Germany	8767	EU15	3002
ASEAN	378	US	7436	Korea	2534
Germany	196	Thailand	4494	ROW	2506
Indonesia	120	Malaysia	3467	UK	2437
Malaysia	107	Philippines	2517	World	2023
Italy	85	Singapore	1935	Asia	1820
Thailand	76	Indonesia	1703	France	1818
France	72	Viet Nam	1464	Spain	1672
Singapore	51	India	1430	US	1496
UK	37	France	1306	Taiwan	1479
India	33	Italy	1211	Indonesia	1419
Spain	21	Hong Kong	1060	Italy	1419
Viet Nam	13	UK	892	Japan	1345
Philippines	10	Spain	355	Hong Kong	262

Generally, 2002 is the key year when all the countries' exports led by Chinese manufacturing exports to US begun increasing extremely fast. Asia's overall exports led by China increased more quickly than that of US but less rapidly than Europe. Indeed, most of European countries' exports led by China rose more slowly than that of Asian economies. Among European Union, Germany's exports to China for Chinese manufacturing exports to US ascended the most rapidly in Europe and more rapidly than several Asian countries. Among Asia, Japan's exports to China for Chinese manufacturing exports to US rose the least quickly and less quickly than European countries. Under the influence of these two countries, Asia's overall exports promoted by Chinese exports to US increased less rapidly than that of Europe.

When looking at each Asian country, ASEAN economies' performances were outstanding. In 2012, they accounted for 14% in the world measured by the export led by Chinese manufacturing exports to US. ASEAN countries' share in the world showed in Table 3-13 remained around 10% when entering twenty-first century. Although their share reduced by 1% from 2010 to 2011, it re-increased to 14% in 2012. Besides, ASEAN's exports driven by Chinese manufacturing exports to US increased faster than that of the rest of the world (except for India).Among ASEAN countries, the Philippines, Vietnam and Thailand's exports led by Chinese manufacturing exports to US rose faster than that of India. They are three countries whose exports profited from Chinese manufacturing exports to US increased the fastest over the world.

Philippines' exports led by China went down over 2010-2011. That of Vietnam still increased but the growth slowed down during this year. From 2011, the former re-increased and the later increased much faster than before. It should be noted that even though a rapid increase, Philippines and Vietnam's shares in the world were only 2% (for Philippines) and 1% (for Vietnam). They were not as large as that of other Asian industrialized countries (such as Thailand and Malaysia).

Thailand's exports led by Chinese manufacturing exports to US increased less rapidly than Philippines and Vietnam. Yet Thailand represented 4% of the world. This share was the largest among ASEAN countries. As same as the Philippines and Vietnam, Thailand's speed of growth slowed down from 2010 and re-increased after one year.

Singapore's speed of growth was lower than that of the Philippines, Vietnam and Thailand. Yet it was higher than that of the rest Asian countries. In 1995, Singapore's share in the world measured by the export led by Chinese manufacturing exports to US was only 0.9%. Until 2012, it has increased to 1.7%.

Malaysia's share of exports promoted by China occupied 3% in the world in 2012. Its share was the second largest among ASEAN countries, only behind Thailand. Malaysia's exports led by Chinese exports to US expanded the most quickly during the period of 2007-2010.

Indonesia's speed of growth was one of the lowest in Asia. It is the only ASEAN country whose speed was lower than Asian average level. Indeed, its level was beyond Asian overall level before 2007. However, Indonesian exports to China for Chinese manufacturing exports to US declined from 2007. Thus, its share in the world was 2.2% in 1995, which was the biggest among ASEAN countries. Until 2012, the share has decreased to 1.5%, which was the second smallest among ASEAN economies.

Indian exports led by Chinese manufacturing exports to US increased faster than most Asian countries over 1995-2012. However, its share in the world in 2012 was not as large as that of other economies. India occupied only 1% of the world export led by Chinese manufacturing exports to US. Besides, its share has reduced since 2005. In Figure 3-13, we could see that from 2005, nearly all the Asian countries' growth has slowed down even reduced. Until 2011, they have recovered.

Korea, Japan and Taiwan are the three Asian countries from whom China imported the most for its manufacturing exports to US. In 2012, they occupied respectively 16.8%, 16.6% and 8% of Chinese total imports for its manufacturing exports to US.

Korea profited the most from Chinese manufacturing exports to US in addition to ASEAN countries. Its share in the world reduced from 15% to 13% during 2010 and 2011. Yet in 2012, it re-increased to 17%. Its speed of growth was lower than that of India and ASEAN countries but higher than that of Japan, Taiwan, most European countries and US.

Japan and Taiwan also profited much from Chinese manufacturing exports to US. They accounted for a large share in the world but the shares reduced over time. Their exports led by Chinese manufacturing exports to US increased more slowly than that of Asian region. In 1995, Japan and Taiwan's shares in the world were 25% and 11%. Until 2012, Japan's share has reduced to 17% and Taiwan to 8%. The evolution of their exports led by China was similar before 2005. From then to 2007, Japan's exports led by China decreased, while that of Taiwan still increased but the growth slowed down. After 2007 their evolutions returned similar, noting a rapid increase from 2007 to 2010, a reduction over 2010-2011, then re-increasing. Also after 2007, Japan's growth rate was lower than that of Taiwan and it was the lowest over the world, except for Hong Kong.

As Figure 3-13 showed, the growth speed of Hong Kong's exports to China for Chinese manufacturing exports to US remained lower than that of Japan. It continued falling down during the decade of 2000-2010, then a little increase[47].

As for European Union, it represented 14% in the world measured by the export to China for Chinese manufacturing exports to US in 2012. This share was much smaller than Asian share (58%). Yet it continued rising generally, while Asian share fell by 7% over 1995-2012. Among European Union, Germany profited the most from Chinese

[47] The estimation of Hong Kong in 2011 is not taken into account because the evolution was abnormal.

manufacturing exports to US. For one thing, Germany's share of exports to China for Chinese manufacturing exports to US illustrated in Table 3-13 was the largest among European countries. It occupied more than the half of European overall exports led by China. For another, Germany's speed of raise revealed in Figure 3-13 was also the highest in Europe. It rose from 3.6% in 1995 to 7.9% in 2012. It should be noted that since 2010, the growth of EU's exports led by Chinese manufacturing exports to US has slowed down like what has happened in Asia. Until 2011, most European countries have recovered except for Germany and Spain.

UK's exports led by Chinese exports to US increased the fastest among European countries from 2011. Its general speed of growth over 1995-2012 was only lower than Germany. However, it accounted for only 1% of world export led by Chinese manufacturing exports to US in 2012. This percentage was much smaller than that of Germany (8%). These two European countries' speeds of growth were both higher than that of Korea[48], while other European countries' speeds were all lower than this Asian country.

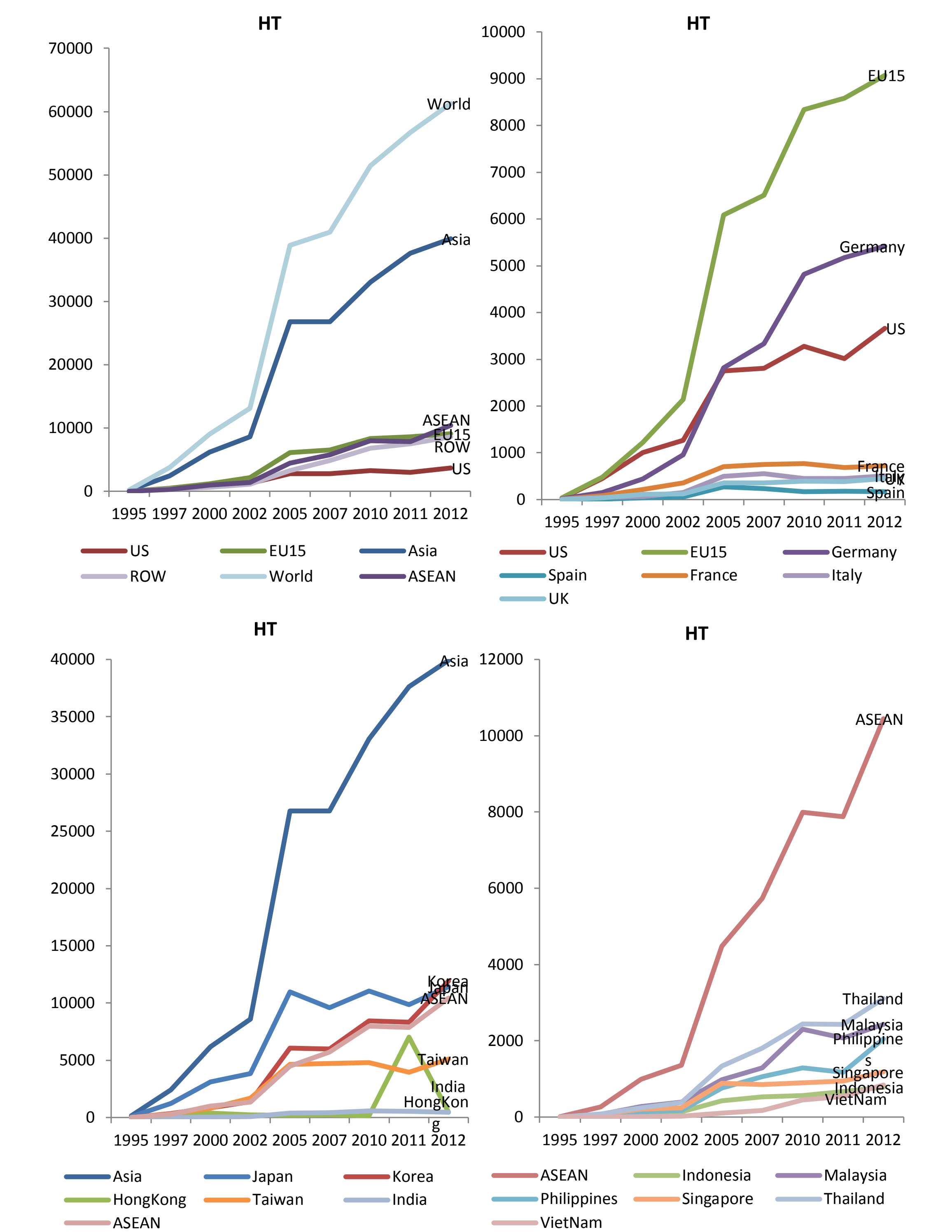
As showed in Figure 3-12, France's exports led by Chinese manufacturing exports to US were more than that of UK. Yet French exports rose less quickly than the later and its share in the world continued reducing from 2002. Italy and Spain's speeds of growth were both lower than other European countries but their shares of exports led by China in the world still cannot be ignored, especially Italy, whose share in the world was always around 1%. Besides, Spain's exports led by Chinese manufacturing exports to US before 2007 rose faster than most of European countries.

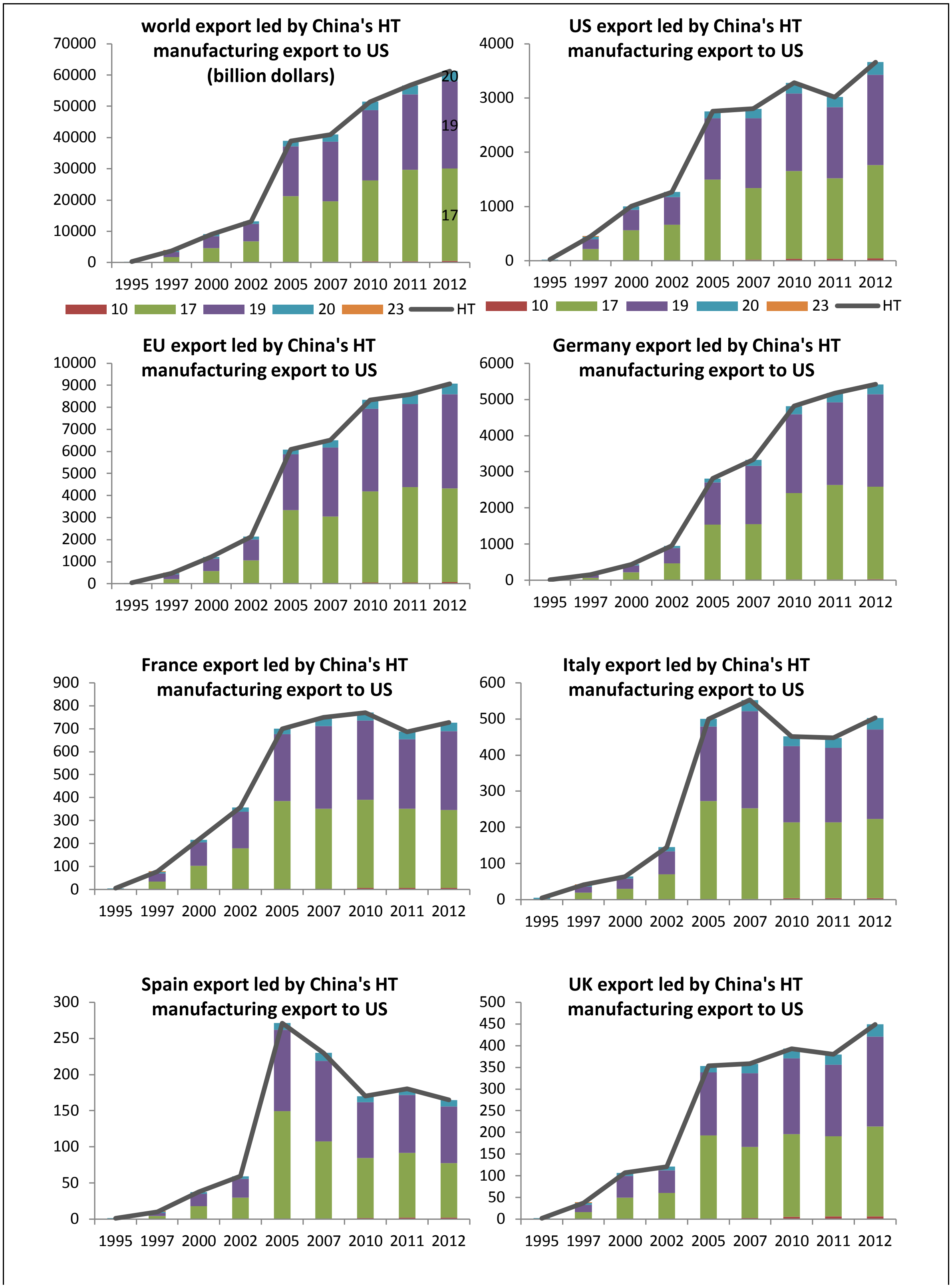
In 2012, US's exports led by China occupied 7% in the world. Indeed, the share was ever higher than 11% in 1997. Since this year until 2011, US's share has begun to reduce. As revealed in Figure 3-12, its growth rate of 2012 relative to 1995 was only a little higher than that of Italy, Japan, Indonesia and Hong Kong, whose growth speeds were the lowest in the world. Thus US's exports to China for Chinese manufacturing production did not rise as quickly as that of other Asian and European countries.

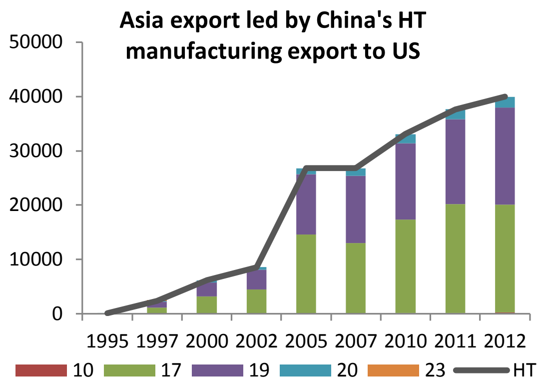
[48] Except for 2012, UK's level was a little lower than Korea.

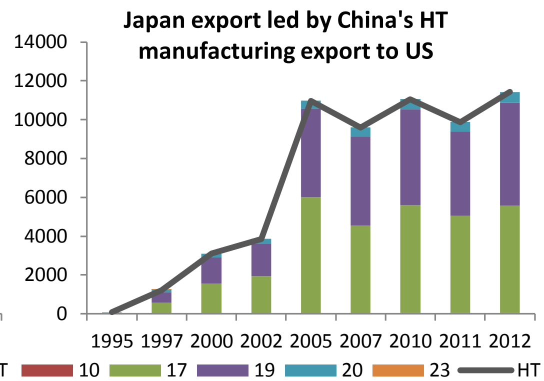
4.2.1.2 Impact of Chinese High-Tech exports to US

Figure 3-14 each country's exports led by Chinese High-Tech exports to US (billion dollars)

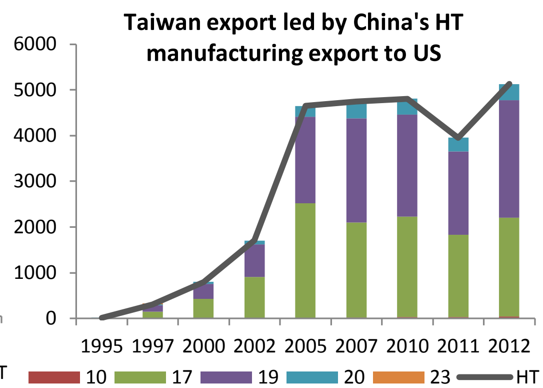



world export led by China's HT manufacturing export to US (billion dollars)
70000 60000 50000 40000 30000 20000 10000 0
1995 1997 2000 2002 2005 2007 2010 2011 2012
20
19
17
10 17 19 20 23 HT
US export led by China's HT manufacturing export to US
4000 3000 2000 1000 0
1995 1997 2000 2002 2005 2007 2010 2011 2012
10 17 19 20 23 HT
EU export led by China's HT manufacturing export to US
10000 9000 8000 7000 6000 5000 4000 3000 2000 1000 0
1995 1997 2000 2002 2005 2007 2010 2011 2012
Germany export led by China's HT manufacturing export to US
6000 5000 4000 3000 2000 1000 0
1995 1997 2000 2002 2005 2007 2010 2011 2012
France export led by China's HT manufacturing export to US
900 800 700 600 500 400 300 200 100 0
1995 1997 2000 2002 2005 2007 2010 2011 2012
Italy export led by China's HT manufacturing export to US
600 500 400 300 200 100 0
1995 1997 2000 2002 2005 2007 2010 2011 2012
Spain export led by China's HT manufacturing export to US
300 250 200 150 100 50 0
1995 1997 2000 2002 2005 2007 2010 2011 2012
UK export led by China's HT manufacturing export to US
500 450 400 350 300 250 200 150 100 50 0
1995 1997 2000 2002 2005 2007 2010 2011 2012

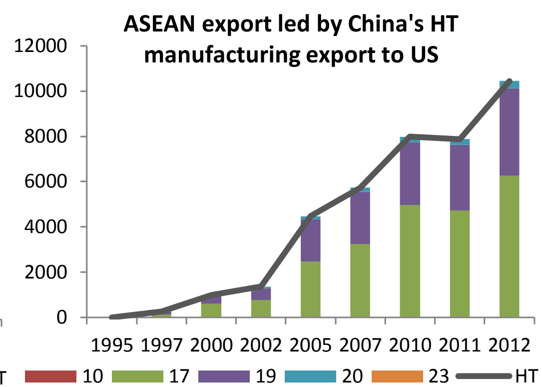

Asia export led by China's HT manufacturing export to US
50000
40000
30000
20000
10000
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
10 17 19 20 23 HT

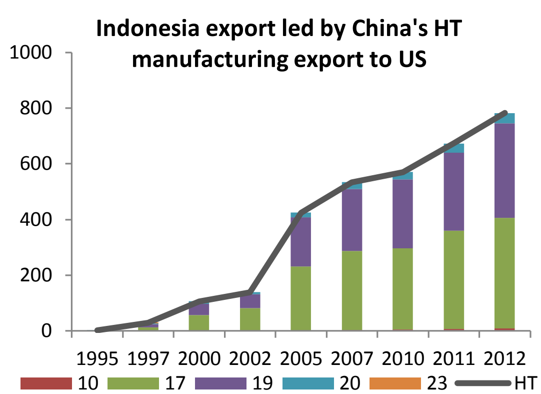

Japan export led by China's HT manufacturing export to US
14000
12000
10000
8000
6000
4000
2000
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
10 17 19 20 23 HT

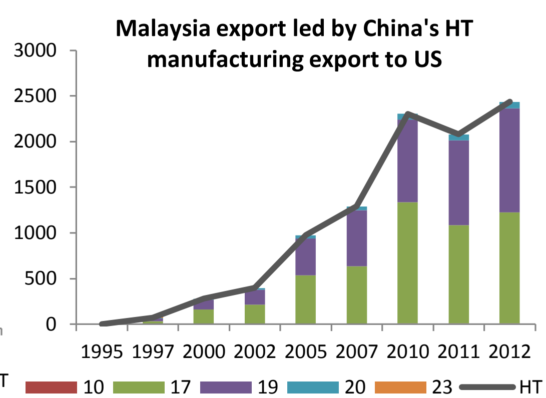

Korea export led by China's HT manufacturing export to US
14000
12000
10000
8000
6000
4000
2000
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
10 17 19 20 23 HT


Taiwan export led by China's HT manufacturing export to US
6000
5000
4000
3000
2000
1000
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
10 17 19 20 23 HT


India export led by China's HT manufacturing export to US
600
500
400
300
200
100
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
10 17 19 20 23 HT


ASEAN export led by China's HT manufacturing export to US
12000
10000
8000
6000
4000
2000
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
10 17 19 20 23 HT


Indonesia export led by China's HT manufacturing export to US
1000
800
600
400
200
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
10 17 19 20 23 HT


Malaysia export led by China's HT manufacturing export to US
3000
2500
2000
1500
1000
500
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
10 17 19 20 23 HT

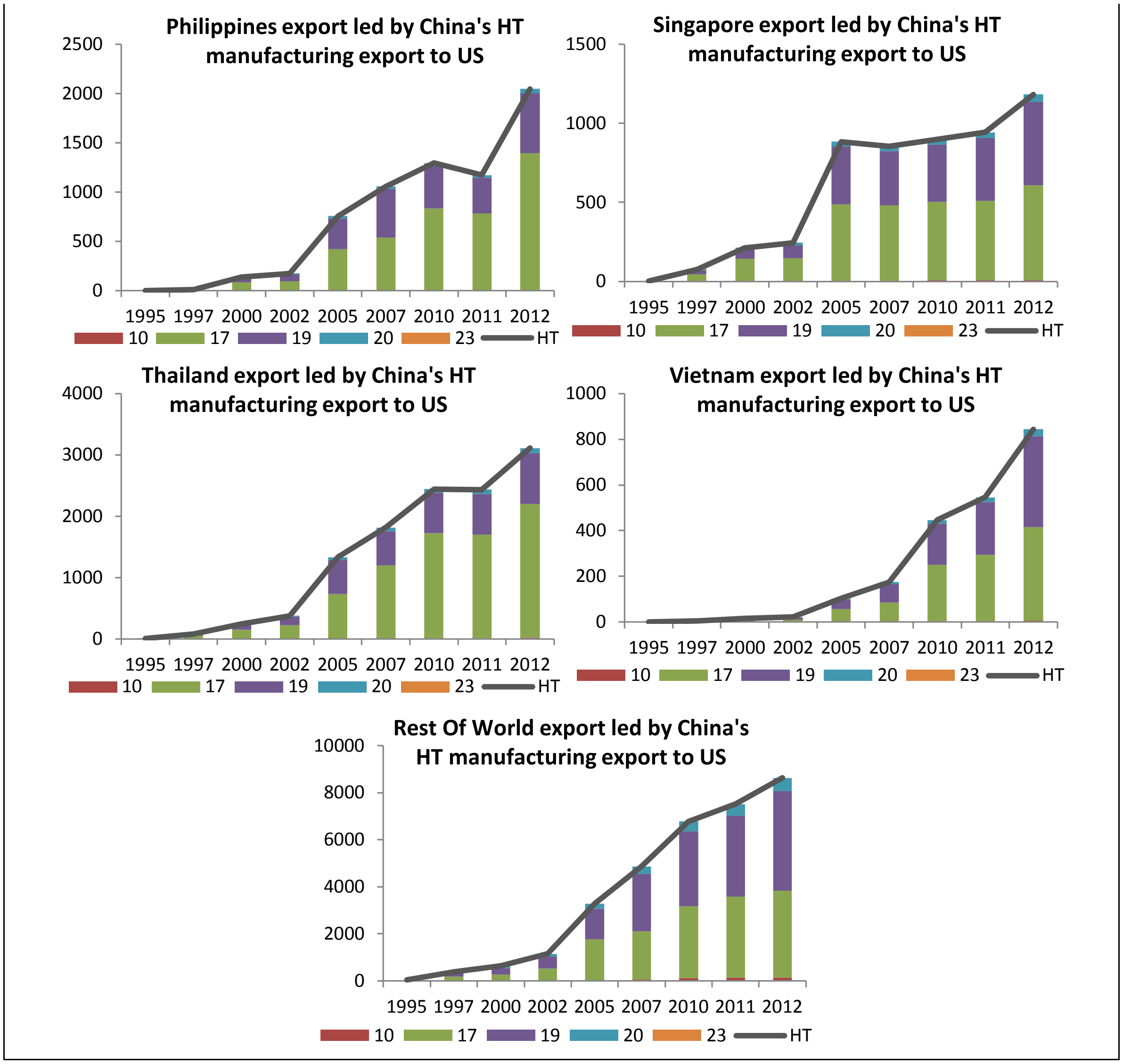


Figure 3-14 shows the growth of exports led by Chinese High-Tech exports to US. All the countries' growths accelerated in 2002 and slowed down from 2005. Chinese exports of office accounting computing machinery (code 17[49]) and radio television, communication equipment (code 19) to US promoted much more exports of other countries than other highly qualified sectors.

Among all the regions, Asia was the largest beneficiary of Chinese High-Tech exports to US. Its share of exports profited from Chinese High-Tech exports to US was higher than that from Chinese overall manufacturing exports. As illustrated in Table 3-15, in 2012 Asia accounted for 65% of world export led by Chinese High-Tech exports to US, while it occupied 58% of that led by Chinese overall manufacturing ones.

[49] Illustrated in Appendix 2

The countries from which China imported the most for its High-Tech exports to US were Korea, Japan and Taiwan. Their world shares of exports led by Chinese High-Tech exports to US in 2012 were correspondingly 19.5%, 18.7%, 8.4%, while the shares of exports led by Chinese overall manufacturing exports to US were 16.8%, 16.6% and 8.1%. Hence these countries' shares of exports profited from Chinese High-Tech exports to US were also higher than that from overall manufacturing ones.

Before 2012, Japan was the biggest beneficiary of Chinese High-Tech exports to US. However, Japan's exports remained stable from 2005 and even reduced over 2005-2007 and 2010-2011. More than the half of Japan's exports to China was used for Chinese exports of Office accounting computing machinery to US. The exports have reduced like a wave since 2005.

In 2012, Korea passed Japan and became the largest beneficiary of Chinese High-Tech exports to US. Different from Japan, Korea's exports to China for Chinese High-Tech exports to US continued increasing from 2002, especially for Chinese exports of office accounting computing machinery. Besides, Chinese exports of radio television, communication equipment and medical precision optical instruments to US also promoted much exports of Korea. As similar as Japan's evolutions over 2005-2007 and 2010-2011, Korea's growth of exports driven by Chinese High-Tech exports to US suspended (but not decreased as Japan). Then from 2011 to 2012, Korea's exports led by China increased the fastest among Asian countries.

Taiwan's exports promoted by Chinese exports of Office accounting computing machinery developed as same as Japan. The only difference from Japan is that Taiwan's exports led by Chinese overall High-Tech exports to US did not decrease in 2007 thanks to the impact of Chinese exports of radio television and communication equipment.

ASEAN's exports led by Chinese High-Tech exports to US were just a little less than Korea. Yet ASEAN's speed of export growth from 1995 to 2012 was generally higher than Korea, especially the growth of exports led by Chinese exports of Office accounting computing machinery. Indeed, most of ASEAN countries' exports led by Chinese High-Tech exports to US rose faster than that of Korea. The ASEAN countries from which China imported the most for its High-Tech exports to US were Thailand, Malaysia, Philippines, Singapore, Indonesia and Vietnam in sequence.

Thailand's exports to China for Chinese High-Tech exports to US were the most among ASEAN countries. Its speed of growth was also the highest. The most increase came from China's exports of office accounting computing machinery to US. Vietnam's speed of growth was as high as Thailand but Vietnam's exports led by Chinese High-Tech exports to US were the smallest among ASEAN economies.

Another highly developing country is Malaysia. It was the second largest beneficiary of Chinese High-Tech exports to US among ASEAN countries. During 2010-2011, Malaysia's exports to China for Chinese High-Tech exports to US decreased quickly. It recovered in the following year. It should be noted that China's imports from Malaysia for Chinese exports of radio television, communication equipment (code 19) and medical precision optical instruments (code 20) did not reduce over this period. Yet the imports for office accounting computing machinery (code 17)'s exports to US fell a great deal.

Different from Malaysia, the decrease over 2010-2011 of Philippines's exports led by Chinese High-Tech exports to US derived from the decrease of radio television, communication equipment (code 19) rather than the reduction of office accounting computing machinery (code 17). China's imports from Philippines for Chinese exports of the later (code 17) continued increasing without stop. As same as the Philippines, Indonesia's exports to China for Chinese High-Tech exports to US also continued rising in series.

The speed of growth of Singapore's exports led by China's High-Tech exports to US was the lowest in Asia. The export increased quickly over 2002-2005 but then it has not varied until 2011. India's exports led by Chinese High-Tech exports to US were the lowest over the world and they have reduced since 2010.

European Union's overall exports led by China's High-Tech exports to US were much less than Asia but more than US and the rest of the world. Its level was as high as that of ASEAN but its speed of growth was lower than the later.

Indeed, most of European countries' exports driven by China's High-Tech exports to US were less than that of US and the rest of the world. Germany's growth of exports led by China was much higher than that of the rest European countries. It was the only European country whose exports led by Chinese High-Tech exports to US were more than that of US. Among all the High-Tech sectors, Chinese exports of office accounting computing machinery to US promoted the most exports of Germany. Its growth suspended over 2005-2007 and 2010-2012. The exports led by Chinese exports of radio television, communication equipment and medical precision optical instruments increased in succession.

France and UK's exports to China for Chinese High-Tech exports to US seemed more stable relative to other European countries. They stayed around nearly the same level during 2005 and 2011. In European Union, France was the second largest beneficiary of Chinese High-Tech exports to US. Yet its exports led by Chinese exports of office accounting computing machinery reduced from 2010.

Italy and Spain's exports led by Chinese High-Tech exports to US reduced the most quickly among European countries. Italy's exports led by Chinese High-Tech exports to US reduced from 2007. Until 2011 they have recovered. China's imports from Italy for the exports of office accounting computing machinery have reduced much since 2005. However, in 2012, Italy's exports profited from Chinese High-Tech exports to US remained larger than that of UK and Spain. Over 1995-2012, Spain's profits from Chinese High-Tech exports to US reduced the most among European countries, especially the exports driven by Chinese exports of office accounting computing machinery. These exports have decreased rapidly since 2005.

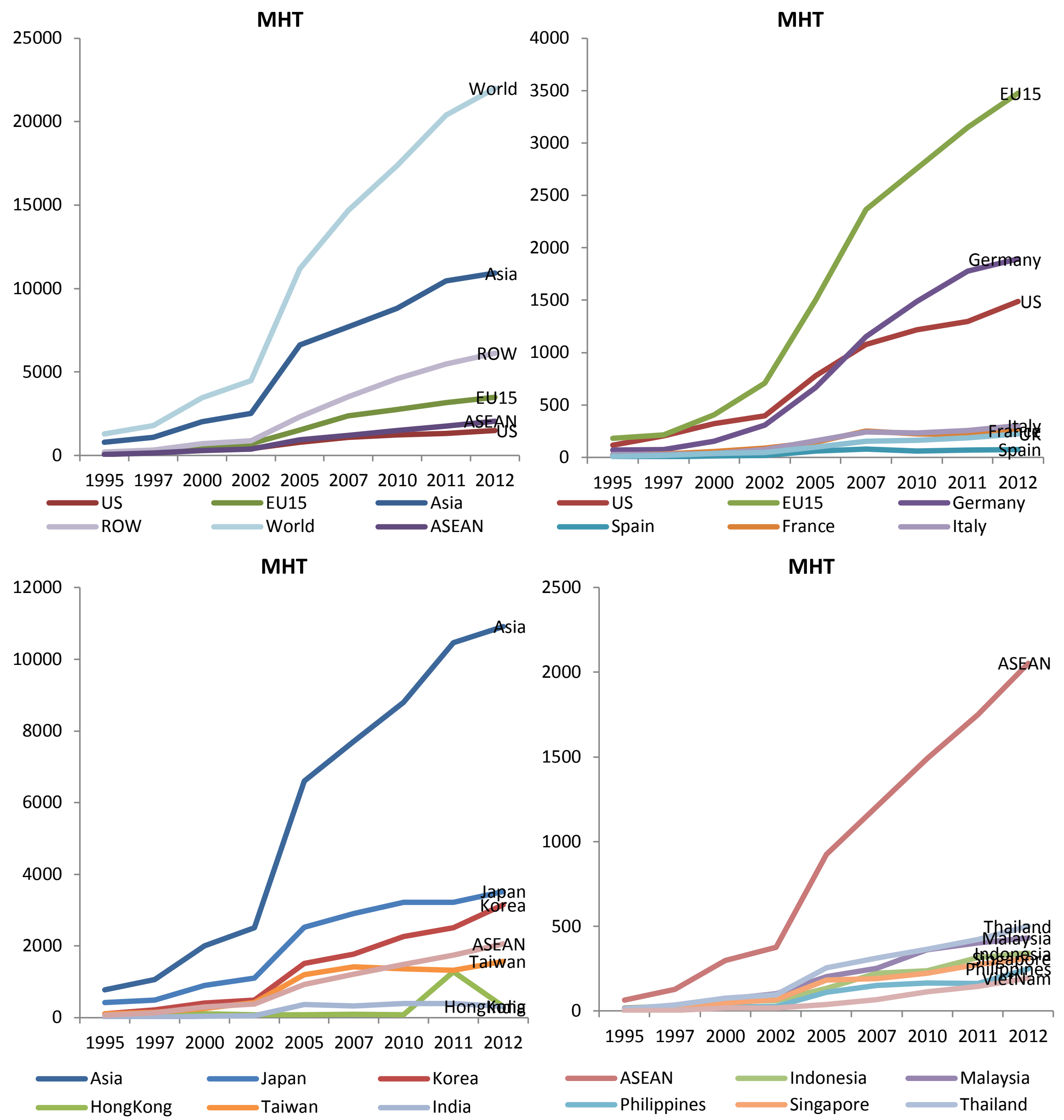
US's exports led by Chinese High-Tech exports to US varied like that of Japan. Its growth stopped from 2005 and then re-increased a little as a wave. As for the rest of the world, including Latin America, the exports promoted by China's High-Tech exports to US were less than that of Asia and Europe but more than US. Furthermore, its growth rate relative to 1995 was also lower than that of Asia and European Union but higher than US.

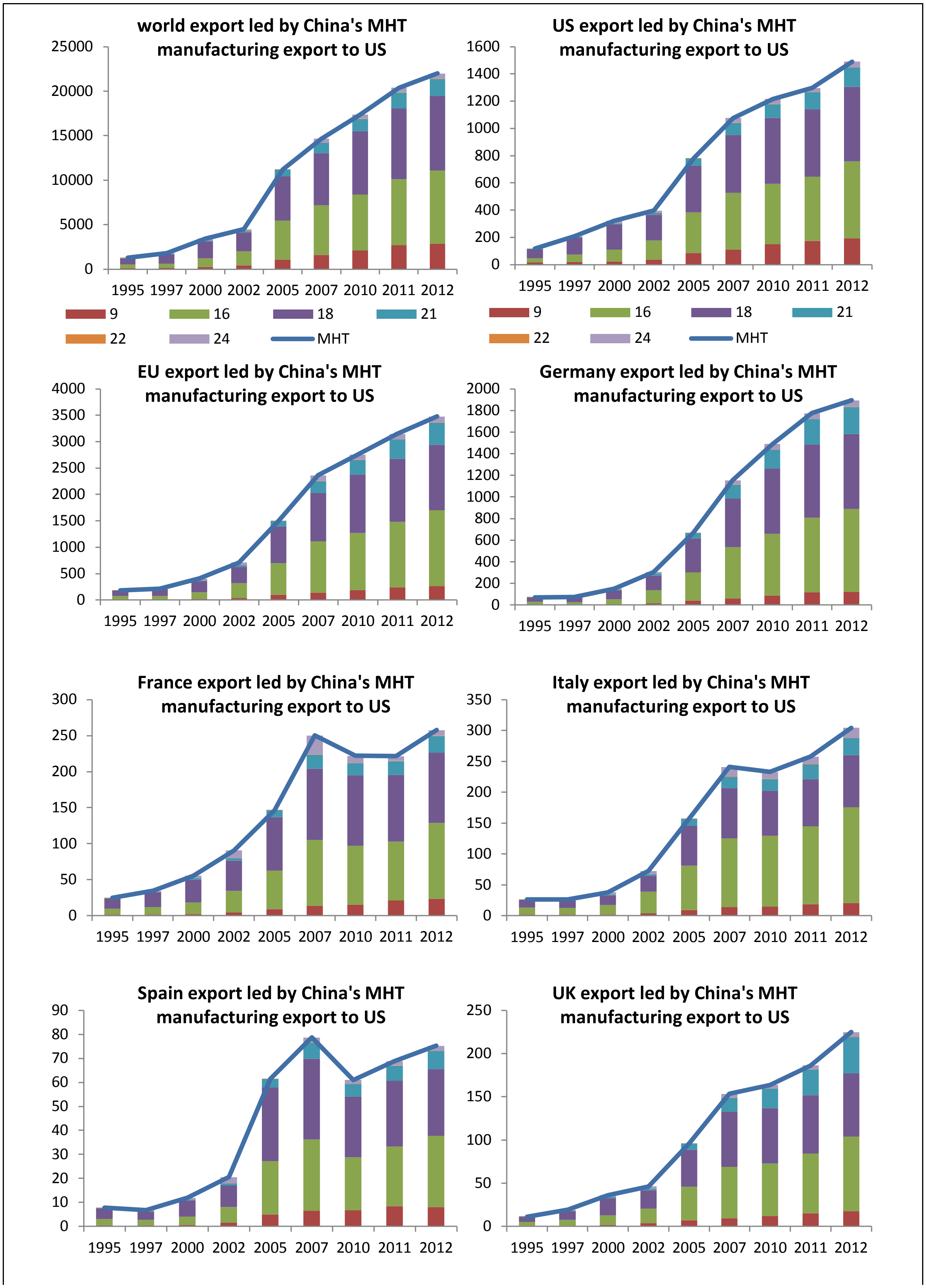
each country's exports led by Chinese High-Tech exports to US							
1995			2012			Growth	
	billion dollar	world share		billion dollar	world share	1995=100 (%)	
World	247,1	100	World	61277,8	100	Philippines	524178
Asia	151,3	61,21	Asia	39912,2	65,13	VietNam	216533
Japan	81,7	33,06	Korea	11945,6	19,49	Thailand	125552
EU15	36,6	14,79	Japan	11432,7	18,66	Malaysia	90530
ROW	35,7	14,44	ASEAN	10442,9	17,04	ASEAN	90044
US	23,6	9,56	EU15	9075,6	14,81	Korea	60462
Taiwan	20,4	8,24	ROW	8629,4	14,08	India	57503
Korea	19,8	7,99	Germany	5417,8	8,84	Singapore	46303
HongKong	17,0	6,88	Taiwan	5126,4	8,37	Germany	38286
Germany	14,2	5,73	US	3660,7	5,97	Asia	26387
ASEAN	11,6	4,69	Thailand	3113,7	5,08	Indonesia	25439
Italy	5,4	2,17	Malaysia	2436,5	3,98	Taiwan	25176
France	5,1	2,06	Philippines	2048,4	3,34	EU15	24829
Indonesia	3,1	1,24	Singapore	1182,3	1,93	World	24796
Malaysia	2,7	1,09	VietNam	844,0	1,38	ROW	24177
Singapore	2,6	1,03	Indonesia	781,8	1,28	UK	19128
Thailand	2,5	1,00	France	726,4	1,19	US	15497

UK	2,3	0,95	Italy	502,7	0,82	France	14264
Spain	1,5	0,62	India	483,8	0,79	Japan	13992
India	0,8	0,34	HongKong	480,7	0,78	Spain	10813
Philippines	0,4	0,16	UK	449,0	0,73	Italy	9390
VietNam	0,4	0,16	Spain	164,7	0,27	HongKong	2829

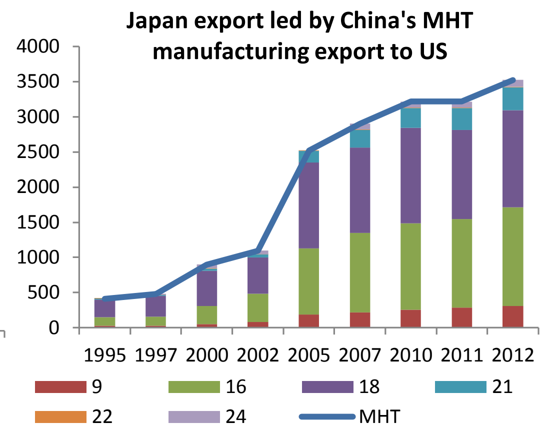
4.2.1.3 Impact of Chinese Medium-High-Tech exports to US

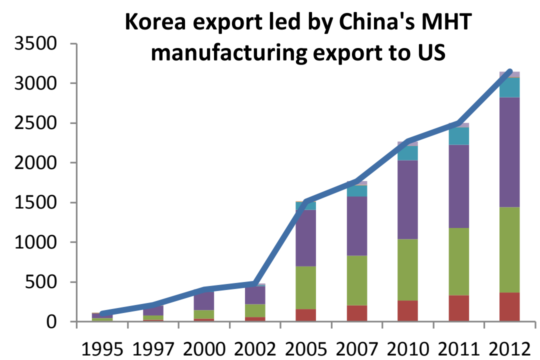
Figure 3-15 each country's exports led by Chinese Medium-High-Tech exports to US (billion $)

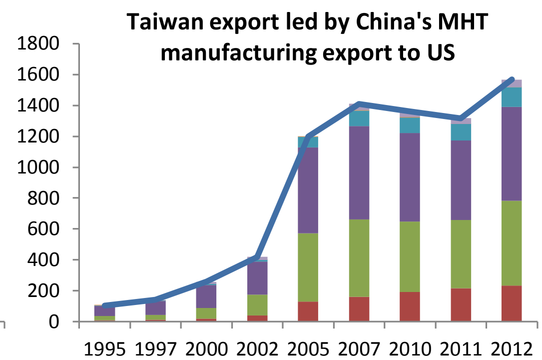



world export led by China's MHT manufacturing export to US
25000
20000
15000
10000
5000
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
9
16
18
21
22
24
MHT
US export led by China's MHT manufacturing export to US
1600
1400
1200
1000
800
600
400
200
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
9
16
18
21
22
24
MHT
EU export led by China's MHT manufacturing export to US
4000
3500
3000
2500
2000
1500
1000
500
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
Germany export led by China's MHT manufacturing export to US
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
France export led by China's MHT manufacturing export to US
300
250
200
150
100
50
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
Italy export led by China's MHT manufacturing export to US
350
300
250
200
150
100
50
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
Spain export led by China's MHT manufacturing export to US
90
80
70
60
50
40
30
20
10
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
UK export led by China's MHT manufacturing export to US
250
200
150
100
50
0
1995 1997 2000 2002 2005 2007 2010 2011 2012

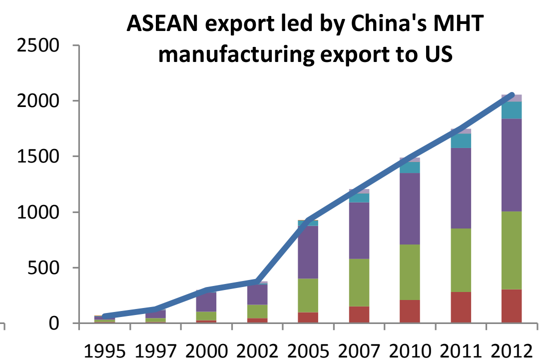

Asia export led by China's MHT manufacturing export to US
0
2000
4000
6000
8000
10000
12000
1995 1997 2000 2002 2005 2007 2010 2011 2012
9
16
18
21
22
24
MHT


Japan export led by China's MHT manufacturing export to US
0
500
1000
1500
2000
2500
3000
3500
4000
1995 1997 2000 2002 2005 2007 2010 2011 2012
9
16
18
21
22
24
MHT

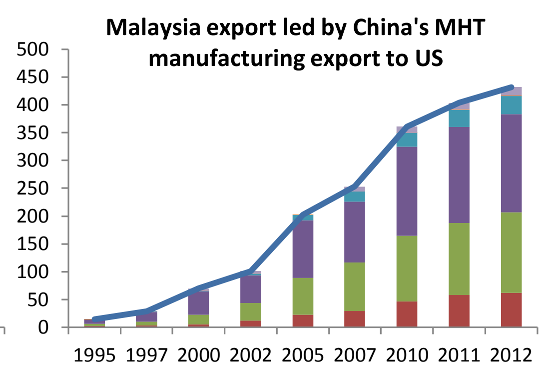

Korea export led by China's MHT manufacturing export to US
0
500
1000
1500
2000
2500
3000
3500
1995 1997 2000 2002 2005 2007 2010 2011 2012

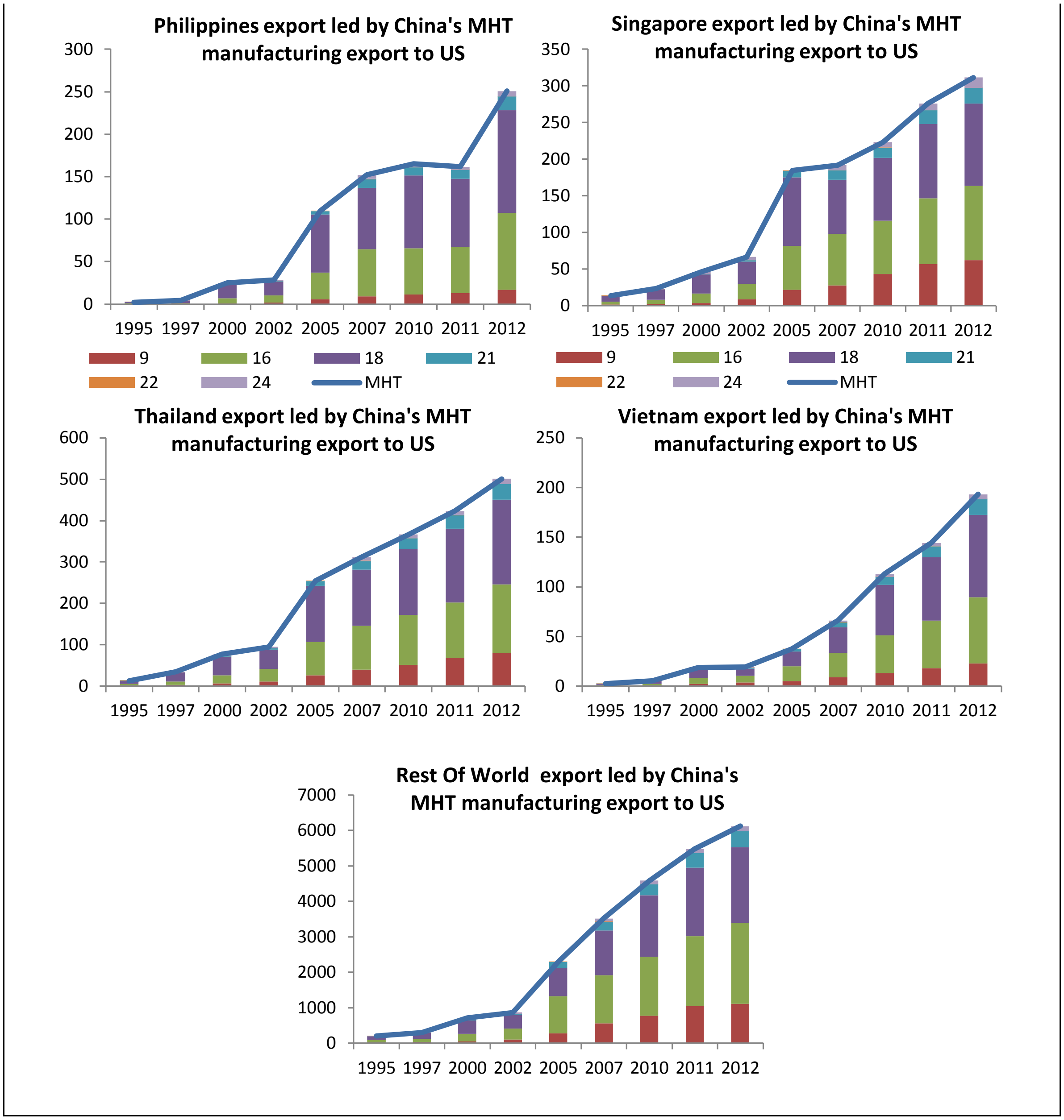

Taiwan export led by China's MHT manufacturing export to US
0
200
400
600
800
1000
1200
1400
1600
1800
1995 1997 2000 2002 2005 2007 2010 2011 2012


India export led by China's MHT manufacturing export to US
0
50
100
150
200
250
300
350
400
450
1995 1997 2000 2002 2005 2007 2010 2011 2012


ASEAN export led by China's MHT manufacturing export to US
0
500
1000
1500
2000
2500
1995 1997 2000 2002 2005 2007 2010 2011 2012


Indonesia export led by China's MHT manufacturing export to US
0
50
100
150
200
250
300
350
400
1995 1997 2000 2002 2005 2007 2010 2011 2012


Malaysia export led by China's MHT manufacturing export to US
0
50
100
150
200
250
300
350
400
450
500
1995 1997 2000 2002 2005 2007 2010 2011 2012



Chinese Medium-High-Tech exports to US promoted much less exports of other countries than Chinese High-Tech exports to US. Among all the Medium-High-Tech sectors, Chinese exports of machinery and equipment (including electrical Machinery and equipment[50]) promoted the most world exports. Besides, the exports of chemicals[51] (excluding pharmaceuticals) and motor vehicles [52] also promoted a large number of world exports but less than machinery and equipment's exports. As for the rest

[50] Code 16 and code 18 according to Appendix 2
[51] Code 9 according to Appendix 2
[52] Code 21 according to Appendix 2

Medium-High-Tech sectors (including Building, repairing of Ships and boats, Railroad transport equipment), the impact of Chinese exports to US seemed limited.

As showed in Table 3-15, Asia was the largest beneficiary of Chinese Medium-High-Tech exports to US. Yet it recently profited less from Chinese Medium-High-Tech exports to US than from High-Tech ones. Its share in the world was 49.6% for Medium-High-Tech level while 65.1% for High-Tech in 2012. Nearly all the Asian countries' (excluding Hong Kong, India, Indonesia) shares of world exports led by Chinese Medium-High-Tech exports to US were smaller than that by High-Tech ones. By contrast, US and European Union's world shares of exports profited from Chinese Medium-High-Tech exports to US were larger than that from High-Tech ones.

In Asian region, ASEAN countries' gap between the export led by Chinese Medium-High-Tech exports to US and that by High-Tech ones was the largest. Firstly, ASEAN's exports led by Chinese Medium-High-Tech exports to US rose less quickly than that by High-Tech ones. Secondly, ASEAN's world share of the former was smaller than that of the later. Their exports led by Chinese Medium-High-Tech exports to US accounted for 9% of the world in 2012, while that by High-Tech ones accounted for 17%. Therefore, ASEAN countries profited much less from Chinese Medium-High-Tech exports to US than from High-Tech ones. As same as mentioned above, among all the Medium-High-Tech sectors, Chinese exports of machinery and equipment to US promoted the most exports of ASEAN countries.

Thailand, Malaysia, Indonesia and Singapore were the four biggest ASEAN countries from whom China imported the most for its Medium-High-Tech exports to US. For them, Chinese exports of machinery and equipment to US still promoted the most exports among all the Medium-High-Tech sectors. Besides, Chinese exports of chemicals (excluding pharmaceuticals) to US also had a large impact on these countries. The impact of this sector swelled more rapidly than other Medium-High-Tech sectors, including the sector of Machinery and equipment.

Philippines' exports led by Chinese exports of chemicals to US did not vary so much as other ASEAN countries. Differently, its exports to China for Chinese exports of motor vehicles increased more significantly than that for chemicals. When calculating the growth rate, Philippines' exports led by Chinese Medium-High-Tech exports to US increased the most slowly among ASEAN countries, especially during 2007-2010.

Japan, Korea and Taiwan were still the three largest beneficiaries of Chinese Medium-High-Tech exports to US. Korea's speed of growth was the highest among them. Japan's growth of exports led by China has slowed down since 2005. From the same year, Taiwan's rise of exports led by Chinese Medium-High-Tech exports to US also decelerated. During 2007 and 2011, the exports decreased. Indeed, Taiwan's exports led by Chinese exports of chemicals and motor vehicles increased over time, while that by Chinese exports of machinery and equipment decreased over 2007-2011. Thus Taiwan's overall exports led by Chinese Medium-High-Tech exports to US declined at that moment.

India's exports to China for Chinese exports of chemicals and motor vehicles to US did not raise so much as Taiwan. Its exports driven by Chinese Medium-High-Tech exports to US remained the lowest among Asia countries. The exports rose quickly in 2002 but did not increase anymore after then.

In contrast to Asia, US and European Union's world shares of exports driven by Chinese Medium-High-Tech exports to US were both larger than those by High-Tech ones. The growth of US and European Union's exports profited from Chinese Medium-High-Tech exports to US has slowed down since 2007, except for Germany. Yet their export growths driven by Chinese High-Tech exports to US have decelerated since 2005.

Germany was the only country whose exports to China for Chinese Medium-High-Tech exports to US continued increasing over time and the increase did not suspend in 2007. Besides of machinery and equipment, Chinese exports of motor vehicles to US also promoted a large number of exports of Germany.

In UK's exports led by China, the sector of Moto Vehicle also represented a larger share. Although UK's growth of exports led by Chinese Medium-High-Tech exports to US decelerated from 2007, the exports still continued rising thanks to the increase of Chinese imports for its motor vehicles' exports to US.

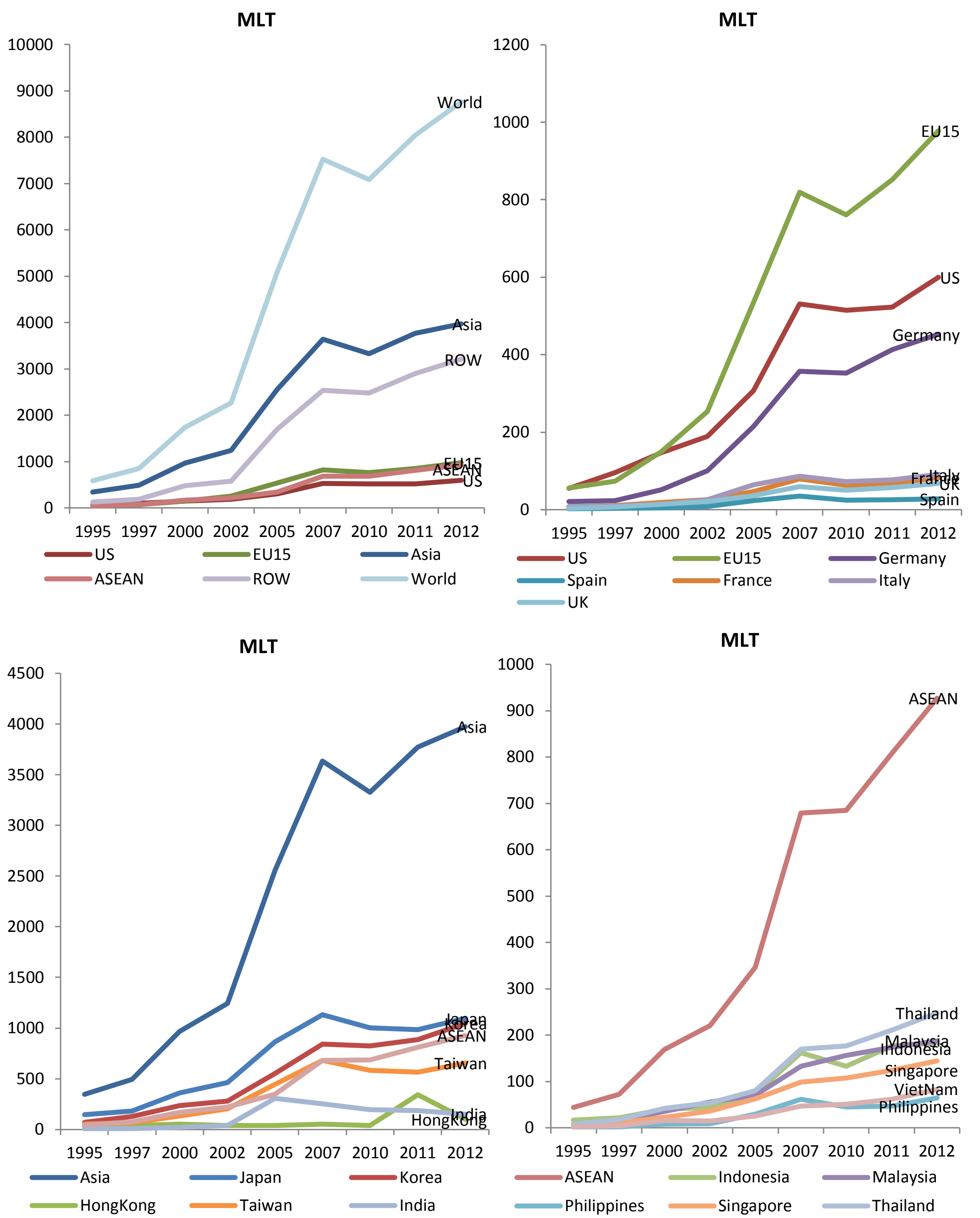
In Italy, France and Spain, the evolutions of exports driven by Chinese Medium-High-Tech exports to US are revealed similar, noting largely increased until 2007, decreased over the following three years (2007-2010) and re-increased after then. It should be noted that different from France, Italy and Spain's world shares of exports profited from Chinese Medium-High-Tech exports to US were both larger than those from High-Tech ones. As showed in Table 3-15, Italy and Spain's shares in the world for Medium-High-Tech level were 1.4% and 0.34%, respectively, while the shares for High-Tech level were 0.8% and 0.27%. Furthermore, Italy's world share in 2012 (1.4%) was larger than that of France (1.2%) and Spain (0.3%). It indicates that Italy profited more from Chinese Medium-High-Tech exports to US than other two countries.

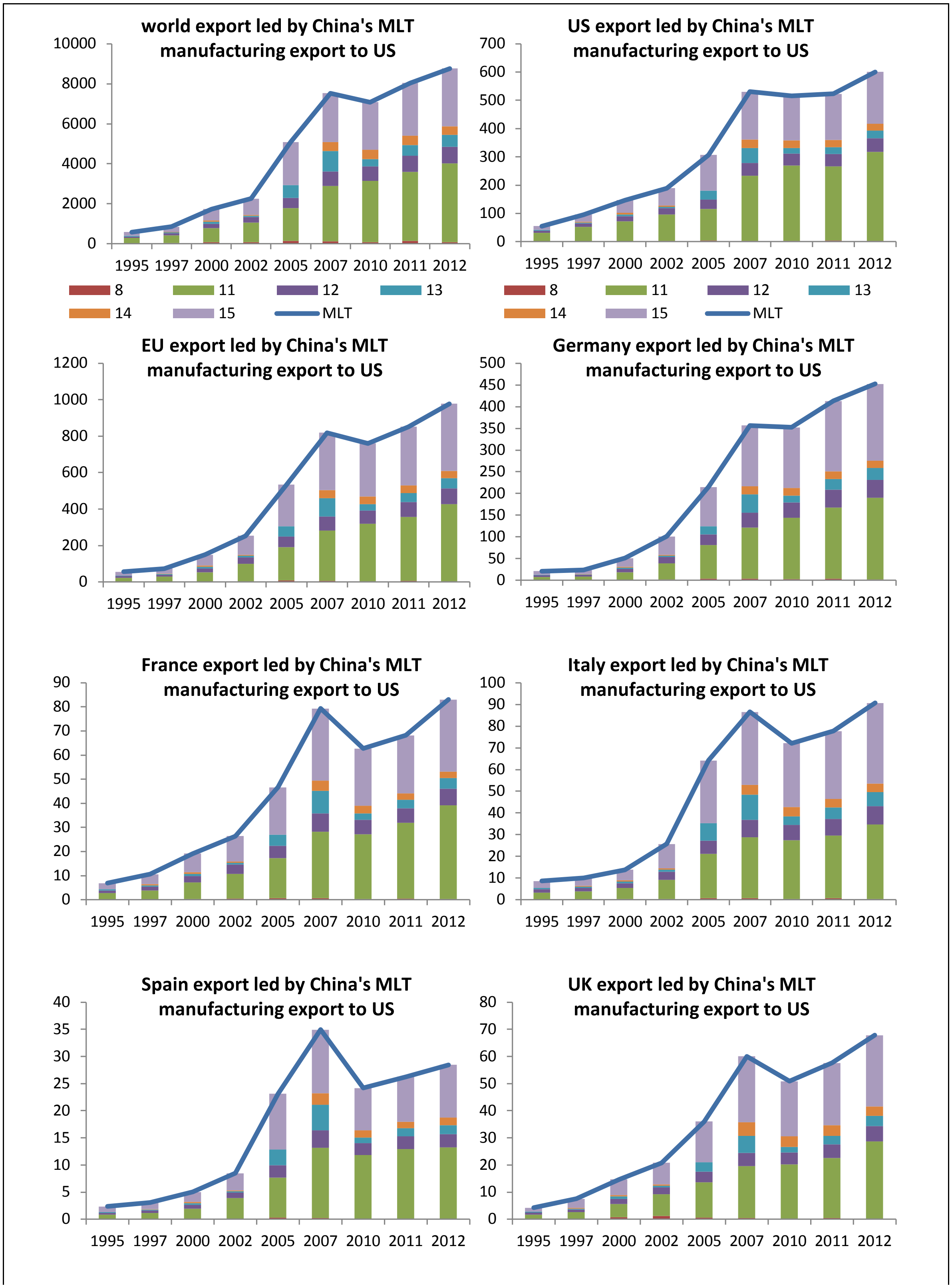
As same as US and European Union, the group of the Rest of the World (R.O.W.)'s share of exports led by Chinese Medium-High-Tech exports to US was larger than that by High-Tech ones. ROW accounted for 28% of world export driven by Chinese Medium-High-Tech exports to US, while it occupied only 14% of that by High-Tech ones. China's imports from the group of R.O.W. for Chinese exports of chemicals (excluding pharmaceuticals) to US were the most among the world.

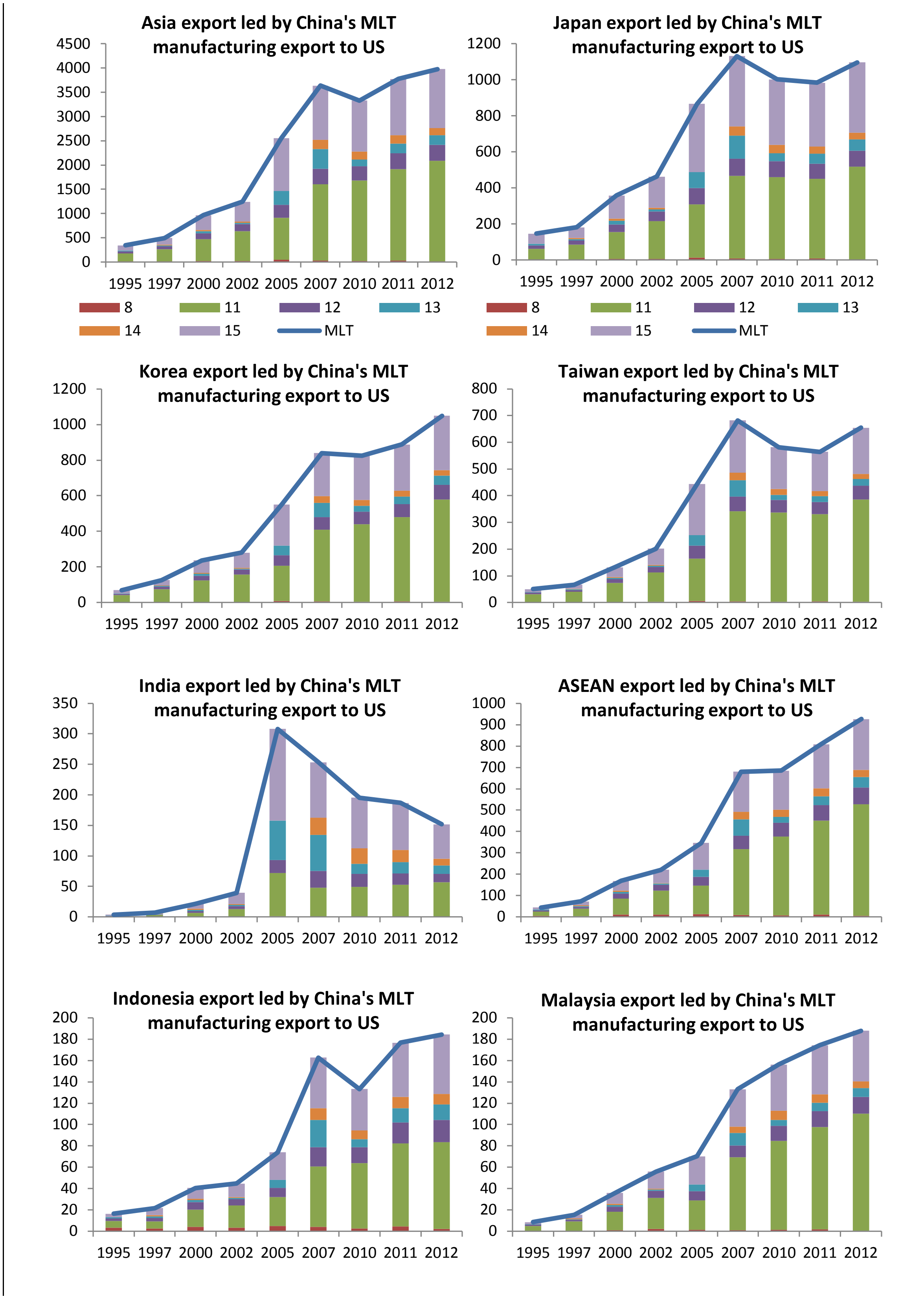
each country's exports led by Chinese Medium-High-Tech exports to US							
1995			2012			Growth	
	billion dollar	world share		billion dollar	world share	1995=100 (%)	
World	1273,2	100	World	22000,9	100	Philippines	11183
Asia	775,1	60,9	Asia	10914,3	49,6	VietNam	7603
Japan	414,7	32,6	ROW	6120,3	27,8	India	6330
ROW	199,9	15,7	Japan	3522,6	16,0	Thailand	3831
EU15	181,9	14,3	EU15	3475,9	15,8	ASEAN	3171
US	116,3	9,1	Korea	3148,5	14,3	ROW	3062
Taiwan	105,7	8,3	ASEAN	2054,3	9,3	Malaysia	3027
Korea	105,6	8,3	Germany	1893,3	8,6	Korea	2980
HongKong	79,4	6,2	Taiwan	1567,6	7,1	Germany	2678
Germany	70,7	5,6	US	1490,4	6,8	Singapore	2266
ASEAN	64,8	5,1	Thailand	501,1	2,3	UK	1994
Italy	26,2	2,1	Malaysia	431,8	2,0	EU15	1911
France	24,9	2,0	Indonesia	340,8	1,5	Indonesia	1812
Indonesia	18,8	1,5	HongKong	313,4	1,4	World	1728
Malaysia	14,3	1,1	Singapore	311,3	1,4	Taiwan	1483
Singapore	13,7	1,1	India	307,9	1,4	Asia	1408
Thailand	13,1	1,0	Italy	304,4	1,4	US	1282
UK	11,3	0,9	France	257,6	1,2	Italy	1163
Spain	7,8	0,6	Philippines	250,8	1,1	France	1034
India	4,9	0,4	UK	224,7	1,0	Spain	965
VietNam	2,5	0,2	VietNam	193,3	0,9	Japan	849
Philippines	2,2	0,2	Spain	75,2	0,3	HongKong	395

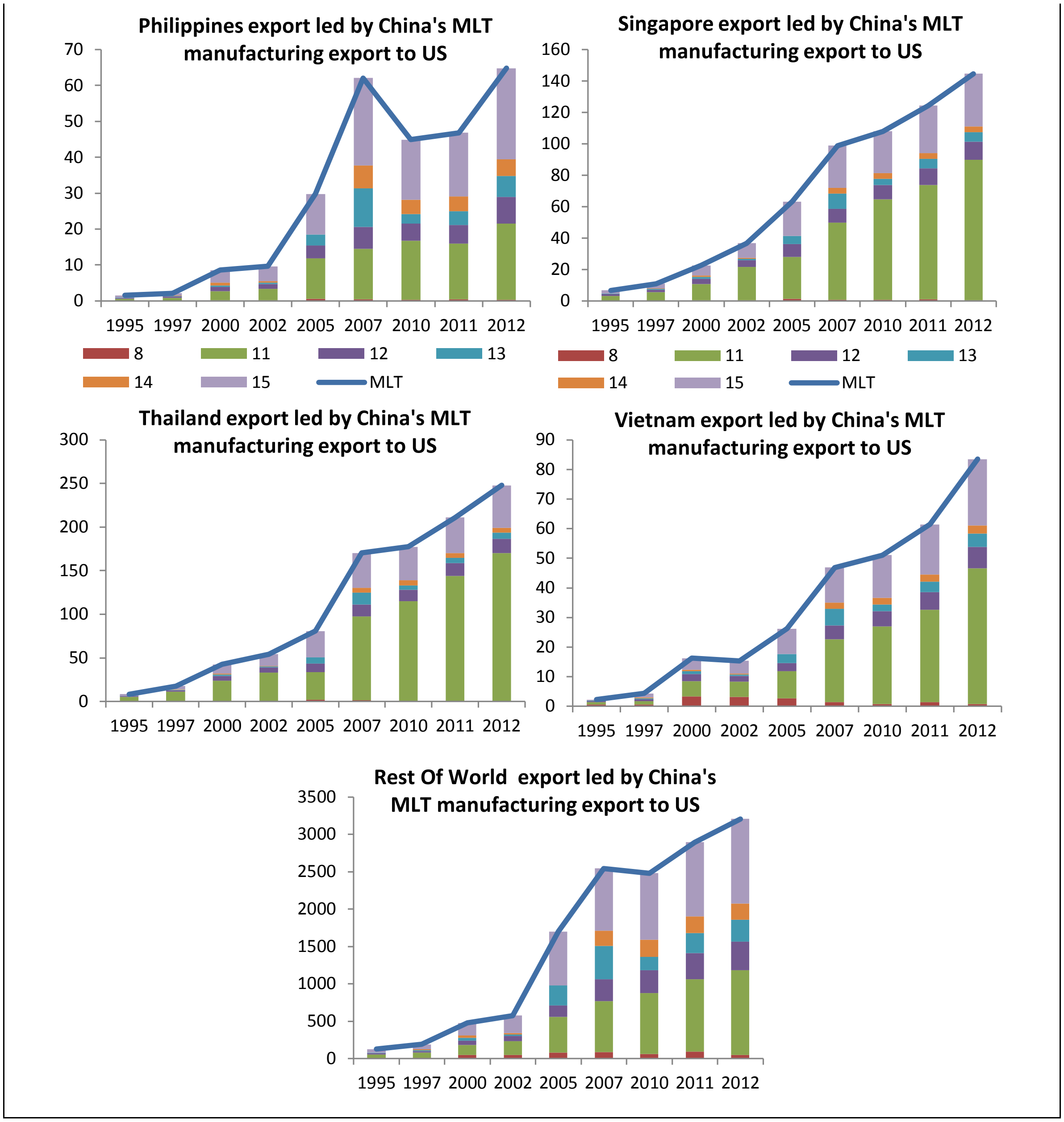
4.2.1.4 Impact of Chinese Medium-Low-Tech exports to US

Figure 3-16 each country's exports led by Chinese Medium-Low-Tech exports to US (billion $)




world export led by China's MLT manufacturing export to US
0
2000
4000
6000
8000
10000
1995 1997 2000 2002 2005 2007 2010 2011 2012
US export led by China's MLT manufacturing export to US
0
100
200
300
400
500
600
700
1995 1997 2000 2002 2005 2007 2010 2011 2012
8
11
12
13
14
15
MLT
8
11
12
13
14
15
MLT
EU export led by China's MLT manufacturing export to US
0
200
400
600
800
1000
1200
1995 1997 2000 2002 2005 2007 2010 2011 2012
Germany export led by China's MLT manufacturing export to US
0
50
100
150
200
250
300
350
400
450
500
1995 1997 2000 2002 2005 2007 2010 2011 2012
France export led by China's MLT manufacturing export to US
0
10
20
30
40
50
60
70
80
90
1995 1997 2000 2002 2005 2007 2010 2011 2012
Italy export led by China's MLT manufacturing export to US
0
10
20
30
40
50
60
70
80
90
100
1995 1997 2000 2002 2005 2007 2010 2011 2012
Spain export led by China's MLT manufacturing export to US
0
5
10
15
20
25
30
35
40
1995 1997 2000 2002 2005 2007 2010 2011 2012
UK export led by China's MLT manufacturing export to US
0
10
20
30
40
50
60
70
80
1995 1997 2000 2002 2005 2007 2010 2011 2012


Asia export led by China's MLT manufacturing export to US
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
8 11 12 13 14 15 MLT
Japan export led by China's MLT manufacturing export to US
1200
1000
800
600
400
200
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
8 11 12 13 14 15 MLT
Korea export led by China's MLT manufacturing export to US
1200
1000
800
600
400
200
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
Taiwan export led by China's MLT manufacturing export to US
800
700
600
500
400
300
200
100
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
India export led by China's MLT manufacturing export to US
350
300
250
200
150
100
50
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
ASEAN export led by China's MLT manufacturing export to US
1000
900
800
700
600
500
400
300
200
100
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
Indonesia export led by China's MLT manufacturing export to US
200
180
160
140
120
100
80
60
40
20
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
Malaysia export led by China's MLT manufacturing export to US
200
180
160
140
120
100
80
60
40
20
0
1995 1997 2000 2002 2005 2007 2010 2011 2012



As showed in Figure 3-16, the growth of nearly all the countries' exports led by Chinese Medium-Low-Tech exports to US suspended in 2007. In general, Chinese Medium-Low-Tech exports to US promoted much less world export than Chinese exports of other technology levels. It is compatible with the conclusion of section 4.1. Chinese Medium-Low-Tech exports to US in 2012 needed the least imported inputs and led the least world export among all the technology levels.

When comparing Medium-Low-Tech sectors, Chinese exports of rubber, plastics products[53] and fabricated metal products[54] (except machinery and equipment) to US promoted the most world export.

In the world export led by Chinese Medium-Low-Tech exports to US, the group of Rest of the world (R.O.W.) occupied 37% in 2012. Yet its share in the world export led by Chinese High-Tech exports to US was only 14%; that by Medium-High-Tech ones was 28% and that by Low-Tech ones was 30%. The world share of exports profited from Chinese Medium-Low-Tech exports to US was the largest among all the technology levels. In 2007, Chinese imports from R.O.W. for Chinese exports of iron and steel to US decreased quickly. Hence the rise of this group's exports led by Chinese Medium-Low-Tech exports to US suspended in this year. However, Chinese imports from R.O.W. for the exports of other Medium-Low-Tech sectors, including rubber, plastics products, metal products and non-metallic mineral products, still rose simultaneously. In 2010 when Chinese imports for its exports of iron and steel to US re-increased, the group of rest of the world's exports led by Chinese overall Medium-Low-Tech exports to US re-increased as a whole.

Asia was also the biggest beneficiary of Chinese exports to US at this technology level. Indeed, it profited less from Chinese Medium-Low-Tech exports to US than from Chinese exports of other technology levels. Firstly, Asia occupied 45% of the world export led by Chinese Medium-Low-Tech exports to US. This share is lower than that by High-Tech ones (65%) and Medium-High-Tech ones (49.6%). Secondly, most of Asian countries' exports led by Chinese Medium-Low-Tech exports to US reduced in 2007, except for Korea and some ASEAN countries whose exports slowed down the growth rather than reduced.

Among all the countries, Japan, Korea and Taiwan were still the 3 biggest beneficiaries of Chinese Medium-Low-Tech exports to US. In 2012, Japan's share in the world was the largest among these countries. Korea's speed of growth of exports led by Chinese Medium-Low-Tech exports to US was the highest. Thus in 2012, Korea's share in the world (12%) was nearly equal to Japanese share (12.5%). Taiwan's evolution of exports led by Chinese Medium-Low-Tech exports to US was similar as that of Japan, noting a rapid reduce from 2007 to 2011 (the speed of decrease slowed down between 2010 and 2011), then a re-increase from 2011.

[53] Code 11 according to Appendix 2
[54] Code 15 according to Appendix 2

ASEAN countries remained the most active group of Asia. They profited less from Chinese Medium-Low-Tech exports to US than from High-Tech one. Its share of exports led by Chinese Medium-Low-Tech exports in the world was 11% in 2012, while that by High-Tech ones was 17%. Thailand, Malaysia, Singapore and Vietnam's exports led by Chinese Medium-Low-Tech exports to US continued increasing, especially during 2005-2007. Most of their benefits derived from Chinese exports of rubber and plastics products to US. China's fabricated metal products' exports also promoted unignorable exports of these countries.

Indonesia and Philippines' exports led by Chinese Medium-Low-Tech exports to US reduced between 2007 and 2010. These two countries profited more from Chinese exports of fabricated metal products (except machinery and equipment) than other ASEAN economies. Especially for Philippines, its exports led by Chinese exports of fabricated metal products (except machinery and equipment) were more than that of rubber and plastics products (traditional sector, Chinese exports of which promoted the most world export among Medium-Low-Tech sectors).

Indian exports to China for Chinese Medium-Low-Tech exports to US stayed at the lowest level of Asia (except for Hong Kong that we do not discuss in this section because of the abnormal evolution in 2011). The exports soared between 2002 and 2005, and have dived since then. When regarding disaggregated Medium-Low-Tech sectors, as same as Philippines, India also profited more from Chinese exports of fabricated metal products than from that of rubber and plastics products.

European Union's exports led by Chinese Medium-Low-Tech exports to US were just a little more than ASEAN. Germany was still the largest beneficiary of Chinese Medium-Low-Tech exports in Europe. It was the only European country whose exports led by China did not descend over 2007-2010. Chinese exports of fabricated metal products promoted more exports of Germany than its Rubber and plastics' exports.

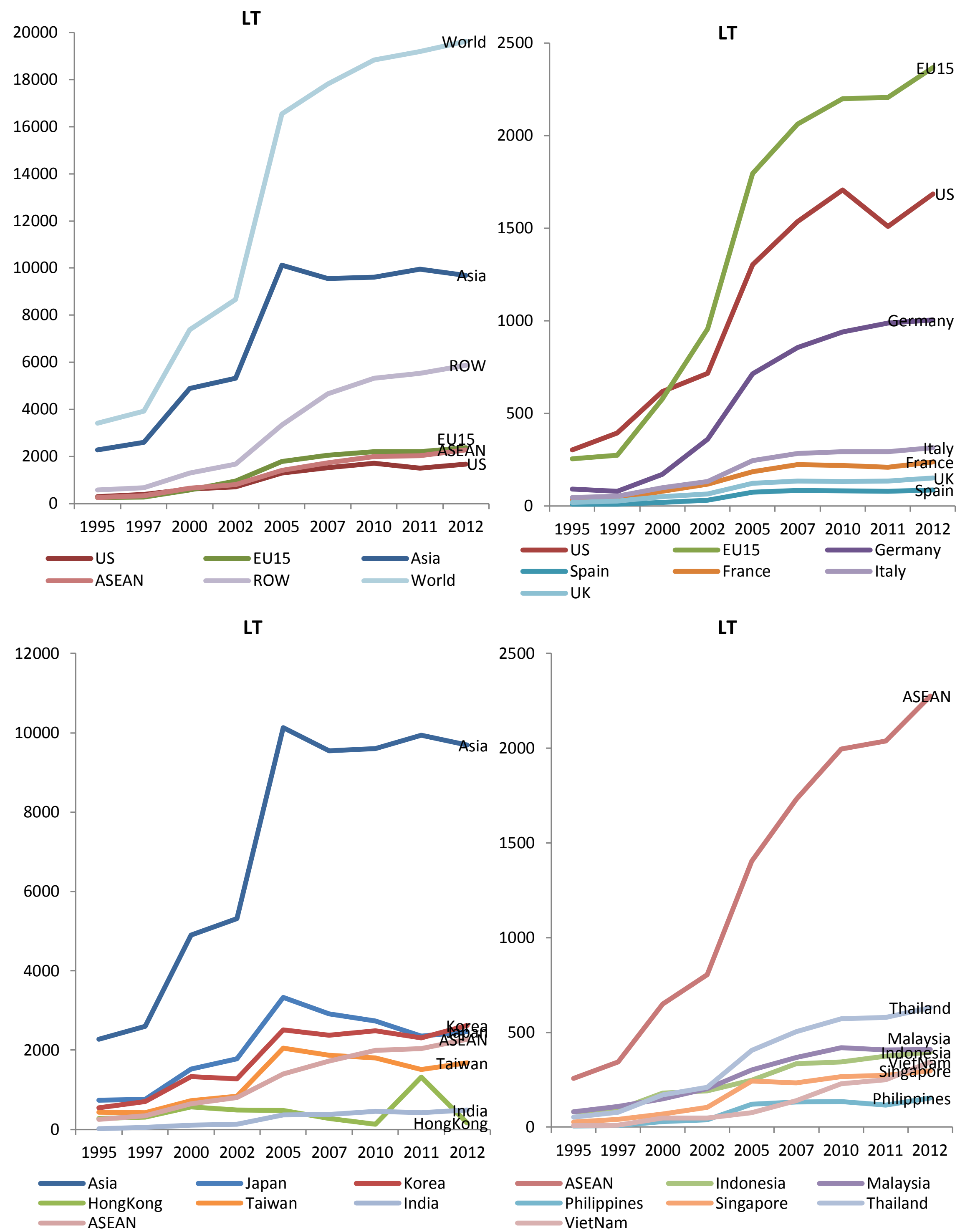
The other European countries' evolutions of exports driven by Chinese Medium-Low-Tech exports to US were similar. It is always revealed a quick decline over 2007-2010 and soft rise after then. The same as Germany, UK and Italy's exports profited more from Chinese exports of fabricated metal products than from the exports of rubber and plastics. In contrast, France and Spain's exports were mainly led by Chinese exports of rubber and plastics instead of fabricated metal products.

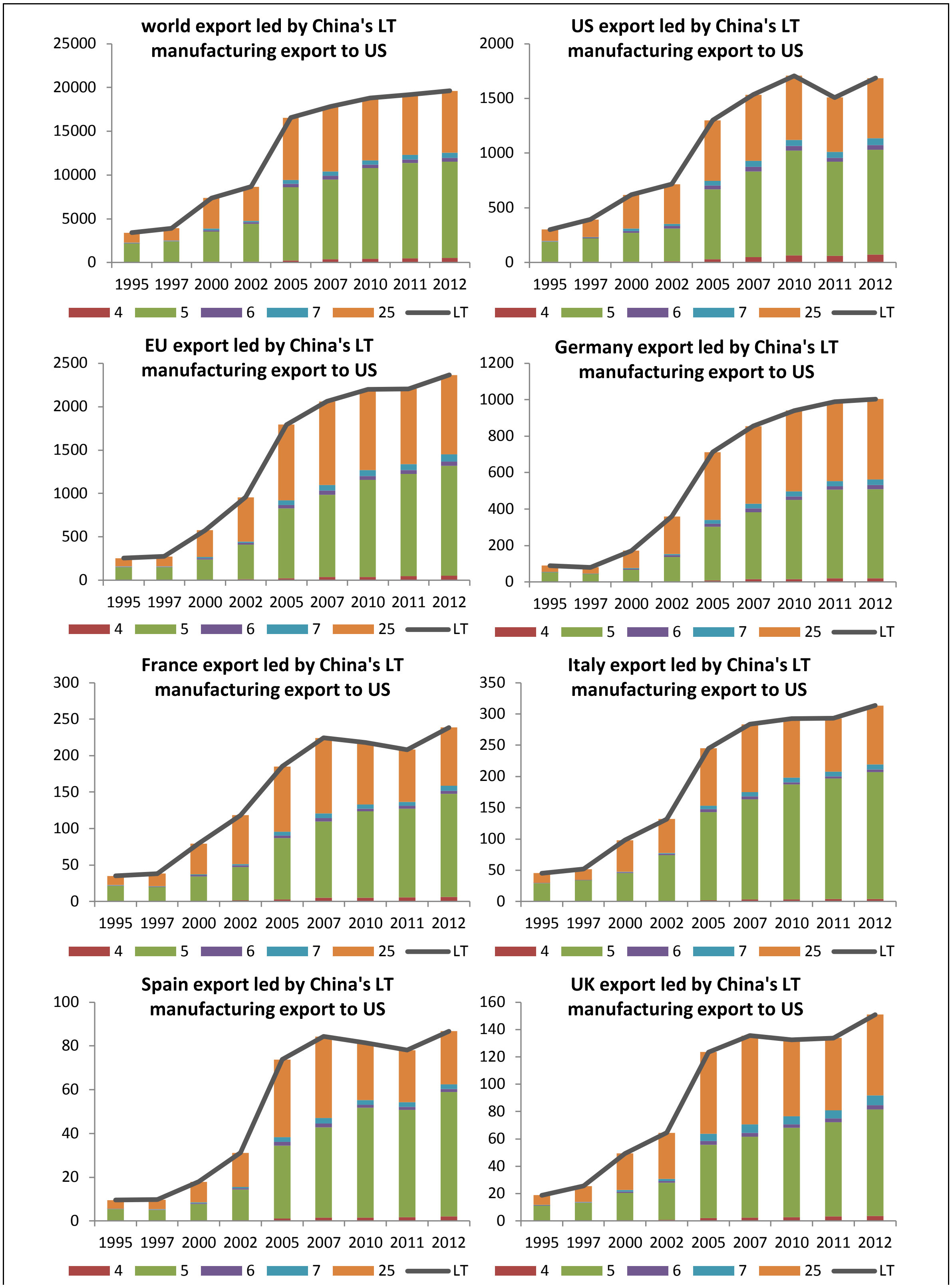
US's exports to China for Chinese High-Tech and Medium-High-Tech exports to US were lower than Germany, while its exports led by Chinese Medium-Low-Tech exports were higher than the later. The profit rose quickly during 2002-2007. After then it stayed at the same level until 2011. Most of the profit derived from China’s exports of rubber and plastics products.

each country's exports led by Chinese Medium-Low-Tech exports to US							
1995			2012			Growth	
	billion dollar	world share		billion dollar	world share	1995=100 (%)	
World	582,2	100	World	8762,4	100	Philippines	4191
Asia	344,8	59,2	Asia	3976,9	45,4	India	3976
Japan	146,2	25,1	ROW	3207,2	36,6	VietNam	3635
ROW	126,5	21,7	Japan	1096,2	12,5	Thailand	2966
Korea	69,0	11,9	Korea	1048,9	12,0	ROW	2535
EU15	55,6	9,6	EU15	978,2	11,2	Malaysia	2178
US	55,3	9,5	ASEAN	926,7	10,6	Germany	2160
Taiwan	50,6	8,7	Taiwan	654,8	7,5	Singapore	2152
ASEAN	44,2	7,6	US	600,1	6,8	ASEAN	2098
HongKong	30,9	5,3	Germany	452,5	5,2	EU15	1759
Germany	20,9	3,6	Thailand	247,8	2,8	UK	1605
Indonesia	16,6	2,8	Malaysia	187,9	2,1	Korea	1519
Malaysia	8,6	1,5	Indonesia	184,2	2,1	World	1505
Italy	8,6	1,5	India	151,8	1,7	Taiwan	1294
Thailand	8,4	1,4	Singapore	144,6	1,6	Spain	1215
France	6,9	1,2	HongKong	98,5	1,1	France	1206
Singapore	6,7	1,2	Italy	90,6	1,0	Asia	1153
UK	4,2	0,7	VietNam	83,5	1,0	Indonesia	1112
India	3,8	0,7	France	83,0	0,9	US	1085
Spain	2,3	0,4	UK	67,8	0,8	Italy	1055
VietNam	2,3	0,4	Philippines	64,8	0,7	Japan	750
Philippines	1,5	0,3	Spain	28,4	0,3	HongKong	318

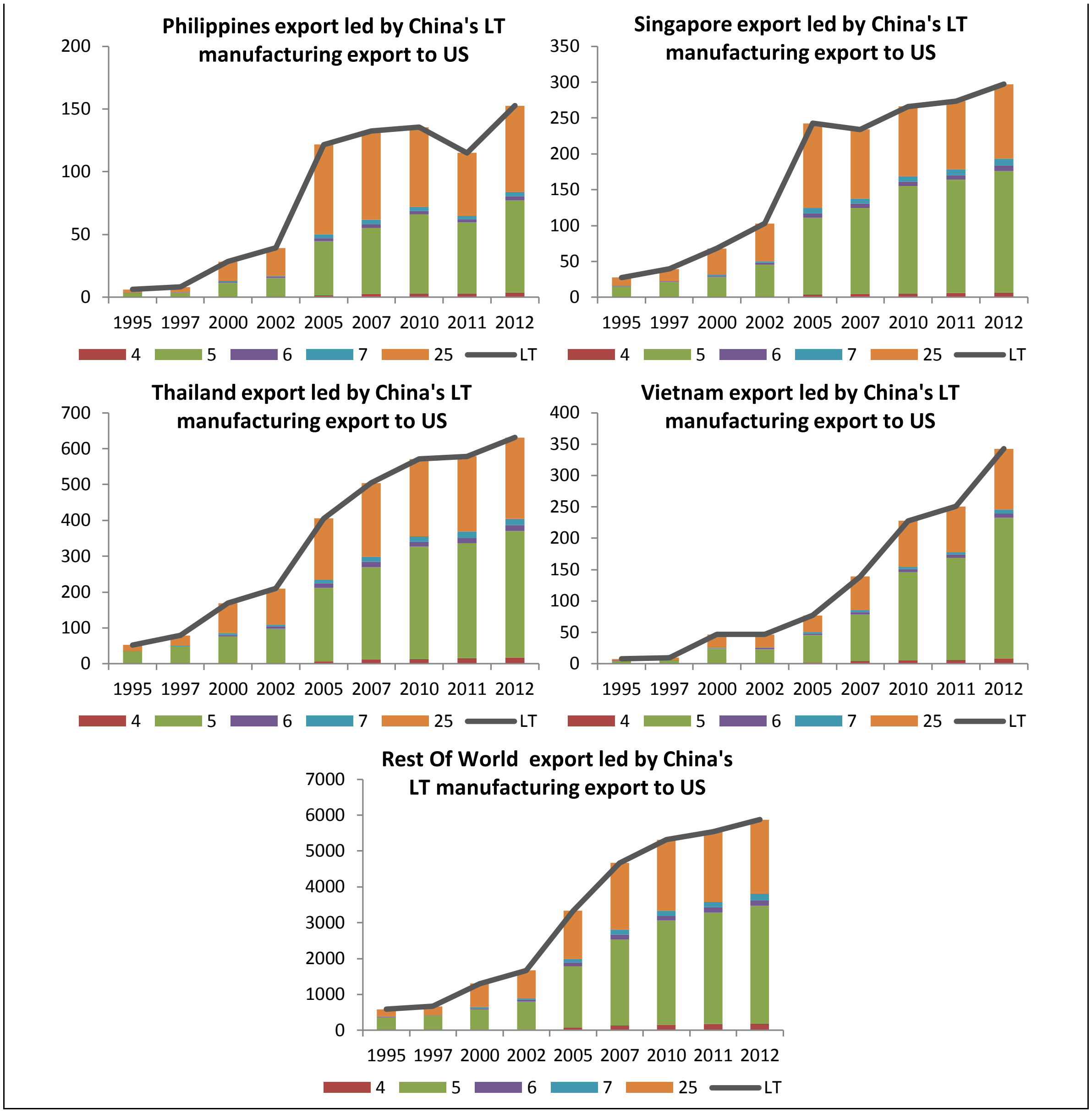
4.2.1.5 Impact of Chinese Low-Tech exports to US

Figure 3-17 each country's exports led by Chinese Low-Tech exports to US (billion $)




world export led by China's LT manufacturing export to US
25000
20000
15000
10000
5000
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
US export led by China's LT manufacturing export to US
2000
1500
1000
500
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
EU export led by China's LT manufacturing export to US
2500
2000
1500
1000
500
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
Germany export led by China's LT manufacturing export to US
1200
1000
800
600
400
200
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
France export led by China's LT manufacturing export to US
300
250
200
150
100
50
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
Italy export led by China's LT manufacturing export to US
350
300
250
200
150
100
50
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
Spain export led by China's LT manufacturing export to US
100
80
60
40
20
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
UK export led by China's LT manufacturing export to US
160
140
120
100
80
60
40
20
0
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT


Asia export led by China's LT manufacturing export to US
0 2000 4000 6000 8000 10000 12000
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
Japan export led by China's LT manufacturing export to US
0 500 1000 1500 2000 2500 3000 3500
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
Korea export led by China's LT manufacturing export to US
0 500 1000 1500 2000 2500 3000
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
Taiwan export led by China's LT manufacturing export to US
0 500 1000 1500 2000 2500
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
India export led by China's LT manufacturing export to US
0 100 200 300 400 500 600
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
ASEAN export led by China's LT manufacturing export to US
0 500 1000 1500 2000 2500
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
Indonesia export led by China's LT manufacturing export to US
0 100 200 300 400 500
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT
Malaysia export led by China's LT manufacturing export to US
0 100 200 300 400 500
1995 1997 2000 2002 2005 2007 2010 2011 2012
4 5 6 7 25 LT



Generally, the world export led by Chinese Low-Tech exports soared between 1997 and 2005, especially over 2002-2005. After 2005, its growth speed has largely slowed down. As illustrated in Table 3-15, Asia's exports led by Chinese Low-Tech exports to US accounted for nearly the half in the world. The group of Rest of the World (R.O.W.) occupied 30%. These two groups of countries both profited more from Chinese exports of textile than from other lowly qualified sectors. Their difference is revealed in Figure 3-17. The export growth of Asia stopped and remained around the same level from 2005, while that of R.O.W. continued climbing up especially from 2002.

Among all the countries, Japan's exports led by Chinese Low-Tech exports to US were always the most (except 2012). Table 3-15 shows that its world share at Low-Tech level was nearly equal to that of European Union in 2012. Yet Japan's exports to China for Chinese Low-Tech exports to US decreased from 2005, so did Taiwan. In the same year, Korea's exports driven by Chinese Low-Tech exports to US did not decrease, nor increase. Until 2012, Korea has passed Japan and became the largest beneficiary of Chinese Low-Tech exports to US. Different from Japan, Taiwan and Korea, India's exports led by Chinese Low-Tech exports to US still increased from 2005. Yet it remained at the lowest level across Asian countries.

ASEAN countries' exports promoted by Chinese Low-Tech exports to US continued increasing even in 2005. As mentioned above, ASEAN economies were the most active group of countries in Asian region. Vietnam's exports to China for Chinese Low-Tech exports to US rose the fastest all over the world. At outset, its exports led by China were nearly the fewest in Asia. They were just a little more than those of Philippines. From 2002, Vietnam profited much from Chinese exports of textile to US. In 2012 it became the fourth largest beneficiary of Chinese low-technology exports among ASEAN countries.

Chinese imports from Thailand and Indonesia for Chinese Low-Tech exports to US kept increasing over time. They were the first and the third largest beneficiaries of Chinese Low-Tech exports to US among ASEAN countries. As for the second largest beneficiary, Malaysia, its exports led by China have begun falling down since 2010. Singapore's exports led by Chinese Low-Tech exports to US mounted between 2002 and 2005 but since then its growth speed has slowed down a lot. Philippines's growth of exports led by Chinese Low-Tech exports to US was the slowest among ASEAN countries. It is the only ASEAN country whose exports in Figure 3-17 diminished in 2011.

European countries' evolutions were similar as that of the world. Their exports driven by Chinese Low-Tech exports to US ascended steeply during 1997-2005. From 2005, the growth speed slowed down. US's evolution was also similar as them, except for 2011 when its exports led by Chinese Low-Tech exports reduced greatly.

In conclusion, when considering the periods, the promoting effect of Chinese exports to US on world export soared in 2002. However, since 2005, the impact of Chinese sophisticated[55] and Low-Tech exports to US has not been so significant as before. The growth of world export driven by Chinese Medium-Low-Tech exports to US has decelerated later since 2007.

[55] Including High-Tech export and Medium-High-Tech export

When considering the technology levels, for nearly all the countries, Chinese sophisticated (High-Tech and Medium-High-Tech) exports to US promoted more exports of them than Chinese lower technology ones. European Union, Asia, including ASEAN countries' shares in the world measured by their exports to China for Chinese sophisticated exports to US were higher than the shares measured by their exports for Chinese low technological one.

When considering the countries and regions, Asia was always the largest beneficiary of Chinese increasing exports to US. It occupied the largest world share no matter for which technology levels. Yet its share has declined since 2005. ASEAN countries were always the most active part in Asia and their shares in the world continued increasing. Among ASEAN countries, Thailand and Vietnam were the two largest beneficiaries of Chinese increasing exports. Singapore profited more from Chinese low technological exports to US than from high technological one.

Among all the countries, Japan and Korea were recently the two biggest beneficiaries of Chinese rising exports to US. Their shares in the world export led by Chinese exports at each technology level were all much larger than that of other countries, even larger than European Union's overall share in the world. Taiwan was the third largest beneficiary of Chinese manufacturing exports to US. Its exports led by China were always larger than that of US. Its exports to China for Chinese Low technological exports to US were more than that of Germany, while its exports for Chinese high technological exports to US were less than the later. For Japan, Korea and Taiwan, the share of exports led by Chinese high technological exports was all higher than that by low technological ones.

Germany was the largest European beneficiary of Chinese exports growth. Its world share was as big as that of Taiwan and US. When taking technology levels into account, Germany profited much more from Chinese sophisticated exports to US. Its exports led by Chinese high technological exports were more than that of Taiwan and US, while its exports led by Chinese low technological one were less than the later.

India and Hong Kong were the two countries on which China's impact was the lowest all over the world. Because Hong Kong's evolution of 2011 was abnormal, we do not discuss it in this section.

each country's exports led by Chinese Low-Tech exports to US							
1995			2012			Growth	
	billion dollar	world share		billion dollar	world share	1995=100 (%)	
World	3417,7	100	World	19616,9	100	VietNam	4280
Asia	2271,6	66,5	Asia	9691,6	49,4	Philippines	2440
Japan	734,8	21,5	ROW	5874,2	29,9	India	2100
ROW	588,8	17,2	Korea	2617,7	13,3	Thailand	1209
Korea	545,8	16,0	Japan	2469,5	12,6	Germany	1112
Taiwan	433,5	12,7	EU15	2365,9	12,1	Singapore	1071
US	301,8	8,8	ASEAN	2275,2	11,6	ROW	998
HongKong	276,9	8,1	US	1685,3	8,6	EU15	926
ASEAN	257,4	7,5	Taiwan	1675,4	8,5	Spain	905
EU15	255,4	7,5	Germany	1003,2	5,1	ASEAN	884
Germany	90,2	2,6	Thailand	631,0	3,2	UK	804
Indonesia	81,5	2,4	India	486,3	2,5	Italy	693
Malaysia	81,0	2,4	Malaysia	410,5	2,1	France	683
Thailand	52,2	1,5	Indonesia	396,3	2,0	World	574
Italy	45,3	1,3	VietNam	342,9	1,7	US	558
France	34,9	1,0	Italy	313,5	1,6	Malaysia	507
Singapore	27,8	0,8	Singapore	297,3	1,5	Indonesia	486
India	23,2	0,7	France	238,8	1,2	Korea	480
UK	18,8	0,5	HongKong	167,6	0,9	Asia	427
Spain	9,6	0,3	Philippines	152,7	0,8	Taiwan	386
VietNam	8,0	0,2	UK	150,9	0,8	Japan	336
Philippines	6,3	0,2	Spain	86,7	0,4	HongKong	61

4.2.2 Impact on world export of Chinese exports to a given country

Excluding US, we clarify the impact of Chinese rinsing exports to other countries together in this section for two reasons: firstly, the evolution of China's imports from the world for its exports to other countries was already showed in Figure 3-11. In 2002, the world export led by Chinese exports to all the importing countries (*p*) soared largely. Since 2005, the growth has reined in, except for India, Vietnam and the group of Rest of the World. Chinese exports to these countries still promoted world export increasing as quickly as before. Over 2011-2012, it is revealed a general decline across countries. It indicates that Chinese exports to most of the importing countries (*p*) promoted less world export than before. The exception exists in ASEAN economies. Therefore, we study the impact of Chinese exports to ASEAN countries in this section as what we did for Chinese exports to US in section 4.2.1.

Secondly, the evolutions of China's imports from each exporter (*k*) for Chinese exports were similar across importers (*p*). As revealed in section 3.1 (methodology and data), we use the same share of imported inputs in overall imports (β_j) across different importing countries (*p*). Thus the shares of each exporting country (*k*) in the world were similar across Chinese exports to all the importing countries (*p*). For instance, Asia's exports led by Chinese manufacturing exports to US occupied more than the half in the world. Its exports led by Chinese manufacturing exports to European Union also occupied a same percentage in the world. However, the values of Asian exports driven by Chinese exports to US and to European Union were not the same. Asia's exports led by Chinese exports to US measured by value were much larger than that led by Chinese exports to European Union.

4.2.2.1 Impact on world export of Chinese exports to the world, by exporter

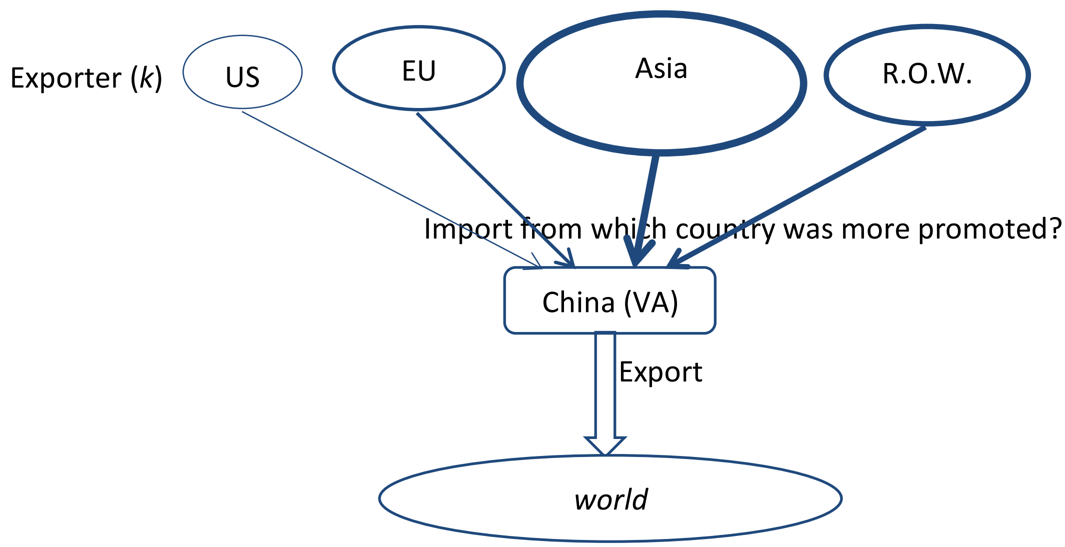


Figure 3-18 world export led by Chinese exports to world by Tech level and by exporter (billion dollars)

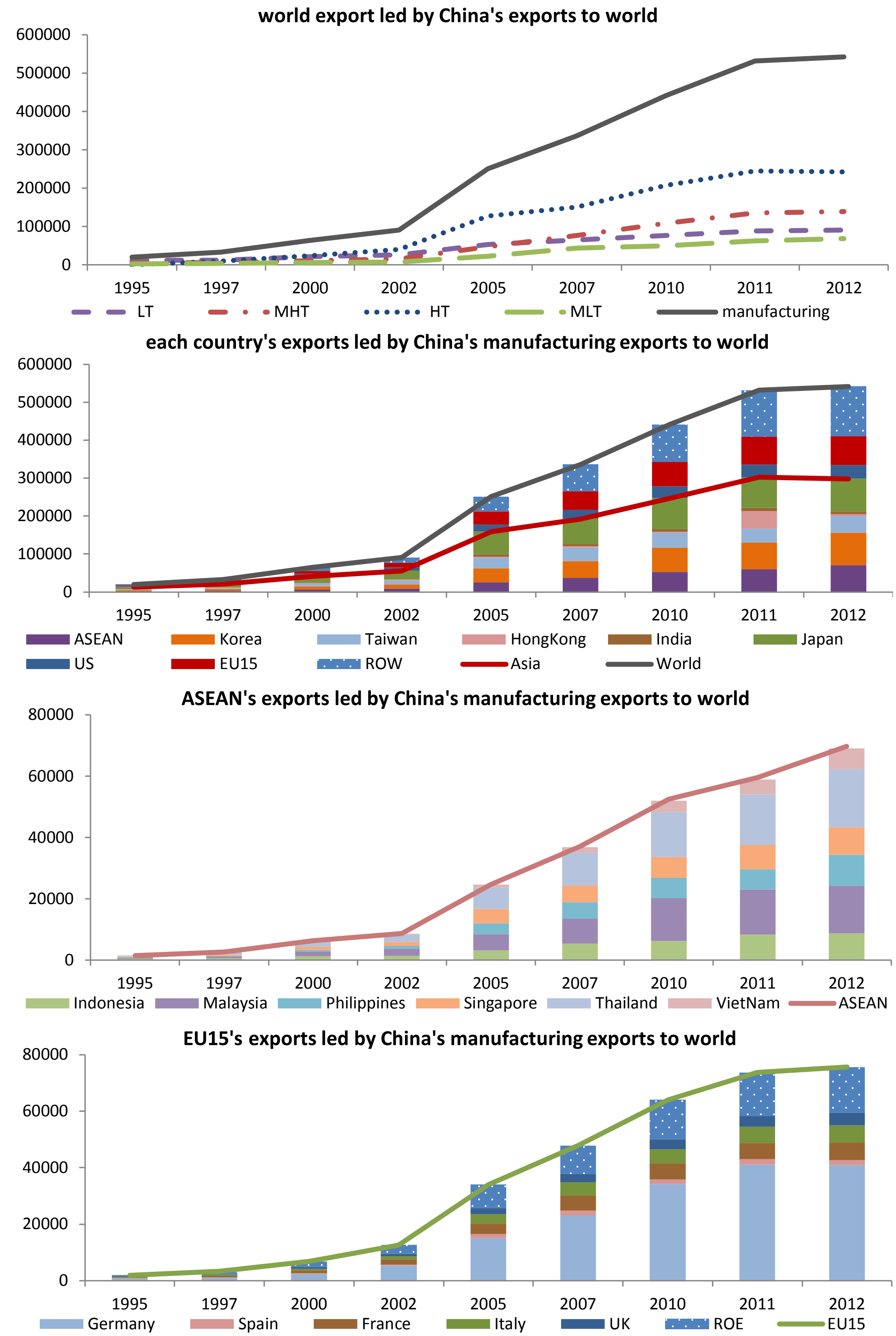


Figure 3-18 pictures the impact of Chinese exports to the world on world export by technology level and by exporter. As same as the impact of Chinese exports to US, Chinese sophisticated exports to the world also promoted much more exports of other countries than Chinese low technological ones. In 2002, the world export led by Chinese sophisticated (High-Tech plus Medium-High-Tech) and Low-Tech exports to the world all increased sharply. This promotion effect decelerated from 2005. The impact of Chinese Medium-Low-Tech exports to the world slackened later from 2007.

The only difference between the impact of Chinese exports to the world and that to US was the variation of world export led by China over 2011-2012. The growth of world export led by Chinese exports to the world stopped during this period. Asia's exports promoted by Chinese exports to the world even decreased. In contrast, the world export driven by Chinese exports to US continued increasing.

Table 3-16 illustrates the growth rate of each country's exports led by Chinese exports to the world in 2012 relative to 1995. The evolutions of their exports led by Chinese exports to the world were similar as those led by Chinese exports to US. Generally, all countries' exports driven by Chinese sophisticated exports increased faster than the exports driven by low technological ones, especially Asia. The growth rates of Asian exports led by Chinese High-Tech and Medium-High-Tech exports were correspondingly 32926% and 2341% over 1995-2012, while that by Medium-Low-Tech and Low-Tech were 1740% and 576%. The higher technology level, the higher growth rate it had.

During 1995-2012, ASEAN countries were always the most active part among the world, especially Philippines, Vietnam and Thailand. Their world shares of exports led by China continued increasing more quickly than other economies, except India for certain technology levels.

Indonesia is an exception of ASEAN countries. Its exports led by Chinese exports to the world did not increase as quickly as other ASEAN countries. The growth speed was even lower than most of the economies mentioned in this section.

India was one of countries whose exports led by China ascended the fastest between 1995 and 2012. Its exports led by Chinese Medium-Low-Tech exports to the world increased the second fastest among the world. That led by Chinese Medium-High-Tech and Low-Tech exports raised the third fastest. Yet its exports led by Chinese High-Tech exports did not increase as fast as that of other technology levels.

Behind ASEAN countries and India is Korea. Its exports led by Chinese sophisticated exports to the world rose more rapidly than the rest countries, while its exports led by

Chinese Low-Tech exports rose less quickly. Korea profited more from Chinese sophisticated exports to the world than from low technological ones.

Another country whose exports driven by China also rose fast is Germany. Its growth speed was the highest among European countries. The growth of its exports led by Chinese low technological exports to the world was quicker than Korea. Its exports to China for Chinese overall manufacturing exports to the world rose even faster than Malaysia and ASEAN group.

It is interesting that Spain's exports led by Chinese Low-Tech exports to the world rose also quickly and more quickly than other countries excluding India, ASEAN and Germany. However, Spain did not profited much from Chinese exports of other technology levels (excluding Low-Tech). Its growth rates of exports led by Chinese High- and Medium-High-Tech exports to the world were one of the lowest in the world.

As for other countries, Taiwan profited more from Chinese sophisticated exports to the world than from low technological one. Its growth rate of the former was much higher than the later. Japan and Hong Kong's exports led by China increased the most slowly among the world.

Table 3-17 illustrates the world share of each country's exports driven by Chinese manufacturing exports. Among all the countries and regions, Asia's exports led by China were always the most and its shares in the world were always the largest (except for Medium-Low-Tech level). Nevertheless, because its growth rate showed in Table 3-16 was lower than that of European Union and the group of rest of the world (ROW), Asia's world share decreased from 63% in 1995 to 55% in 2012. Indeed, its world shares of exports driven by Chinese High-Tech exports rose by 3% during 1995-2012, while that of other technology levels all declined. Exactly speaking, Asian world share of exports to China for Chinese Medium-High-tech exports decreased by 11%; that of Medium-Low-Tech decreased by 14%, and that of Low-Tech decreased by 17%. Therefore, Asia's share of world export driven by Chinese low technological exports declined faster than that by high technological ones.

On contrary, the group of Rest of the World (R.O.W.)'s share of the world increased from 18% to 24% over 1995-2012. Its world share of exports driven by Chinese low technological exports rose faster than that by high technological ones. The former rose by 18% for Medium-Low-Tech level and by 13% for Low-Tech one. The later increased by 12% for Medium-High-Tech level and by 0% for High-Tech one.

As same as the impact of Chinese exports to US, Japan and Korea were still the two largest beneficiaries of Chinese exports to the world. Their exports led by Chinese exports of each technology level were all much more than that of other countries. When regarding their exports driven by Chinese High-Tech and Low-Tech exports, their world shares were even larger than European Union's overall share of the world. In 2012, Japan and Korea's world shares of exports led by Chinese sophisticated exports (19% and 20% for High-Tech, 16% and 14% for Medium-High-Tech) were both higher than that of low technological ones (11% and 10% for Medium-Low-Tech, 13% and 12% for Low-Tech). Indeed, Japan's world share was always the highest over the world in 1995. Yet its growth speed of exports led by China was one of the lowest over the world (Table 3-16) and its world share at each technology level all decreased over time. Until 2012, Japan's world share has been passed by Korea and Japan has become the second largest beneficiary of Chinese rising exports to the world. Korea in 2012 was the first biggest beneficiary of Chinese manufacturing exports. In contrast to Japan, Korea's world shares of exports led by China increased between 1995 and 2012. Among four technology levels, Korea's shares of world exports to China for Chinese High-Tech, Medium-High-Tech and Medium-Low-Tech exports increased, while that for Chinese Low-Tech exports decreased. Hence during 1995-2012, Korea profited more from Chinese highly qualified exports than from lowly qualified ones.

Germany was always the largest European beneficiary of Chinese exports to the world. In 1995, Germany's exports led by Chinese exports of each technology level were all fewer than that of Taiwan and US. Nevertheless in 2012, Germany's exports led by Chinese highly qualified exports became more than that of Taiwan and US, while its exports led by Chinese lowly qualified exports were still less than the later. Therefore, Germany also profited more from Chinese sophisticated exports' growth than from low technological one.

Between Taiwan and US, Taiwan profited more from Chinese sophisticated exports than US. In 1995, Taiwan's exports to China for Chinese High-Tech, Medium-High-Tech and Medium-Low-Tech exports were less than US. Its exports for Chinese exports of these technology levels increased faster than US. Until 2012, they have all become more than that of US. However, as revealed in Table 3-16, Taiwan's growth of exports led by China was slower than that of Korea, ASEAN countries, European Union and the group of rest of the world. Therefore Taiwan's share of the world showed in Table 3-17 reduced generally, except for the share of exports led by Chinese High-Tech exports which rose by only 0.4% over 1995-2012. Besides, Taiwan's growth of exports to China for Chinese Low-Tech exports was one of the slowest over the world. Thus Taiwan's world share at this level was the only one that was still less than US in 2012. US's share of exports led by Chinese exports of each technology level all declined over 1995-2012. The large decline was revealed in high technological sectors. The world share of US exports led by Chinese Low-Tech exports did not descend so much as that led by Chinese higher technological exports.

Among ASEAN countries, Thailand and Malaysia were the two largest beneficiaries of Chinese manufacturing exports to the world. Their shares in the world increased at all technology levels. Between them, Thailand's share ascended faster than Malaysia. Malaysia's share of exports led by Chinese lowly qualified exports did not raise much.

As for other fastest increasing countries, Philippines, Vietnam and India, their shares in the world were still not large as other countries. Philippines' exports led by Chinese High-Tech, Medium-High-Tech and Medium-Low-Tech exports increased the fastest over the world. In 1995, its world share of exports to China for Chinese High-Tech exports was only 0.2%, which was the second smallest over the world. In 2012, its world share climbed to 3.1%, which was only smaller than that of Thailand and Malaysia among ASEAN economies. Yet its world shares of exports to China for Chinese exports of other technology levels remained small (around 1%) in 2012. Philippines' share of world exports led by Chinese High-Tech exports rose much faster than that by low technological ones.

In contrast with Philippines, India's world share of exports driven by Chinese Low-Tech exports increased faster than that by higher technological ones. Its share in the world measured by the exports for Chinese Low-Tech exports soared by 1.8% (from 0.7% to 2.5%) over 1995-2012, while that for other technological ones rose less quickly than the former. The world share of exports driven by Chinese Medium-Low-Tech exports rose by 1% (from 0.8% to 1.8%) over 1995-2012, that by Medium-High-Tech ones rose by 1% (from 0.4% to 1.4%) and that by High-Tech ones rose by 0.5% (from 0.3% to 0.8%). The higher technology level, the smaller world share it had.

Vietnam's exports led by Chinese Low-Tech exports increased the fastest over the world. As same as India, Vietnam's world share of exports driven by Chinese Low-Tech exports increased faster than that by other technological ones. It rose from 0.2% in 1995 to 1.8% in 2012. Different from India, Vietnam's world share of exports for Chinese High-Tech exports also increased much. It ascended from 0.2% in 1995 to 1.4% in 2012. As for other technology levels (Medium-High-Tech and Medium-Low-Tech), Vietnam's world shares at these levels remained small compared with other fast expanding countries and they did not increase much as Low-Tech and High-Tech level.

each country's exports led by Chinese manufacturing exports to world							
1995			2012			Growth	
	billion dollar	world share		billion dollar	world share	1995=100 (%)	
World	20309,3	100	World	541713,2	100	Philippines	24984
Asia	12831,7	63,2	Asia	298031,6	55,0	VietNam	11524
Japan	4984,4	24,5	ROW	131796,8	24,3	Thailand	6715
ROW	3688,0	18,2	Korea	86437,5	16,0	India	5961
Korea	2699,5	13,3	Japan	85920,5	15,9	Germany	5636
Taiwan	2185,5	10,8	EU15	75588,5	14,0	ASEAN	4961
EU15	1952,4	9,6	ASEAN	69711,0	12,9	Singapore	4724
US	1837,2	9,0	Taiwan	43171,4	8,0	Malaysia	4273
HongKong	1432,5	7,1	Germany	40879,4	7,5	EU15	3872
ASEAN	1405,1	6,9	US	36296,4	6,7	ROW	3574
Germany	725,4	3,6	Thailand	18967,0	3,5	Korea	3202
Indonesia	468,3	2,3	Malaysia	15435,6	2,8	UK	3189
Malaysia	361,3	1,8	Philippines	10241,1	1,9	World	2667
Italy	316,7	1,6	Singapore	9008,5	1,7	France	2344
Thailand	282,4	1,4	Indonesia	8651,8	1,6	Asia	2323
France	264,2	1,3	India	7434,8	1,4	Spain	2267
Singapore	190,7	0,9	VietNam	6765,2	1,2	US	1976
UK	137,5	0,7	France	6193,0	1,1	Taiwan	1975
India	124,7	0,6	Italy	6135,8	1,1	Italy	1937
Spain	77,4	0,4	HongKong	5356,4	1,0	Indonesia	1847
VietNam	58,7	0,3	UK	4385,0	0,8	Japan	1724
Philippines	41,0	0,2	Spain	1754,0	0,3	HongKong	374

4.2.2.2 Impact on world export of Chinese exports to ASEAN countries, by exporter

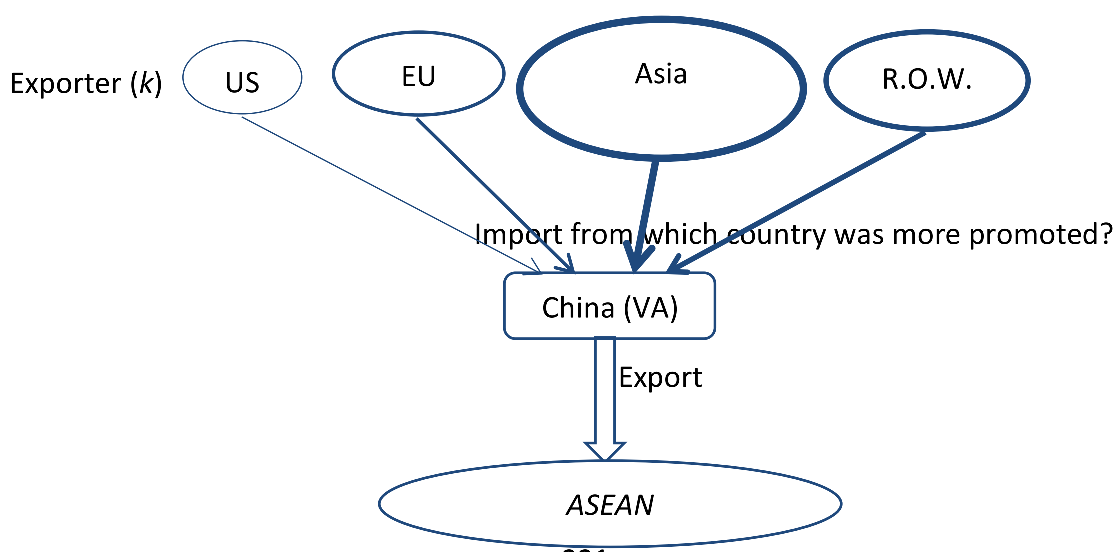


Table 3-18 and Table 3-19 display each country's exports led by Chinese exports to ASEAN countries measured by growth rate relative to 1995 and by world share. The values of exports led by China at billion dollars were so different across countries that we do not illustrate them in the figures. As mentioned previously, we use the same share of imported inputs in overall imports (β_j) across all the importing countries (*p*). Thus the share of each exporting country (*k*) in the world, their orders and their evolutions were similar across China's exports to all the countries. Therefore, Table 3-18 is similar as Table 3-16. Table 3-19 is similar as Table 3-17.

For the measurement by growth rate, the only difference between Table 3-18 and Table 3-16 is that Germany's exports led by Chinese manufacturing exports to ASEAN countries increased less quickly than that of Malaysia and ASEAN as a whole. Yet its exports promoted by Chinese manufacturing exports to the world rose faster than the later. For the measurement by world share, the difference is that European Union's exports led by Chinese manufacturing exports to ASEAN countries in 1995 were more than that of Korea and Taiwan. Its exports driven by Chinese manufacturing exports to the world were less than the later in that year.

As for other countries, the orders of world shares and the evolutions between 1995 and 2012 were similar. For instance, Asia profited more from Chinese High-Tech exports to ASEAN countries than from low technological ones. Its world share of exports led by Chinese High-Tech exports to ASEAN increased by 3% over 1995-2012, while that of other technology levels declined oppositely.

In 1995, Japan, Korea, US and Taiwan were the four largest beneficiaries of Chinese manufacturing exports to ASEAN countries. In 2012, Germany's exports led by Chinese high technological exports to ASEAN passed US and Taiwan. Germany became the third largest beneficiary of Chinese high technological exports. For lower technology levels, Germany's exports promoted by Chinese low technological exports to ASEAN economies remained smaller than that of US and Taiwan in 2012.

In general, the impacts of Chinese rising exports to US, to the world and to ASEAN countries were similar. If we study Chinese exports to European Union, Japan…all other importing countries (*p*), the impacts would be also similar. Therefore, we only research the impacts of Chinese exports to these three importers on world export in this chapter.

each country's exports led by Chinese manufacturing exports to ASEAN							
1995			2012			Growth	
	billion dollar	world share		billion dollar	world share	1995=100 (%)	
World	1404,5	100	World	56598,6	100	Philippines	28536
Asia	836,8	59,6	Asia	29936,3	52,9	VietNam	13252
Japan	371,0	26,4	ROW	15233,7	26,9	Thailand	9917
ROW	278,4	19,8	Korea	8686,1	15,3	India	9401
EU15	160,5	11,4	Japan	8658,9	15,3	Malaysia	7129
Korea	152,7	10,9	EU15	7688,8	13,6	ASEAN	6938
US	128,8	9,2	ASEAN	6848,4	12,1	Germany	6648
Taiwan	122,7	8,7	Taiwan	4406,2	7,8	Singapore	6067
ASEAN	98,7	7,0	Germany	4125,6	7,3	Korea	5688
HongKong	83,3	5,9	US	3739,8	6,6	ROW	5472
Germany	62,1	4,4	Thailand	1781,5	3,1	EU15	4790
Indonesia	35,8	2,6	Malaysia	1521,1	2,7	UK	4036
Italy	25,0	1,8	Philippines	947,3	1,7	World	4030
Malaysia	21,3	1,5	Indonesia	940,0	1,7	Taiwan	3590
France	21,3	1,5	Singapore	910,2	1,6	Asia	3577
Thailand	18,0	1,3	India	782,8	1,4	France	2955
Singapore	15,0	1,1	VietNam	679,0	1,2	US	2904
UK	11,2	0,8	Italy	638,3	1,1	Spain	2771
India	8,3	0,6	France	628,6	1,1	Indonesia	2624
Spain	6,5	0,5	HongKong	553,9	1,0	Italy	2552
VietNam	5,1	0,4	UK	450,2	0,8	Japan	2334
Philippines	3,3	0,2	Spain	180,5	0,3	HongKong	665

5. Conclusion

In China, most of the imports have been used for the production and the export. The share of intermediate uses in Chinese imports increased over the 1995-2007 and the share of final uses declined. Since the analysis of trade data could not give a satisfying result, we set up regional input-output-tables and we study the imported intermediate inputs of Chinese export to assess China's effect on world exports.

Between 1995 and 2012, the imported inputs embodied in a unit of Chinese export raised. In other words, Chinese exports increasingly promoted world export. During this period, China's exports to the USA, Japan, Korea and Germany increased the most. Simultaneously, Chinese exports to these countries have the most stimulated world exports. Besides, China's exports to ASEAN countries and India have increased the most rapidly. Hence, this chapter studies respectively the impact of Chinese rising exports to USA, to the world and to ASEAN countries. Because we assume that the share of imported inputs in overall imports is the same across importing countries, China's export growth to these different markets has similar impacts.

The promoting effect of Chinese export growth on world export soared in 2002. However, since 2005, China's sophisticated exports promoted more world export than the exports of low qualified products. Furthermore, the countries and regions' exports led by Chinese sophisticated exports increased faster than the exports led by Chinese lower technology exports Among all the manufacturing sectors, Chinese sophisticated exports of machinery and equipment, including electrical machinery and equipment, had the strongest positive impact on world export. Meanwhile, Chinese exports of low-tech products of textile also led more world export than other sectors.

In terms of region, Asia was always the largest beneficiary of Chinese export growth. In 2012, more than a half of imported inputs embodied in Chinese manufacturing exports came from Asia. China's need of import from Asia for high-Tech export was even higher. However, Asia's share of world export led by China has decreased between 1995 and 2012, especially the share of exports led by Chinese low technological exports. ASEAN countries have been the most active in Asia. Thailand, the Philippines, Vietnam's exports driven by China increased the fastest. In contrast with Asia, the "Rest of the World", including Latin America and Arab countries, profited more from Chinese low technological exports.

In terms of country, Japan, Korea, Taiwan, US and Germany were the five biggest beneficiaries of Chinese export growth. India and Hong Kong were the two countries on which China's impact was the lowest in the world. Japan and Korea's exports led by

Chinese exports at every technology level were the largest in the world, even larger than European Union's overall exports led by China. However, their exports led by China rose slowly. Taiwan's exports driven by China were always larger than those of the USA, except for the exports linked to low technological exports. Germany's growth speed of exports led by China was the highest among European countries. It benefited widely from Chinese sophisticated exports' growth.

Thus, Asia, especially ASEAN countries could benefit from China's structural changes of export, so could Germany. In contrast, other countries, including other European countries, Latin America…would lose. If they would like to profit from China's export growth and the change of its export, they should adjust their trade structure with China.

General conclusion

According to the empirical study, both cost and non-cost competitiveness have had significant impacts on China's trade performance. Chapter 1 firstly studies China's cost competitiveness and the factors that affect it in comparisons with 19 countries.

During the 1970-2012 period, China's relative level of labor compensation was much lower than in industrialized countries but a little higher than in the emerging countries, except for Malaysia. China has improved its labor productivity. Although it was still much less productive than industrialized countries, its production became more efficient than the rest of emerging countries, excluding Thailand and Malaysia.

For the whole economy ("total economy"), China was characterized by a cost-advantage compared with industrialized economies. Yet it was handicapped in comparison with emerging countries. Its cost per output was higher than that of all the emerging economies. For the manufacturing sector, differently, Chinese relative unit labor costs were lower than those of developed countries and most of the developing countries, aside from Thailand.

Since 1990s, China could not maintain its low cost advantage because of the growth of labor remuneration. Its non-cost competitiveness has increased and has stimulated its export development. During the 1994-2004 decade, China's structural change was impressive and has resulted in a strong technological shift. The high-tech export's share has increased rapidly while the low-tech export's share diminished. Nevertheless, from 2004 the growth of the former stopped, even dropped and the later continued to decrease as before. China was recently more and more specialized in medium-low qualified sectors, which are based on natural resource.

The study of input-output tables shows that China's domestic value added (also named local content) of nearly all the high-qualified sectors' export has declined, except for electronic components. The export sectors in which the local content increased are the low- and medium-low-technology sectors. A unit of Chinese export needed more imported inputs than before. The technological shift of Chinese export was implemented through an increasing dependence on imports from other countries.

Thus, the assessment of China's structural change leads to different conclusions, depending whether it is based on export data or on input-output tables (export minus import of inputs). The empirical study of chapter 2 confirms that China's rising export has mainly relied on cost advantages and price competitiveness, instead of "non-cost competitiveness". Since its cost advantages has decreased recently, China must enhance the local content of its production to consolidate the development of sophisticated exports.

Indeed, most of Chinese imports were used as intermediate inputs for the production and export. The share of intermediate uses in Chinese import has increased since 1995, while the share of final uses has declined.

Since the imported inputs embodied in a unit of Chinese export has increased, a unit of Chinese export stimulted more world export than before. Chapter 3 establishes regional input-output tables and we find that among all the countries, China's export to the United States, Japan, Korea and Germany have had the strongest positive impact on world export. Besides, world export led by China's export to ASEAN countries and India have the most Increased.

The positive effects of Chinese export growth on world export soared in 2002. However, since 2005, the world export led by Chinese sophisticated[56] and low technological export has not changed as much as before.

China's sophisticated exports promoted more world export than the exports of low qualified goods. Furthermore, all the countries exports led by Chinese sophisticated exports increased faster than those linked to low technology exports. Among all the manufacturing sectors, Chinese sophisticated export of machinery and equipment, including electrical machinery and equipment, has had the greatest positive impact.

In terms of region, Asia has always been the largest beneficiary of Chinese export growth. However, its share of world export linked to China's export growth has decreased between 1995 and 2012, especially its share in world export led by Chinese low technological exports. ASEAN countries were the most active contributors to this division of labor in Asia. Thailand, the Philippines, Vietnam's exports driven by China increased the fastest. In terms of country, initially the United States, Japan and European industrialized countries were the main beneficiaries of Chinese imports of intermediate inputs. Yet their exports to China used as intermediate inputs for the production did not change much over time. Asian new industrialized economies have rapidly emerged as new suppliers, especially for high technological products. In 2012, Japan, Korea, Taiwan, US and Germany were the five biggest beneficiaries of Chinese export growth. India and Hong Kong were the two countries on which China's exports impact was the lowest in the world.

[56] Sophisticated export comprises high-technological and medium-high-technological export.

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Appendix 1: Definition of labor cost

The 11th ICLS (Geneva, 1966) adopted a resolution concerning statistics on labor cost, recommending the following International Standard Classification of Labor Cost:

I. Direct wages and salaries

1. Straight-time pay of time-related workers
2. Incentive pay of time-rated workers
3. Earnings of piece-workers (excluding overtime premiums)
4. Premium pay for overtime, late shift and holiday work

II. Remuneration for time not worked

1. Annual vacation, other paid leave, including long-service leave
2. Public holidays and other recognized holidays
3. Other time off granted with pay (e.g. birth or death of family members, marriage of employees, functions of titular office, union activities)
4. Severance and termination pay where not regarded as social security expenditure

III. Bonuses and gratuities

1. Year-end and seasonal bonuses
2. Profit-sharing bonuses
3. Additional payments in respect of vacation, supplementary to normal vacation pay and other bonuses and gratuities

IV. Food, drink, fuel and other payments in kind

V. Cost of workers' housing borne by employers

1. Cost for establishment-owned dwellings
2. Cost for dwellings not establishment-owned (allowances, grants, etc.)
3. Other housing costs

VI. Employers' social security expenditure

1. Statutory social security contributions (for schemes covering old age, invalidity and survivors, sickness, maternity, employment injury, unemployment, and family allowances)
2. Collectively agreed, contractual and non-obligatory contributions to private social security schemes and insurances (for schemes covering old age, invalidity and survivors, sickness, maternity, employment injury, unemployment and family allowances)

3a. direct payments to employees in respect of absence from work due to sickness, maternity or employment injury, to compensate for loss of earnings

3b. other direct payments to employees regarded as social security benefits

4. Cost of medical care and health services
5. Severance and termination pay where regarded as social security expenditure

VII. Cost of vocational training, including fees and other payments for services of outside instructors, training institutions, teaching material, reimbursements of school fees to workers, etc.

VIII. Cost of welfare services

1. Cost of canteens and other food services
2. Cost of education, cultural, recreational and related facilities and services
3. Grants to credit unions and cost of related services for employees

IX. Labor cost not elsewhere classified, such as costs of transport of workers to and from work undertaken by employer (including reimbursement of fares, etc.), cost of work clothes, cost of recruitment and other labor costs

X. Taxes regarded as labor cost, such as taxes on employment or payrolls, included on a net basis, i.e. after deduction of allowances or rebates made by the State.

Appendix 2: ISIC Rev.3 Classification of manufacturing, correspondence between codes, sectors and technology levels

(International Standard Industrial Classification of All Economic Activities, Rev.3)

Manufacturing sectors (M):

OECD codes	Description
4	Food, beverage, tobacco
5	Textile, leather and footwear
6	Wood and cork products
7	Pulp, paper, printing publishing
8	Coke, refined petroleum products, nuclear fuel
9	Chemicals excluding pharmaceuticals
10	Pharmaceuticals
11	Rubber, plastics products
12	Other Non-metallic mineral products
13	Iron and Steel
14	Non-ferrous metals
15	fabricated metal products, except machinery and equipment
16	Machinery and equipment
17	Office accounting computing machinery
18	Electrical machinery and apparatus
19	Radio television, communication equipment
20	Medical precision optical instruments
21	Motor vehicles, trailers & semi-trailers
22	Building and repairing of Ships and boats
23	Aircraft and Spacecraft
24	Railroad transport equipment
25	manufacturing n.e.c., including furniture; recycling

High-Tech sectors (HT):

OECD codes	Description
10	Pharmaceuticals
17	Office accounting computing machinery
19	Radio television, communication equipment
20	Medical precision optical instruments
23	Aircraft and Spacecraft

Medium-High-Tech sectors (MHT):

OECD codes	Description
9	Chemicals excluding pharmaceuticals
16	Machinery and equipment
18	Electrical machinery and apparatus
21	Motor vehicles, trailers & semi-trailers
22	Building and repairing of Ships and boats
24	Railroad transport equipment

Medium-Low-Tech sectors (MLT):

OECD codes	Description
8	Coke, refined petroleum products, nuclear fuel
11	Rubber, plastics products
12	Other Non-metallic mineral products
13	Iron and Steel
14	Non-ferrous metals
15	fabricated metal products, except machinery and equipment

Low-Tech sectors (LT):

OECD codes	Description
4	Food, beverage, tobacco
5	Textile, leather and footwear
6	Wood and cork products
7	Pulp, paper, printing publishing
25	manufacturing n.e.c., including furniture; recycling

Tables

Table 3-0.1 Pooled estimating results of Equation (38)

$\triangle\ln(EXP/W)_i$		Manufacturing			Total		
Country	Variable	World manufacturing import market	Us manufacturing import market	Japan manufacturing import market	World import market	Us import market	Japan import market
USA	constant	-0.04**		-0.04***	-0.04**		-0.04*
	$\triangle\ln(EXP/W)_{cn}$	0.29*		0.35***	0.30*		0.20*
	$\triangle\ln(EXP/W)_{i,-1}$	0.41*		0.33***	0.34*		0.47***
	$\triangle\ln(RULC_i)$	-0.07		0.23	0.28		0.40
	1970-2012	0.15			0.34***		0.32***
	Adjusted R^2	0.17		0.48	0.17		0.39
	DW	1.88		2.02	1.43		1.69
France	constant	-0.00	-0.00	-0.03*	-0.00	-0.04	0.00
	$\triangle\ln(EXP/W)_{cn}$	-0.21**	0.06	0.32***	-0.21	0.31*[57]	-0.18
	$\triangle\ln(EXP/W)_{i,-1}$	-0.12	0.18	0.16	-0.05	0.19	0.39**
	$\triangle\ln(RULC_i)$	0.24***	-0.45***	0.26*	0.24**	-0.25*	0.13
	1970-2012	-0.10	0.04		0.00	0.07	0.13
	Adjusted R^2	0.44	0.32	0.32	0.27	0.38	0.16
	DW	1.35	2.17	2.08	1.31	2.62	1.56
Germany	constant	0.01	0.01	-0.04**	0.00	-0.01	-0.02
	$\triangle\ln(EXP/W)_{cn}$	-0.33**	-0.01	0.23**	-0.24	0.11	0.01
	$\triangle\ln(EXP/W)_{i,-1}$	-0.34**	0.43**	0.1	-0.32**	0.47**	0.36**
	$\triangle\ln(RULC_i)$	0.35***	-0.17	0.35**	0.41***	-0.07	0.58***
	1970-2012	-0.13	-0.04		-0.13	-0.01	-0.03
	Adjusted R^2	0.49	0.13	0.19	0.54	0.12	0.44
	DW	1.86	2.32	1.95	1.40	2.24	1.92
Italy	constant	-0.01	0.01	-0.03	0.00	-0.04*	-0.00
	$\triangle\ln(EXP/W)_{cn}$	-0.19**	-0.05	0.33**	-0.29*	0.27*	-0.08
	$\triangle\ln(EXP/W)_{i,-1}$	-0.52***	0.14	0.22	-0.33*	0.39***	0.64***
	$\triangle\ln(RULC_i)$	0.28***	-0.62***	0.15	0.23**	-0.29***	0.04
	1970-2012	-0.21***	0.03		-0.17	0.10	0.09
	Adjusted R^2	0.53	0.25	0.12	0.25	0.58	0.33
	DW	1.80	1.91	2.03	1.43	2.68	1.42
Spain	constant	0.02	0.01	-0.05	0.00	-0.00	-0.05
	$\triangle\ln(EXP/W)_{cn}$	-0.04	0.17	0.64***	0.12	0.14**	0.55*
	$\triangle\ln(EXP/W)_{i,-1}$	-0.11	-0.02	-0.15	-0.10	0.12	-0.39**
	$\triangle\ln(RULC_i)$	0.09	-0.81***	-0.15	0.18*	-0.55***	0.08
	1970-2012	-0.04	0.17		0.12	0.14**	0.27
	Adjusted R^2	-0.09	0.31	0.23	0.01	0.23	0.14
	DW	1.93	2.03	1.80	1.36	2.12	1.32
UK	constant	-0.01	-0.02	-0.04**	-0.02	-0.07**	-0.02
	$\triangle\ln(EXP/W)_{cn}$	-0.17	0.08	0.25***	-0.10	0.48***	0.10
	$\triangle\ln(EXP/W)_{i,-1}$	-0.04	0.27	0.25	-0.16	0.01	0.42*
	$\triangle\ln(RULC_i)$	0.14	-0.32***	0.01	0.11	-0.41**	0.23
	1970-2012	-0.15	0.01		-0.04	0.09	0.16
	Adjusted R^2	0.02	0.28	0.18	-0.06	0.34	0.09
	DW	1.75	2.22	2.04	1.81	2.42	1.88
Japan	constant	-0.06***	-0.07***		-0.08***	-0.09***	
	$\triangle\ln(EXP/W)_{cn}$	0.45***	0.38***		0.64***	0.49***	
	$\triangle\ln(EXP/W)_{i,-1}$	0.04	0.45***		0.03	0.37**	
	$\triangle\ln(RULC_i)$	0.19*	0.12		0.35***	0.20	
	1970-2012	0.01	-0.01		0.18	0.03	
	Adjusted R^2	0.25	0.38		0.48	0.47	
	DW	1.66	1.89		1.51	1.83	

[57] Estimation of the data from 1985 to 2012

Korea	constant	-0.04	-0.03	-0.05	0.00	-0.04	-0.04
	$\triangle \ln(EXP/W)_{cn}$	0.55*[58]	0.21	0.70***	0.23	0.29*	0.61**[59]
	$\triangle \ln(EXP/W)_{i,-1}$	-0.04	0.51***	0.10	0.15	0.52***	-0.08
	$\triangle \ln(RULC_i)$	0.14	0.01	0.47*	0.14	-0.06	0.63**
	1970-2012	0.26	0.06		0.21	0.1	0.61**
	Adjusted R^2	0.33	0.17	0.38	0.03	0.23	0.19
	DW	1.72	2.12	1.30	1.81	2.26	1.28
Thailand	constant	-0.04*	-0.02	0	-0.02	-0.02	0.01
	$\triangle \ln(EXP/W)_{cn}$	0.69***	0.36***	0.32***	0.51**	0.30**	0.24
	$\triangle \ln(EXP/W)_{i,-1}$	0.34**	0.32**	0.51***	0.38*	0.42**	0.40**
	$\triangle \ln(RULC_i)$	-0.12	0.01	-0.14	0.01	0.19*	-0.07
	1970-2012	0.14	0.03		0.55**	0.30**	0.24
	Adjusted R^2	0.47	0.42	0.26	0.17	0.43	0.19
	DW	1.09	1.45	2.17	1.76	1.69	2.18
Indonesia	constant	-0.06	-0.01	-0.01	-0.05	0.00	-0.09***
	$\triangle \ln(EXP/W)_{cn}$	0.81**[60]	0.14	0.41**	0.53*	0.04	0.9***
	$\triangle \ln(EXP/W)_{i,-1}$	0.18	0.09	-0.07	0.31	0.42**	0.1
	$\triangle \ln(RULC_i)$	-0.05	-0.11	0.05	-0.16	-0.1	-0.2
	1970-2012	0.33	0.08	0	-0.05	0.05	0.53**
	Adjusted R^2	0.11	-0.09	0.06	0.23	0.09	0.52
	DW	2.11	1.86	2.33	1.83	2.09	1.66
India	constant	-0.03	0.01	-0.03	-0.06	0.01	-0.02
	$\triangle \ln(EXP/W)_{cn}$	0.50**	0.10	0.45***	0.90**[61]	0.08	0.11
	$\triangle \ln(EXP/W)_{i,-1}$	0.36**	0.28	-0.11	0.13	0.40**	0.04
	$\triangle \ln(RULC_i)$	-0.03	-0.21**	0.09	0.08	-0.14	0.04
	1970-2012	0.17	0.03		0.20	0.03	0.08
	Adjusted R^2	0.12	0.13	0.16	0.19	0.14	-0.1
	DW	1.91	1.84	2.10	1.51	1.67	1.47
Mexico	constant	-0.05	-0.02	-0.04	-0.04	-0.04**	-0.07
	$\triangle \ln(EXP/W)_{cn}$	0.51**[62]	0.35***	0.77**[63]	0.44	0.47***	0.48
	$\triangle \ln(EXP/W)_{i,-1}$	0.68***	0.54***	0.18	0.80***	0.67***	0.15
	$\triangle \ln(RULC_i)$	-0.01	-0.09	-0.09	-0.08	-0.08	-0.04
	1970-2012	0.21	0.35***		0.44	0.47**	0.48
	Adjusted R^2	0.38	0.41	0.09	0.48	0.66	-0.14
	DW	1.71	2.07	1.70	1.83	1.86	1.66

[58] Estimation of data from 1990, before 1990 coefficient non-significant
[59] Estimation of data from 1970
[60] Estimation of data since 1985
[61] Estimation of data since 1985
[62] Estimation of data since 1985
[63] Estimation of data since 1985

Table 3-0.2 Hausman Test

in world market:

Depended Variable	Fixed	Random	Var(Diff.)	Prob.
DLXW_US	-0,10	0,06	0,01	0,03
DLXW_fr	0,01	-0,05	0,00	0,37
DLXW_ger	-0,14	-0,16	0,01	0,79
DLXW_ita	0,07	-0,09	0,00	0,01
DLXW_spain	-0,01	-0,03	0,01	0,86
DLXW_uk	0,14	-0,05	0,02	0,16
DLXW_jpn	0,02	0,02	0,00	0,93
DLXW_kor	0,04	0,05	0,00	0,86
DLXW_thailand	0,28	0,20	0,01	0,36
DLXW_idn	0,60	0,31	0,10	0,35
DLXW_india	0,09	0,11	0,02	0,84
DLXW_mex	0,17	0,24	0,12	0,84

in US market :

Depended Variable	Fixed	Random	Var(Diff.)	Prob.
DLXW_france	0,02	0,01	0,00	0,54
DLXW_germany	-0,03	-0,01	0,00	0,12
DLXW_italy	0,02	0,01	0,00	0,38
DLXW_spain	0,01	0,02	0,00	0,54
DLXW_uk	0,00	0,01	0,00	0,83
DLXW_jpn	0,02	0,02	0,00	0,85
DLXW_korea	0,01	0,02	0,00	0,52
DLXW_thailand	0,02	0,00	0,00	0,04
DLXW_indonesia	0,06	0,00	0,01	0,48
DLXW_india	0,03	0,01	0,00	0,51
DLXW_mexico	0,01	0,00	0,00	0,76

In Japan market :

Depended Variable	Fixed	Random	Var(Diff.)	Prob.
DLXW_us	0,14	0,19	0,00	0,04
DLXW_france	-0,18	-0,13	0,00	0,00
DLXW_germany	-0,06	-0,03	0,00	0,20
DLXW_italy	-0,09	-0,08	0,00	0,05
DLXW_spain	-0,11	-0,09	0,00	0,06
DLXW_uk	-0,12	-0,01	0,00	0,00
DLXW_kor	-0,06	0,00	0,00	0,00
DLXW_thailand	-0,03	0,05	0,00	0,17
DLXW_indonesia	0,38	0,43	0,01	0,71
DLXW_india	0,57	0,43	0,01	0,15
DLXW_mexico	0,83	0,75	0,11	0,79

Table 3-0.3 Results of dated panel regression

Country	variable	World				US				Japan			
1970-2008		import market				import market				import market			
$\triangle\ln(X/W_i)$													
		FE_i	FE_t	RE_t	FE_{it}	FE_i	FE_t	RE_t	FE_{it}	FE_i	FE_t	RE_t	FE_{it}
USA	constant	-0.03***	-0.00	-0.02**	-0.00					-0.05***	-0.04***	-0.04***	-0.04***
		(-3.63)	(-0.65)	(-1.97)	(-0.46)					(-5.15)	(-8.48)	(-3.27)	(-8.39)
	$\triangle\ln(X/W)_{cn}$	0.20***	-0.10	0.06	-0.12					0.32***	0.14**	0.19***	0.13**
		(2.66)	(-0.96)	(0.85)	(-1.10)					(5.11)	(2.63)	(4.12)	(2.46)
	Adjusted R^2	0.06	0.87	-0.00	0.87					0.25	0.94	0.17	0.94
	DW	1.25	2.09	1.71	2.12					1.17	2.35	1.66	2.49
	Hausman P. RE			0.03								0.04**	
France	constant	-0.00	-0.01		-0.01	-0.00	-0.01*		-0.01*	-0.02	0.02***	0.01	0.02***
		(-0.03)	(-1.22)		(-1.21)	(-0.50)	(-1.80)		(-1.77)	(-1.11)	(4.74)	(0.78)	(4.77)
	$\triangle\ln(X/W)_{cn}$	-0.12	0.01		0.01	0.01	0.02		0.02	0.27***	-0.18***	-0.13**	-0.18***
		(-1.54)	(0.06)		(0.09)	(0.74)	(1.32)		(1.30)	(3.13)	(-4.37)	(-3.37)	(-4.40)
	Adjusted R^2	0.01	0.88		0.88	-0.02	0.97		0.97	0.09	0.97	0.10	0.97
	DW	2.13	1.50		1.48	1.41	1.75		1.75	1.57	1.93	1.59	1.96
	Hausman P. RE			0.37				0.54				0.00***	
Germany	constant	0.01	0.00		0.01	-0.01	-0.00		-0.00	-0.02	-0.01		-0.01
		(0.88)	(0.47)		(0.49)	(-1.06)	(-0.11)		(-0.11)	(-1.35)	(-1.68)		(-1.63)
	$\triangle\ln(X/W)_{cn}$	-0.18**	-1.14		-1.15	0.01	-0.03*		-0.03*	0.12	-0.06		-0.06
		(-2.19)	(-1.17)		(-1.16)	(0.66)	(-1.67)		(-1.65)	(1.19)	(-1.01)		(-.1.01)
	Adjusted R^2	0.04	0.87		0.87	-0.02	0.97		0.97	-0.01	0.96		0.95
	DW	1.99	2.09		2.09	1.16	1.82		1.82	1.58	2.04		2.04
	Hausman P. RE			0.79				0.12				0.20	
Italy	constant	0.02**	-0.01	0.00	-0.01	-0.02	-0.02***		-0.03***	-0.01	0.01***	0.01	0.01***
		(1.96)	(-1.39	(0.19)	(-1.44)	(-0.98)	(-4.10)		(-4.03)	(-0.67)	(3.06)	(0.36)	(3.01)
	$\triangle\ln(X/W)_{cn}$	-0.28***	0.07	-0.10	0.08	0.00	0.02		0.02	0.21*	-0.09***	-0.08**	-0.09***
		(-3.59)	(0.72)	(-1.26)	(0.81)	(0.01)	(1.42)		(1.40)	(1.80)	(-2.72)	(-2.38)	(-2.66)
	Adjusted R^2	0.13	0.91	0.01	0.91	-0.03	0.98		0.98	0.02	0.99	0.06	0.99
	DW	2.17	1.52	1.85	1.53	1.59	1.63		1.63	1.59	2.05	1.72	2.03
	Hausman P. RE			0.01				0.38				0.05**	
Spain	constant	0.03***	0.02**		0.03**	-0.02	-0.01***		-0.01***	-0.01	0.02***	0.02	0.02***

		(2.95)	(2.41)		(2.40)	(-1.25)	(-2.41)		(-2.37)	(-0.36)	(4.23)	(0.57)	(4.14)
	$\Delta\ln(X/W)_{cn}$	-0.04	-0.01		-0.02	0.03**	0.01		0.01	0.28*	-0.11**	-0.09*	-0.11**
		(-0.53)	(-0.11)		(-0.19)	(2.30)	(1.01)		(1.00)	(1.81)	(-2.18)	(-1.81)	(-2.11)
	Adjusted R^2	-0.02	0.85		0.84	0.04	0.99		0.99	0.02	0.99	0.03	0.99
	DW	1.76	1.69		1.69	1.86	1.70		1.70	2.80	1.94	2.27	1.94
	Hausman P. RE			0.86				0.54				0.06*	
UK	constant	-0.01	-0.03**		-0.04**	-0.02*	-0.01		-0.02	-0.04***	-0.02**	-0.02	-0.02**
		(-0.91)	(-2.27)		(-2.39)	(-1.70)	(-0.90)		(-0.89)	(-3.15)	(-2.61)		(-2.56)
	$\Delta\ln(X/W)_{cn}$	-0.14	0.14		0.18	0.01	0.00		0.00	0.25***	-0.12	-0.01	-0.12
		(-1.47)	(0.84)		(0.99)	(1.44)	(0.09)		(0.09)	(2.89)	(-1.62)		(-1.58)
	Adjusted R^2	0.00	0.78		0.78	0.00	0.71		0.70	0.09	0.91	-0.01	0.91
	DW	2.03	1.78		1.82	1.43	1.52		1.52	1.50	2.45	1.78	2.45
	Hausman P. RE			0.16				0.83				0.00***	
Japan	constant	-0.01	-0.01		-0.01	-0.03**	-0.03***		-0.03***				
		(-0.59)	(-1.00)		(-1.11)	(-2.00)	(-5.23)		(-5.19)				
	$\Delta\ln(X/W)_{cn}$	0.01	0.02		0.04	0.02*	0.02		0.02				
		(0.10)	(0.24)		(0.37)	(1.80)	(1.32)		(1.30)				
	Adjusted R^2	-0.03	0.94		0.94	0.02	0.98		0.98				
	DW	1.99	1.54		1.56	1.32	1.67		1.67				
	Hausman P. RE			0.93				0.85					
Korea	constant	0.06***	0.06***		0.06***	0.02	0.02***		0.02***	-0.02	0.03***	0.03	0.03***
		(3.31)	(6.78)		(6.61)	(0.71)	(3.17)		(3.13)	(-1.15)	(6.66)		(6.76)
	$\Delta\ln(X/W)_{cn}$	0.08	0.04		0.03	0.03**	0.01		0.01	0.75***	-0.06	0.00	-0.06
		(0.55)	(0.41)		(0.32)	(2.16)	(1.03)		(1.01)	(5.20)	(-1.03)		(-1.17)
	Adjusted R^2	-0.02	0.97		0.97	0.03	0.99		0.99	0.25	0.99	-0.01	0.99
	DW	1.34	1.49		1.50	1.31	1.67		1.67	1.65	1.11	1.55	1.16
	Hausman P. RE			0.86				0.52				0.00***	
Thailand	constant	0.04***	0.03**		0.03**	0.05***	0.03***	0.04**	0.03***	0.02	0.03***	0.03	0.03***
		(3.35)	(2.34)		(2.57)	(3.40)	(4.21)	(2.03)	(4.15)	(1.06)	(3.52)		(3.70)
	$\Delta\ln(X/W)_{cn}$	0.10	0.28**		0.24*	-0.02***	0.02	-0.00	0.02	0.18*	-0.03	0.05	-0.05
		(0.90)	(2.06)		(1.75)	(-2.05)	(1.44)	(-0.10)	(1.42)	(1.82)	(-0.31)		(-0.49)
	Adjusted R^2	-0.01	0.90		0.90	0.03	0.97	-0.01	0.97	0.02	0.87	-0.01	0.87
	DW	2.21	2.56		2.64	1.03	1.93	1.36	1.93	1.4	1.55	1.42	1.66
	Hausman P. RE			0.36				0.04				0.17	

Indonesia	constant	0.01	-0.02		-0.02	0.02	-0.00		-0.00	-0.02	-0.01		-0.01
		(0.51)	(-0.70)		(-0.54)	(1.04)	(-0.10)		(-0.10)	(-0.9)	(-0.89)		(-0.78)
	$\Delta \ln(X/W)_{cn}$	0.22	0.60*		0.55	-0.00	0.06		0.06	0.46***	0.38**		0.36**
		(1.34)	(1.65)		(1.46)	(-0.14)	(0.68)		(0.68)	(3.55)	(2.33)		(2.19)
	Adjusted R^2	0.00	0.68		0.67	-0.02	0.57		0.57	0.13	0.82		0.82
	DW	1.68	0.90		0.92	1.43	1.33		1.33	2.25	1.60		1.63
	Hausman P. RE			0.35				0.48				0.71	
India	constant	0.01	0.01		0.02	0.01	0.00		0.00	-0.04***	-0.06***		-0.06***
		(0.74)	(0.85)		(1.08)	(0.87)	(0.18)		(0.17)	(-2.32)	(-4.87)		(-4.75)
	$\Delta \ln(X/W)_{cn}$	0.13	0.09		0.04	0.00	0.03		0.03	0.30***	0.57***		0.54***
		(1.09)	(0.45)		(0.19)	(0.07)	(0.74)		(0.74)	(2.74)	(4.08)		(3.92)
	Adjusted R^2	-0.01	0.83		0.83	-0.03	0.87		0.86	0.08	0.81		0.81
	DW	1.39	2.03		2.10	1.71	1.62		1.62	2.06	1.68		1.78
	Hausman P. RE			0.84				0.51				0.15	
Mexico	constant	0.02	0.02		0.03	0.04***	0.03*		0.03*	-0.06**	-0.06*		-0.06*
		(1.08)	(0.70)		(0.78)	(3.32)	(1.71)		(1.68)	(-1.98)	(-1.89)		(-1.83)
	$\Delta \ln(X/W)_{cn}$	0.25*	0.17		0.13	-0.00	0.01		0.01	0.73***	0.83**		0.82**
		(1.87)	(0.46)		(0.34)	(-0.46)	(0.22)		(0.22)	(4.01)	(2.14)		(2.06)
	Adjusted R^2	0.02	0.48		0.47	-0.02	0.65		0.64	0.16	0.51		0.49
	DW	1.13	1.07		1.09	1.15	1.67		1.69	1.82	1.69		1.69
	Hausman P. RE			0.84				0.76				0.79	

Table 3-1 growth rate of China's exports 1995-2012

Importer	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	HT	MHT	MLT	LT	M	T
US	**8,5**	**3,6**	**7,1**	**13,8**	**1,5**	**12,8**	**13,4**	**8,7**	**6,1**	**10,4**	**8,4**	**10,9**	**15,5**	**24,1**	**7,8**	**16,5**	**7,0**	**41,6**	**20,8**	**11,8**	**7,8**	**4,5**	**17,5**	**11,8**	**8,8**	**4,2**	**8,6**	**8,5**
EU15	**4,9**	**6,6**	**5,9**	**14,5**	**0,6**	**8,7**	**7,5**	**9,6**	**12,3**	**14,0**	**8,8**	**10,0**	**17,6**	**24,4**	**13,7**	**23,1**	**8,6**	**152,2**	**357**	**4,9**	**19,4**	**6,5**	**19,2**	**14,4**	**10,8**	**6,6**	**11,2**	**10,8**
Germany	3,0	4,0	4,5	8,1	0,3	9,2	5,0	6,5	8,2	6,9	5,8	6,2	10,8	19,8	11,0	20,2	7,8	130,7	573	1,4	12,5	4,6	16,2	11,2	8,7	4,1	8,7	8,5
Spain	7,7	9,7	2,9	16,7	-0,5	7,5	5,9	9,7	12,2	25,2	2,7	10,6	22,2	11,7	14,5	10,8	4,3	173,3	220		55,1	5,7	9,1	14,6	9,2	8,3	9,6	9,4
France	2,0	6,9	3,9	9,5	0,5	7,8	14,1	7,6	10,4	9,9	8,1	11,7	19,7	27,3	12,9	15,3	6,8	64,4	6,3	277,9	7,9	5,4	16,7	14,0	9,0	6,1	10,0	9,7
Italy	4,9	5,8	3,2	16,9	-0,8	7,9	4,5	8,3	12,9	13,7	21,0	12,1	17,7	13,0	10,3	26,4	7,5	216,6	942	-0,5	40,4	3,0	14,5	13,4	11,5	5,1	9,0	8,6
UK	16,7	13,5	16,8	23,8	10,4	8,1	8,8	15,9	20,8	19,6	14,1	15,6	36,6	33,1	22,6	31,3	14,7	158,1	590	13,0	16,1	18,8	27,3	21,8	16,1	15,2	19,0	18,4
Asia	**2,3**	**3,3**	**2,5**	**11,4**	**13,8**	**12,1**	**8,7**	**21,8**	**8,7**	**4,9**	**14,8**	**19,1**	**24,5**	**36,9**	**15,0**	**31,2**	**23,0**	**21,7**	**9,6**	**46,5**	**20,1**	**11,2**	**28,8**	**16,5**	**10,4**	**3,8**	**9,9**	**8,8**
Japan	1,4	1,6	1,6	15,6	2,3	6,6	5,2	12,0	3,1	0,9	2,7	11,0	24,4	25,1	6,7	20,9	11,2	52,3	-0,5	1,8	10,4	5,9	19,1	10,4	4,3	2,0	4,9	4,3
Korea	4,8	2,5	3,1	24,5	0,7	10,5	7,2	47,0	16,1	5,8	5,6	35,9	53,9	44,4	41,9	39,9	56,7	417,3	1064	34,6	13,8	11,1	38,1	24,4	8,3	3,5	11,5	10,1
Hong Kong	1,7	0,1	1,3	1,8	68,2	2,5	25,5	4,0	3,0	2,3	55,1	3,8	0,4	-1,0	11691	-1,0	2,8	-0,3	4,7	189,4	16,0	71,1	2,8	1,4	25,4	2,5	6,6	5,2
Taiwan	17,3	5,9	0,1	16,5	4,7	24,5	9,0	33,2	18,4	1,8	8,4	11,9	28,7	83,8	11,8	84,0	79,4	427	11,3		37,2	9,9	74,9	19,2	4,8	5,6	15,2	12,7
India	16,1	22,1	520	17,1	1,5	42,8	15,8	183	170	99,1	61,4	310,5	108	281,2	183,8	143,0	67,9	813,4	50685	19029	523	101	73,5	72,9	51,0	27,4	57,5	53,0
ASEAN	**4,5**	**18,7**	**22,4**	**13,2**	**34,4**	**14,1**	**7,3**	**33,7**	**12,1**	**8,6**	**10,4**	**21,1**	**21,7**	**45,1**	**20,2**	**38,4**	**38,6**	**27,2**	**6,0**	**14,6**	**23,0**	**27,0**	**35,8**	**19,1**	**14,3**	**14,5**	**19,0**	**17,8**
Indonesia	5,9	26,5	18,4	13,5	140	11,8	8,1	72,7	11,6	8,7	6,5	20,2	25,4	239,4	25,3	45,6	91,8	14,0	167,4	120,1	24,2	31,9	48,8	18,9	19,6	20,3	22,3	18,8
Malaysia	7,5	18,1	20,1	11,6	41,3	15,8	7,6	67,0	22,7	6,8	15,2	18,8	20,5	33,7	25,4	39,3	39,9	141,0	47,0	151,8	68,6	54,3	35,9	23,3	16,8	17,6	22,7	21,1
Philippines	1,3	8,8	18,1	32,6	13,5	11,3	9,5	18,2	10,8	9,2	35,9	12,6	12,8	74,2	27,5	24,9	43,5	36,6	165,2	182,2	16,6	35,8	32,3	15,9	12,9	6,6	11,7	11,2
Singapore	1,4	3,1	14,8	3,8	24,1	4,2	0,9	6,6	4,4	12,4	0,8	7,3	12,0	31,9	4,9	20,1	6,1	0,9	4,0	9,7	1,2	5,4	20,2	5,9	8,5	3,3	9,6	8,8
Thailand	11,6	6,3	16,9	12,6	0,9	13,6	6,5	60,5	19,5	4,5	21,5	25,6	21,5	39,8	31,6	56,3	59,3	60,0	0,9	269,2	12,7	17,1	42,4	21,3	8,0	8,7	16,3	16,0
Vietnam	8,1	92,9	75,7	19,4	332	29,0	13,2	45,3	8,2	56,3	19,9	75,9	30,8	693,5	62,7	239,4	89,5	22,9	14,5		38,9	124,5	125,3	33,7	40,9	44,2	45,2	45,8
ROA	**1,9**	**4,0**	**5,1**	**4,3**	**18,4**	**17,4**	**16,4**	**95,5**	**18,4**	**11,3**	**55,8**	**36,2**	**24,1**	**279,3**	**188,6**	**27,5**	**20,5**	**3,4**	**41,8**	**208,7**	**88,7**	**79,3**	**31,2**	**20,5**	**31,1**	**5,2**	**16,9**	**13,5**
ROW	**7,2**	**9,6**	**37,0**	**19,6**	**19,3**	**21,9**	**12,7**	**31,2**	**23,0**	**65,5**	**45,0**	**24,9**	**38,7**	**132,8**	**33,4**	**57,6**	**29,5**	**104,5**	**76,7**	**3,4**	**27,5**	**17,2**	**54,8**	**35,0**	**31,9**	**10,9**	**23,5**	**22,6**
World	**3,6**	**5,3**	**6,0**	**14,6**	**12,3**	**13,6**	**9,9**	**16,0**	**12,4**	**9,4**	**15,9**	**16,5**	**24,4**	**34,7**	**15,0**	**28,1**	**15,2**	**51,8**	**37,7**	**9,2**	**20,0**	**7,8**	**26,1**	**18,8**	**14,2**	**5,8**	**12,4**	**11,6**

Table 3-2 growth rate of China's exports to Hong Kong

	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M	T
1995-2012	1,7	0,1	1,3	1,8	68	2,5	26	4	3	2,3	55	3,8	0,4	-1	11691	-1	2,8	-0	4,7	189	16	71	6,6	5,2
1995-2011	1,8	4,3	1,9	3	79	6,3	20	101	4,1	1,1	7,8	8,1	7,7	97447	640145	66	42	0	5,3	155	20	127	15	12
2011-2012	0	-1	-0	-0	-0	-1	0,3	-1	-0	0,6	5,4	-1	-1	-1	-1	-1	-1	-0	-0	0,2	-0	-0,4	-1	-1

Table 3-3 contribution rate of each country to China's export growth 1995-2012

Importer	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	HT	MHT	MLT	LT	M	T
US	**14,3**	**17,4**	**21,5**	**18,7**	**0,9**	**10,9**	**16,5**	**21,4**	**10,4**	**4,8**	**4,2**	**16,9**	**17,3**	**30,6**	**17,8**	**22,2**	**14,6**	**17,0**	**0,4**	**21,4**	**9,7**	**28,0**	**24,3**	**15,9**	**11,4**	**20,1**	**19,1**	**19,1**
EU15	**9,2**	**19,5**	**16,3**	**12,1**	**0,7**	**11,2**	**21,3**	**13,6**	**9,8**	**7,0**	**5,8**	**14,2**	**13,9**	**20,3**	**16,1**	**16,7**	**14,9**	**7,7**	**17,1**	**21,4**	**8,6**	**18,6**	**18,0**	**13,2**	**10,7**	**18,3**	**15,7**	**15,7**
Germany	2,3	4,1	3,0	2,0	0,1	3,0	5,0	2,7	2,4	1,0	1,4	3,6	3,5	6,2	5,1	5,3	4,9	2,4	11,3	2,1	2,2	4,0	5,5	3,7	2,9	3,9	4,2	4,3
Spain	1,1	1,8	0,7	0,9	-0,1	1,0	1,9	1,0	0,7	0,8	0,2	1,0	1,0	0,7	0,9	0,7	0,8	0,4	0,5	0,5	0,6	1,1	0,7	0,9	0,7	1,5	1,0	1,0
France	0,9	3,2	1,9	1,6	0,0	1,3	4,1	2,0	1,1	0,3	0,7	2,0	2,2	3,0	2,2	2,4	2,3	0,6	0,1	9,7	1,0	3,1	2,7	1,8	1,2	2,9	2,3	2,3
Italy	0,7	2,3	1,3	0,9	-0,2	1,3	1,8	1,2	1,1	2,0	0,8	1,4	1,7	0,9	1,3	1,8	1,5	1,1	2,8	-1,0	1,2	1,1	1,4	1,4	1,3	1,8	1,5	1,5
UK	1,6	3,6	4,7	4,0	0,9	1,4	2,0	3,1	1,9	0,6	1,2	2,5	2,2	2,6	2,3	1,9	1,9	1,4	0,1	4,2	0,8	4,6	2,2	1,9	1,8	3,8	2,5	2,5
Asia	**45,7**	**22,8**	**25,0**	**30,8**	**59,7**	**44,8**	**30,4**	**21,4**	**29,8**	**44,6**	**69,2**	**28,1**	**27,5**	**20,9**	**33,2**	**29,7**	**36,1**	**20,6**	**16,5**	**44,4**	**26,7**	**20,4**	**27,3**	**31,9**	**35,6**	**23,9**	**28,9**	**29,1**
Japan	16,0	8,2	10,9	10,2	1,4	8,2	5,3	7,5	5,3	2,1	4,5	6,5	8,0	8,3	8,1	9,3	10,6	6,5	-0,1	0,2	6,4	7,9	8,9	7,8	4,8	8,7	7,9	7,9
Korea	5,4	1,7	3,3	2,5	1,1	6,4	3,3	2,1	6,3	14,1	3,7	4,5	2,5	2,1	7,6	3,9	6,7	3,2	5,0	0,3	1,1	1,6	3,5	4,7	5,5	2,0	3,8	3,8
Hong Kong	5,4	0,0	0,5	1,4	15,7	0,9	1,2	0,0	0,7	1,2	40,5	0,4	0,1	0,0	0,1	-0,1	0,3	-0,2	0,4	30,6	0,7	2,5	0,1	0,2	6,2	1,0	1,4	1,4
Taiwan	0,9	0,5	0,1	2,0	0,6	5,3	1,3	1,1	1,4	2,6	5,3	0,8	1,2	1,4	2,8	3,5	3,1	0,8	0,1	0,2	3,1	0,7	2,7	2,5	1,7	0,6	2,0	2,0
India	0,7	1,4	1,6	2,5	1,0	9,6	11,0	1,8	4,0	5,1	5,9	3,7	4,4	1,6	2,9	2,9	2,4	1,9	3,1	3,2	4,0	1,3	2,7	4,8	3,6	1,4	3,0	3,0
ASEAN	**17,3**	**11,0**	**8,6**	**12,3**	**39,9**	**14,3**	**8,3**	**8,9**	**12,1**	**19,6**	**9,3**	**12,3**	**11,3**	**7,3**	**11,8**	**10,2**	**13,1**	**8,5**	**8,1**	**10,0**	**11,4**	**6,5**	**9,4**	**11,8**	**13,8**	**10,2**	**10,9**	**11,0**
Indonesia	2,2	1,8	1,2	1,7	12,1	3,5	2,1	1,5	2,4	3,4	1,1	2,5	2,9	0,9	2,0	1,3	2,2	1,3	3,5	0,5	3,2	1,0	1,2	2,6	2,9	1,6	1,9	2,0
Malaysia	4,4	2,0	1,4	2,8	2,2	2,4	1,2	2,1	3,5	2,5	2,4	2,1	1,9	1,3	2,5	2,5	4,2	2,0	0,9	0,6	3,9	2,1	2,2	2,3	2,3	2,2	2,2	2,2
Philippines	1,8	1,1	1,2	2,2	3,3	1,2	0,7	1,2	1,2	2,4	0,6	0,8	0,7	0,6	1,0	0,6	0,7	0,7	1,0	0,3	1,5	0,8	0,6	0,9	1,3	1,1	0,9	0,9
Singapore	0,7	0,3	0,8	0,8	11,9	0,4	0,1	0,5	0,7	2,3	0,3	1,1	0,7	2,1	1,2	2,1	0,7	0,0	1,9	2,5	0,1	0,5	1,9	0,7	1,8	0,4	1,2	1,2
Thailand	3,9	0,8	1,6	2,0	0,2	3,5	2,0	1,7	2,0	4,3	2,7	2,3	2,4	1,8	2,9	2,1	3,6	2,4	0,7	1,4	0,8	0,8	2,1	2,7	2,3	1,1	2,0	2,1
Vietnam	4,3	3,5	1,8	2,1	10,1	3,3	1,9	1,4	1,6	4,0	2,2	2,6	2,1	0,6	1,8	1,4	1,4	1,4	0,0	1,6	1,0	0,6	1,1	2,1	2,7	2,7	2,0	2,1
ROA	**6,1**	**1,4**	**2,1**	**3,9**	**16,7**	**10,6**	**12,2**	**1,9**	**4,7**	**6,2**	**46,4**	**4,0**	**4,5**	**1,6**	**3,0**	**2,8**	**2,7**	**1,7**	**3,4**	**33,7**	**4,7**	**3,8**	**2,8**	**5,0**	**9,8**	**2,4**	**4,4**	**4,4**
ROW	**30,9**	**40,3**	**37,2**	**38,4**	**38,7**	**33,0**	**31,8**	**43,7**	**50,0**	**43,6**	**20,8**	**40,7**	**41,3**	**28,2**	**32,9**	**31,4**	**34,4**	**54,8**	**66,0**	**12,9**	**55,0**	**33,0**	**30,5**	**39,1**	**42,3**	**37,7**	**36,3**	**36,2**
World	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table 3-4 growth rate of China's imports 1995-2012

Exporter	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	HT	MHT	MLT	LT	M	T
US	**4,2**	**1,9**	**13,3**	**5,8**	**23,5**	**3,6**	**12,1**	**11,8**	**4,9**	**6,4**	**13,7**	**2,0**	**3,8**	**0,9**	**4,3**	**3,2**	**11,0**	**37,2**	**8,5**	**-1,0**	**7,6**	**3,2**	**2,9**	**4,7**	**8,8**	**4,5**	**4,6**	**5,8**
EU15	**16,6**	**9,1**	**33,2**	**17,1**	**65,9**	**14,8**	**21,8**	**27,1**	**7,4**	**5,6**	**39,5**	**9,1**	**4,5**	**7,5**	**9,9**	**1,0**	**15,1**	**36,8**	**-0,5**	**22,1**	**5,9**	**26,0**	**7,6**	**9,2**	**10,2**	**14,9**	**9,3**	**8,3**
Germany	5,2	10,2	26,0	12,6	41,8	16,4	20,1	32,3	23,3	4,3	34,0	25,9	7,0	9,0	18,2	4,5	25,0	59,1	-0,9	89,4	2,5	22,2	17,4	14,4	7,9	9,2	13,6	10,4
Spain	47,4	39,6	7,6	26,7	531	19,1	3,9	24,1	1,7	1,4	441	0,6	1,5	103,6	2,6	-0,8	18,5	5,1		2000	70	38,3	0,6	3,6	5,4	39,5	3,9	4,7
France	62,4	11,8	97,8	8,0	11,0	15,9	24,9	22,2	6,5	4,7	14,3	12,0	2,0	1,0	4,4	1,6	5,7	3,5		17,7	26,1	18,8	10,5	3,5	10,3	25,8	7,3	6,3
Italy	84,6	9,0	77,1	38,2	7,0	7,2	4,9	17,5	3,0	4,5	51,6	3,9	2,4	0,8	4,0	0,5	3,5	4,1	82,5	-0,2	20,3	33,9	1,9	2,9	7,7	14,0	3,8	3,7
UK	39,0	3,6	11,6	30,6	-0,1	12,7	99,4	24,0	4,9	6,2	30,4	4,7	3,1	10,4	6,9	1,2	10,2	108,8	41,7	21,4	4,4	13,2	10,5	12,9	14,3	18,2	12,8	12,2
Asia	**4,1**	**0,4**	**1,3**	**1,8**	**16,1**	**6,6**	**3,2**	**9,9**	**10,3**	**2,4**	**18,5**	**4,0**	**3,6**	**11,7**	**8,0**	**18,5**	**23,9**	**10,1**	**2,1**	**24,6**	**0,1**	**3,0**	**17,7**	**5,8**	**8,1**	**1,3**	**7,3**	**7,6**
Japan	1,8	0,3	2,1	4,2	4,4	4,1	2,4	8,8	6,6	1,7	9,7	4,7	2,9	1,9	4,2	4,7	7,9	8,1	-0,6	42,2	-0,2	2,6	4,7	3,9	3,9	1,0	3,8	3,9
Korea	4,5	0,0	-0,8	0,3	20,6	6,7	2,9	8,3	10,5	4,0	11,8	5,3	8,1	33,2	45,8	39,8	328,6	25,2	12,1	141,1	-0,8	2,4	57,7	10,2	9,5	0,3	10,7	10,7
Hong Kong	0,0	-0,8	-0,8	-0,2	78,1	0,1	4,8	-0,7	-0,7	0,3	52,2	-0,9	-0,6	-0,8	-0,9	-0,8	-0,8	-0,9	13,3		-1,0	-0,7	-0,7	-0,4	12,8	-0,7	0,9	0,9
Taiwan	5,7	0,1	-0,8	1,2	206	7,8	4,0	3,1	14,6	4,6	7,5	6,8	6,3	6,7	5,3	40,0	106,1	1,6	425	1255	-0,2	1,1	41,3	6,3	6,3	0,3	8,6	8,6
India	6,3	11,6	3,0	6,6	46,2	31,6	2,8	8,3	15,8	9,8	112	43,9	71,8	268,2	109,9	30,9	201,9	215,4	6,8		-0,6	164	11,6	36,8	35,0	15,2	22,5	28,4
ASEAN	**4,4**	**8,4**	**1,5**	**5,7**	**16,3**	**16,7**	**4,6**	**25,8**	**34,5**	**6,4**	**22,0**	**6,4**	**6,2**	**100,7**	**42,0**	**107,9**	**53,7**	**39,2**	**-0,4**	**19,2**	**13,5**	**14,4**	**96,2**	**16,3**	**18,9**	**4,1**	**19,6**	**19,8**
Indonesia	34,1	8,2	0,8	6,1	27,6	8,1	7,3	33,8	103	7,9	25,5	1,6	4,1	857,1	215,5	200,0	269,3	1943	-0,9		4,3	40,2	199	10,2	28,1	7,7	12,2	14,3
Malaysia	3,9	0,7	-0,8	4,6	87,7	12,1	70,8	26,6	106	9,5	34,4	4,3	3,1	100,2	29,9	110,5	80,5	28,8	-0,6	1,0	58,9	9,8	105,4	10,4	33,4	2,0	19,4	18,8
Philippines	5,9	18,6	9,3	5,6	-0,9	24,1	1298	14,2	32,4	23,4	19,6	17,6	31,7	4150,1	523,3	1086	448,5	272,5			172	18,2	1487	71,5	4,2	8,7	76,6	71,5
Singapore	6,4	1,7	-1,0	8,0	12,4	21,6	3,3	14,1	0,7	11,9	2,1	6,0	7,5	9,6	11,4	41,0	26,9	6,0	-0,6	27,1	9,4	1,0	26,9	15,8	10,2	4,3	16,1	15,9
Thailand	0,5	2,2	95,3	3,0	44,9	23,4	1,8	17,5	7,3	1,2	49,0	10,1	6,9	264,6	45,9	133,0	50,0	28,5	31,6		8,0	11,0	148,8	20,8	16,3	1,8	14,9	15,7
Vietnam	10,2	729	122	16,8	3878	29,1	23,1	203	2537	125	23,5	4425	146	239112	4604	78795	74897	38,3			254	309	10309	76,5	247	22,2	70,6	52,9
ROA	**2,0**	**0,1**	**-0,5**	**-0,2**	**49,7**	**2,4**	**3,9**	**-0,3**	**1,2**	**4,6**	**57,1**	**-0,7**	**0,0**	**-0,7**	**-0,5**	**-0,7**	**-0,4**	**13,2**	**7,1**		**-0,7**	**3,3**	**-0,4**	**0,8**	**15,0**	**0,6**	**2,1**	**2,8**
ROW	**6,9**	**1,8**	**66,0**	**10,3**	**33,4**	**7,7**	**38,5**	**24,8**	**6,4**	**0,7**	**36,1**	**3,7**	**3,8**	**13,3**	**5,7**	**15,8**	**11,6**	**10,8**	**-0,7**	**12,0**	**8,0**	**21,0**	**15,2**	**6,9**	**12,1**	**6,2**	**8,9**	**24,6**
World	**5,7**	**0,8**	**4,4**	**5,3**	**21,1**	**6,7**	**13,3**	**11,2**	**8,7**	**2,2**	**24,6**	**4,6**	**4,0**	**9,0**	**7,8**	**13,5**	**19,3**	**18,4**	**-0,2**	**5,8**	**1,0**	**5,3**	**13,1**	**6,5**	**9,3**	**3,0**	**7,4**	**10,3**

Table 3-5 contribution rate of each country to China's import growth 1995-2012

Exporter	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	HT	MHT	MLT	LT	M	T
US	**13,0**	**6,4**	**12,9**	**23,8**	**2,7**	**9,0**	**10,5**	**5,7**	**9,0**	**9,1**	**8,5**	**6,7**	**10,0**	**2,4**	**5,1**	**2,4**	**9,4**	**10**	**-18,2**	**-11,3**	**11,6**	**5,8**	**4,0**	**8,8**	**6,8**	**13,6**	**7,2**	**7,1**
EU15	**15,6**	**27,5**	**5,6**	**21,4**	**3,5**	**10,8**	**55,5**	**10,4**	**12,5**	**16,4**	**9,8**	**34,1**	**38,3**	**3,3**	**20,5**	**1,5**	**12,4**	**51,7**	**151,0**	**89,3**	**64,1**	**22,1**	**9,9**	**27,8**	**10,4**	**18,4**	**17,3**	**11,7**
Germany	1,9	4,4	1,6	3,0	0,4	4,0	13,8	5,8	7,0	5,0	2,8	20,5	23,0	0,9	14,2	1,0	7,8	36,8	238,9	32,1	23,1	6,3	4,4	17,2	3,8	2,9	8,8	5,8
Spain	1,5	2,8	0,1	0,8	0,0	0,4	1,8	0,3	0,3	0,2	0,5	0,4	0,5	0,0	0,2	-0,1	0,2	0,6	-0,3	0,3	0,6	0,2	0,1	0,4	0,3	1,3	0,4	0,3
France	5,2	5,0	0,5	1,2	0,1	1,2	6,5	0,9	1,7	1,3	0,5	6,8	2,0	0,1	1,5	0,2	0,8	1,1	-7,1	50,1	3,4	2,0	2,5	1,4	0,9	3,7	1,9	1,2
Italy	0,8	11,5	0,6	1,4	0,1	0,5	2,2	1,0	1,3	1,5	0,5	1,7	5,0	0,0	0,7	0,0	0,4	0,7	-29,2	-0,1	18,8	6,7	0,2	1,8	0,7	3,0	1,1	0,7
UK	1,1	0,9	0,1	4,0	0,0	0,7	9,7	0,6	0,7	1,5	1,8	1,4	1,8	0,4	0,7	0,1	1,0	7,9	-7,8	4,8	0,9	1,2	0,9	2,5	1,1	1,6	1,6	1,1
Asia	**32,4**	**35**	**26,2**	**17,5**	**55,1**	**61,6**	**11,0**	**77,4**	**73,6**	**63,7**	**35,4**	**51,7**	**46,0**	**92,1**	**69,5**	**90,2**	**72,7**	**30,7**	**-101**	**2,3**	**6,0**	**44,5**	**79,4**	**52,3**	**51,4**	**30,4**	**59,2**	**41,8**
Japan	0,7	6,8	0,3	9,0	3,2	13,3	4,1	17,4	28,0	32,6	6,8	23,3	25,6	9,1	22,1	12,9	15,9	19,9	8,4	0,1	-8,2	13,0	12,5	19,0	11,9	4,6	14,0	9,6
Korea	2,1	0,1	-0,6	0,8	23,6	18,6	1,0	9,4	4,8	17,7	4,0	14,1	10,5	10,0	28,6	20,7	31,5	9,5	-14,6	0,2	-2,6	4,7	20,8	16,1	11,1	1,6	15,3	10,0
Hong Kong	0,0	-12,7	-0,1	-0,6	0,2	0,0	2,3	-0,8	-0,4	0,1	14,8	-2,5	-0,6	-1,1	-1,0	-0,6	-0,5	0,0	-0,5	0,0	0,0	-3,1	-0,5	-0,3	6,2	-2,3	0,8	0,5
Taiwan	0,9	1,6	-1,1	1,4	2,3	13,9	0,7	5,8	15,4	8,4	2,9	10,7	6,4	5,0	7,1	20,8	21,4	0,3	-101	0,0	-8,1	3,1	17,7	8,1	4,8	1,2	10,0	6,5
India	1,5	14,4	0,0	0,0	1,0	1,6	1,0	0,4	1,2	2,5	2,8	0,7	0,5	0,2	0,4	0,1	0,2	0,1	-5,8	0,2	-0,1	17,9	0,2	0,8	1,9	4,6	1,2	1,3
ASEAN	**27,2**	**24,6**	**27,7**	**6,9**	**24,7**	**14,1**	**1,8**	**45,1**	**24,6**	**2,4**	**4,1**	**5,5**	**3,5**	**68,9**	**12,3**	**36,3**	**4,1**	**0,9**	**12,7**	**1,7**	**25,2**	**8,9**	**28,8**	**8,5**	**15,6**	**20,7**	**17,9**	**13,8**
Indonesia	10,2	4,8	5,7	5,2	2,2	1,4	0,2	6,6	9,1	0,3	1,0	0,1	0,1	2,0	1,0	0,5	0,1	0,2	6,0	0,0	0,2	1,8	0,5	0,8	2,3	7,2	1,6	2,1
Malaysia	9,6	0,5	-7,9	0,4	6,2	2,8	0,5	10,7	9,6	0,7	1,6	1,3	0,7	12,2	2,4	19,2	1,4	0,1	1,3	0,1	8,8	1,1	12,4	1,7	4,2	4,1	6,0	4,1
Philippines	0,3	0,6	0,9	0,1	-0,3	0,3	0,0	0,2	1,4	0,1	0,6	0,3	0,4	18,2	2,7	4,7	0,5	0,1	-4,4	0,2	0,4	0,3	4,7	0,7	0,3	0,3	1,9	1,5
Singapore	0,7	0,1	-0,3	0,6	13,1	3,7	0,8	0,7	0,1	0,5	0,1	1,9	1,0	4,2	1,5	5,5	1,0	0,0	13,5	0,3	14,9	0,1	3,8	2,0	3,2	0,4	2,7	1,8
Thailand	1,4	3,5	15,6	0,5	1,3	5,4	0,2	18,2	2,9	0,2	0,4	1,2	1,0	30,0	3,1	3,0	1,0	0,3	-1,7	1,1	0,4	3,7	5,2	2,9	3,4	2,9	3,8	2,7
Vietnam	5,0	13,4	11,1	0,1	2,2	0,3	0,1	8,3	1,4	0,5	0,1	0,4	0,2	2,3	1,5	3,5	0,1	0,2	-2,0	0,0	0,3	1,6	2,2	0,4	1,9	5,3	1,8	1,5
ROA	**1,5**	**1,7**	**-0,1**	**-0,6**	**1,3**	**1,6**	**3,3**	**-0,4**	**0,8**	**2,7**	**17,6**	**-1,8**	**0,0**	**-0,8**	**-0,6**	**-0,5**	**-0,3**	**0,1**	**-6,3**	**0,2**	**-0,2**	**14,8**	**-0,3**	**0,6**	**8,1**	**2,3**	**2,0**	**1,8**
ROW	**39,0**	**31,4**	**55,3**	**37,3**	**38,7**	**18,6**	**23,0**	**6,4**	**4,9**	**10,8**	**46,4**	**7,5**	**5,7**	**2,2**	**5,0**	**6,0**	**5,5**	**8,0**	**68,1**	**19,7**	**18,3**	**27,5**	**6,6**	**11,1**	**31,3**	**37,6**	**16,3**	**39,5**
World	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table 3-6 input-output table

Input \ Output		Intermediate Use	Final Use						Gross Output or Import
		Production Sector (j) 1,2,…, n	Household Consumption	Gouvernement expenditure	Gross Capital Formation	export	error	total	
Intermediate Inputs	Domestically Intermediate Inputs 1 (i) ⋮ n	**CI^D**	C^D	G^D	I^D	EXP	ERR^D	**F^D**	**Xi**
	Imported Intermediate Inputs 1 (i) ⋮ n	**CI^M**	C^M	G^M	I^M		ERR^M	**F^M**	**IMP**
Primary Inputs	Depreciation of Fixed Capital Compensation of Employees Net Taxes on Production Operating Surplus	**VA**							
Total inputs		**Xj**							

Table 3-7 Regional matrix of intermediate inputs imported from country k for Chinese exports to market p

Market(p) \ Year	1995-2012									
US	exporter(k) \ Sector(j)	1	2	…	n	HT	MHT	MLT	LT	CI^M
	US EU15 … World	$CIM_{US,1}^{US}$			$CIM_{k,j}^{p}$					
…	…									
World	exporter \ sector	1	2	…	n	HT	MHT	MLT	LT	CI^M
	US EU15 … World		$CIM_{EU,2}^{W}$							

Table 3-8 product classification of UN Broad Economic Category (BEC)

<table>
<tr><td colspan="2" rowspan="3"></td><td colspan="4">End-use</td></tr>
<tr><td rowspan="2">Intermediate</td><td colspan="2">Final demand goods</td><td rowspan="2">Other</td></tr>
<tr><td>Household consumption</td><td>Industrial capital goods</td></tr>
<tr><td rowspan="10">Products characteristics</td><td rowspan="2">Primary products</td><td rowspan="2">Food and beverages (111)
Industrial supplies (21)
Fuels and lubricants (31)</td><td></td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td>Food and beverages (112)</td></tr>
<tr><td rowspan="3">Processed unfinished</td><td></td><td>Food and beverages (122)</td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td colspan="2">Fuels and lubricants e.g. gasoline (32)</td></tr>
<tr><td>Food and beverages (121)
Industrial supplies (22)
Parts and components of capital goods (42)
Parts and components of transport equipments (53)</td><td></td></tr>
<tr><td rowspan="4">Processed finished</td><td colspan="2">Packed medicines (part of 63)</td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td rowspan="3"></td><td>Non-industrial transport equipments (522)
Non durable consumer goods (63)
Semi-durable consumer goods (62)
Durable consumer goods for households (61)</td></tr>
<tr><td colspan="2">Durable personal consumer goods e.g. personal computers (part of 61)
Mobile phones (part of 41)
Passenger motor cars (51)
Fixed line phones (part of 62)</td><td></td></tr>
<tr><td></td><td>Capital goods (41)
Industrial transport equipments</td><td></td></tr>
<tr><td>Other</td><td></td><td></td><td></td><td>Goods n.e.c (7)</td></tr>
</table>

UN BEC codes are given in parentheses.

Table 3-9 correspondence between OECD input-output table and ISIC rev.3

OECD 1995, 2000, 2002, 2005 I-O table		OECD 1997 I-O table	
OECD IO codes and industry Description	ISIC Rev. 3 codes	OECD IO codes	ISIC Rev. 3 codes
1 Agriculture, hunting, forestry and fishing	01+02+05	1	01+02+05
2 Mining and quarrying (energy)	10+11+12	2	10+11+12+13+14
3 Mining and quarrying (non-energy)	13+14		
4 Food products, beverages and tobacco	15+16	3	15+16
5 Textiles, textile products, leather and footwear	17+18+19	4	17+18+19
6 Wood and products of wood and cork	20	5	20
7 Pulp, paper, paper products, printing and publishing	21+22	6	21+22
8 Coke, refined petroleum products and nuclear fuel	23	7	23
9 Chemicals excluding pharmaceuticals	24 excluding 2423	8	24 excluding 2423
10 Pharmaceuticals	2423	9	2423
11 Rubber and plastics products	25	10	25
12 0ther non-metallic mineral products	26	11	26
13 Iron and steel	271+2731	12	271+2731
14 Non-ferrous metals	272+2732	13	272+2732
15 Fabricated metal products, except machinery and equipment	28	14	28
16 Machinery and equipment, n.e.c.	29	15	29
17 0ffice, accounting and computing machinery	30	16	30
18 Electrical machinery and apparatus, n.e.c.	31	17	31
19 Radio, television and communication equipment	32	18	32
20 Medical, precision and optical instruments	33	19	33
21 Motor vehicles, trailers and semi-trailers	34	20	34
22 Building and repairing of ships and boats	351	21	351
23 Aircraft and spacecraft	353	22	353
24 Railroad and transport equipment n.e.c.	352+359	23	352+359

25 Manufacturing n.e.c. (includes furniture) recycling	36+37	24	36+37
26 Production, collection and distribution of electricity	401	25	40+41
27 Manufacture of gas distribution of gaseous fuels through mains	402		
28 Steam and hot water supply	403		
29 Collection, purification and distribution of water	41		
30 Construction	45	26	45
31 Wholesale and retail trade repairs	50+51+52	27	50+51+52
32 Hotels and restaurants	55	28	55
33 Land transport via pipelines	60	29	60+61+62+63
34 Water transport	61		
35 Air transport	62		
36 Supporting and auxiliary transport activities of travel agencies	63		
37 Post and telecommunications	64	30	64
38 Finance and insurance	65+66+67	31	65+66+67
39 Real estate activities	70	32	70
40 Renting of machinery and equipment	71	33	71
41 Computer and related activities	72	34	72
42 Research and development	73	35	73
43 0ther business activities	74	36	74
44 Public administration and defense compulsory social security	75	37	75
45 Education	80	38	80
46 Health and social work	85	39	85
47 0ther community, social and personal services	90+91+92+93	40	90+91+92+93
48 Private households with employed persons Extra-territorial organizations and bodies	95+99	41	95+99

Table 3-10 comparison of the database of CEPII CHELEM and OECD

	1995				1997				2000				2002				2005				2007			
sector	EXPi/EXPm		VSS (FVA)		EXPi/EXPm		VSS (FVA)		EXPi/EXPm		VSS (FVA)		EXPi/EXPm		VSS (FVA)		EXPi/EXPm		VSS (FVA)		EXPi/EXPm		VSS (FVA)	
	CEPII	OECD	CEPII	OECD	CEPII	OECD	CEPII	OECD	CEPII	OECD	CEPII	OECD	CEPII	OECD	CEPII	OECD	CEPII	OECD	CEPII	OECD	CEPII	OECD	CEPII	OECD
4	0,06	0,06	0,00	0,00	0,04	0,06	0,00	0,00	0,03	0,04	0,00	0,00	0,03	0,04	0,00	0,00	0,02	0,03	0,00	0,00	0,02	0,02	0,00	0,00
5	0,43	0,29	0,07	0,05	0,33	0,30	0,05	0,04	0,28	0,25	0,05	0,04	0,25	0,24	0,05	0,04	0,21	0,18	0,04	0,04	0,19	0,17	0,03	0,03
6	0,02	0,01	0,00	0,00	0,01	0,00	0,00	0,00	0,01	0,02	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,03	0,00	0,01	0,01	0,01	0,00	0,00
7	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,03	0,00	0,01	0,01	0,01	0,00	0,00
8	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,02	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00
9	0,05	0,04	0,01	0,01	0,04	0,06	0,01	0,01	0,03	0,05	0,01	0,01	0,03	0,05	0,01	0,01	0,04	0,09	0,01	0,02	0,04	0,05	0,01	0,01
10	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,00
11	0,03	0,04	0,01	0,01	0,03	0,05	0,01	0,01	0,03	0,05	0,01	0,01	0,03	0,04	0,01	0,01	0,03	0,01	0,01	0,00	0,03	0,04	0,01	0,01
12	0,02	0,03	0,00	0,00	0,02	0,02	0,00	0,00	0,02	0,02	0,00	0,00	0,02	0,02	0,00	0,00	0,02	0,01	0,00	0,00	0,02	0,02	0,00	0,00
13	0,04	0,07	0,01	0,01	0,02	0,02	0,00	0,00	0,01	0,02	0,00	0,00	0,01	0,01	0,00	0,00	0,02	0,03	0,01	0,01	0,04	0,05	0,01	0,01
14	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,02	0,02	0,00	0,00
15	0,03	0,03	0,01	0,00	0,03	0,05	0,00	0,01	0,03	0,05	0,01	0,01	0,03	0,05	0,01	0,01	0,04	0,05	0,01	0,01	0,04	0,04	0,01	0,01
16	0,06	0,07	0,01	0,01	0,05	0,06	0,01	0,01	0,06	0,03	0,01	0,01	0,07	0,06	0,01	0,01	0,08	0,08	0,02	0,02	0,08	0,07	0,02	0,02
17	0,00	0,00	0,00	0,00	0,06	0,06	0,02	0,02	0,09	0,07	0,04	0,03	0,12	0,07	0,05	0,03	0,15	0,14	0,08	0,07	0,12	0,12	0,05	0,05
18	0,07	0,19	0,02	0,05	0,07	0,11	0,02	0,03	0,09	0,13	0,02	0,03	0,08	0,11	0,02	0,03	0,07	0,13	0,03	0,05	0,07	0,14	0,02	0,04
19	0,00	0,00	0,00	0,00	0,08	0,02	0,02	0,01	0,11	0,09	0,04	0,03	0,12	0,11	0,05	0,04	0,16	0,06	0,07	0,03	0,16	0,10	0,06	0,04
20	0,03	0,01	0,01	0,00	0,03	0,02	0,01	0,00	0,03	0,02	0,01	0,00	0,03	0,02	0,01	0,00	0,03	0,03	0,01	0,01	0,03	0,02	0,01	0,01
21	0,01	0,03	0,00	0,01	0,01	0,00	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,02	0,02	0,00	0,01
22	0,00	0,02	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,01	0,00	0,00
23	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
24	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,01	0,00	0,00
25	0,12	0,10	0,02	0,02	0,12	0,10	0,01	0,01	0,12	0,08	0,02	0,02	0,11	0,11	0,02	0,02	0,09	0,05	0,02	0,01	0,08	0,08	0,01	0,01
HT	0,03	0,01	0,20	0,20	0,19	0,11	0,29	0,30	0,24	0,18	0,36	0,36	0,28	0,21	0,39	0,38	0,34	0,23	0,48	0,48	0,32	0,25	0,38	0,39
MHT	0,19	0,36	0,20	0,22	0,18	0,24	0,19	0,20	0,20	0,24	0,20	0,21	0,19	0,23	0,22	0,23	0,20	0,32	0,30	0,29	0,22	0,28	0,27	0,28
MLT	0,15	0,18	0,16	0,16	0,13	0,19	0,16	0,17	0,12	0,17	0,19	0,19	0,11	0,15	0,20	0,20	0,12	0,13	0,24	0,26	0,15	0,18	0,24	0,24
LT	0,63	0,46	0,15	0,15	0,51	0,46	0,13	0,13	0,45	0,41	0,17	0,17	0,41	0,41	0,17	0,17	0,34	0,32	0,20	0,19	0,31	0,29	0,17	0,17
M	1	1	0,16	0,17	1	1	0,18	0,17	1	1	0,22	0,22	1	1	0,25	0,23	1	1	0,32	0,30	1	1	0,27	0,27

Table 3-11 share of imported inputs in China's import (%) of 1995

	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	HT	MH	ML	LT	CIM	C	G	I	E	Fm	M
4	16,5	2,0	0,0	0,1	0,1	2,2	0,0	0,0	0,1	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	2,3	0,3	18,7	21,2	69,3	0,0	9,5	0,0	78,8	100
5	0,6	55,7	0,2	1,0	0,2	1,5	0,0	4,1	1,5	0,4	0,0	0,6	1,0	0,0	0,3	0,0	0,1	0,4	0,2	0,0	0,0	6,1	0,1	3,2	7,0	63,6	73,9	23,0	0,0	3,1	0,0	26,1	100
6	0,7	1,1	26,7	1,2	0,2	1,0	0,0	0,4	2,4	1,2	0,0	1,4	2,4	0,0	1,6	0,0	0,1	1,5	0,9	0,0	0,0	48,7	0,1	6,6	6,5	78,5	91,6	8,9	0,0	-0,6	0,0	8,4	100
7	9,2	3,5	0,6	35,4	0,2	5,5	0,0	2,2	15,9	0,6	0,0	1,5	1,9	0,0	5,1	0,0	0,3	0,5	0,3	0,0	0,0	5,4	0,3	13,0	20,7	54,1	88,2	4,1	0,0	7,8	0,0	11,8	100
8	3,2	2,5	0,6	1,5	7,5	16,4	0,0	1,7	20,8	19,7	0,0	2,7	6,4	0,0	3,0	0,0	0,2	2,0	0,9	0,0	0,0	1,9	0,2	27,7	53,2	9,8	90,9	3,0	0,0	6,1	0,0	9,1	100
9	2,4	12,3	0,7	2,3	2,3	31,0	0,0	13,6	4,2	1,5	0,0	1,3	1,4	0,0	4,4	0,0	0,2	0,6	0,4	0,0	0,0	3,3	0,2	37,5	23,3	21,0	82,0	10,5	0,0	7,5	0,0	18,0	100
10	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0
11	5,9	5,2	0,3	1,7	1,0	10,2	0,0	15,8	6,6	1,3	0,0	1,7	8,6	0,0	13,7	0,0	0,6	5,7	2,7	0,0	0,0	5,3	0,6	38,3	29,2	18,4	86,5	9,3	0,0	4,2	0,0	13,5	100
12	3,5	0,9	0,4	0,7	0,9	4,7	0,0	0,5	36,2	7,1	0,0	2,5	3,8	0,0	8,6	0,0	0,5	1,8	0,6	0,0	0,0	1,5	0,5	19,0	47,7	7,0	74,2	9,4	0,0	16,5	0,0	25,8	100
13	0,4	0,6	0,1	0,1	0,2	1,4	0,0	0,3	3,8	32,5	0,0	20,1	20,3	0,0	13,8	0,0	0,6	4,3	2,7	0,0	0,0	3,4	0,6	39,8	59,6	4,5	104	0,2	0,0	-4,7	0,0	-4,5	100
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	4,3	2,7	0,6	0,9	0,5	4,2	0,0	1,8	8,3	3,6	0,0	14,9	11,1	0,0	9,9	0,0	0,7	1,9	2,8	0,0	0,0	6,7	0,7	27,1	31,9	15,2	75,0	11,7	0,0	13,4	0,0	25,0	100
16	1,0	2,0	0,1	0,8	0,6	2,4	0,0	0,5	3,4	3,6	0,0	1,6	17,4	0,0	3,5	0,0	0,5	2,8	4,0	0,0	0,0	0,6	0,5	26,0	13,7	4,5	44,8	0,9	0,0	54,4	0,0	55,2	100
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0,5	0,6	0,1	0,3	0,3	1,0	0,0	0,3	1,2	1,3	0,0	1,0	8,7	0,0	37,0	0,0	1,2	1,4	1,2	0,0	0,0	0,8	1,2	48,1	5,3	2,3	56,9	21,9	0,0	21,2	0,0	43,1	100
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	1,9	1,6	0,1	1,3	1,5	5,9	0,0	1,0	3,2	3,8	0,0	1,7	10,4	0,0	9,5	0,0	5,9	3,0	3,6	0,0	0,0	1,2	5,9	28,8	14,7	6,2	55,6	11,5	0,0	32,9	0,0	44,4	100
21	1,0	1,0	0,1	0,8	0,4	1,4	0,0	0,4	1,8	2,0	0,0	1,2	6,2	0,0	1,1	0,0	0,4	32,5	12,3	0,0	0,0	0,5	0,4	41,2	18,1	3,3	63,0	0,6	0,0	36,4	0,0	37,0	100
22	0,6	0,4	0,0	0,2	0,4	0,8	0,0	0,2	0,8	0,9	0,0	0,3	1,1	0,0	0,4	0,0	0,1	15,3	5,4	0,0	0,0	0,4	0,1	17,6	8,0	1,7	27,2	27,9	0,0	44,9	0,0	72,8	100
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	3,5	7,3	0,3	4,5	0,7	3,5	0,0	1,4	5,0	5,0	0,0	3,0	4,8	0,0	4,7	0,0	0,5	1,2	0,9	0,0	0,0	12,0	0,5	14,2	16,0	27,6	58,3	32,3	0,0	9,4	0,0	41,7	100
HT	1,9	1,6	0,1	1,3	1,5	5,9	0,0	1,0	3,2	3,8	0,0	1,7	10,4	0,0	9,5	0,0	5,9	3,0	3,6	0,0	0,0	1,2	5,9	28,8	14,7	6,2	55,6	11,5	0,0	32,9	0,0	44,4	100
MH	1,2	3,8	0,2	1,0	0,9	8,6	0,0	3,5	2,7	2,1	0,0	1,3	9,7	0,0	16,9	0,0	0,7	3,0	2,4	0,0	0,0	1,3	0,7	38,2	12,9	7,5	59,2	11,5	0,0	29,3	0,0	40,8	100
ML	1,8	1,5	0,2	0,5	0,9	4,0	0,0	2,7	6,4	19,6	0,0	12,6	13,7	0,0	10,6	0,0	0,5	5,6	2,9	0,0	0,0	3,4	0,5	33,9	45,1	7,4	86,9	6,7	0,0	6,4	0,0	13,1	100
LT	5,0	31,2	1,1	6,0	0,3	2,4	0,0	2,7	3,7	1,0	0,0	0,9	1,5	0,0	1,5	0,0	0,1	0,5	0,3	0,0	0,0	7,0	0,1	5,8	8,8	50,3	65,0	29,4	0,0	5,6	0,0	35,0	100
CIM	2,2	9,8	0,4	2,1	0,8	6,4	0,0	3,2	3,5	4,7	0,0	3,0	8,4	0,0	12,3	0,0	0,6	2,8	2,0	0,0	0,0	2,9	0,6	29,8	17,1	17,5	64,9	14,9	0,0	20,1	0,0	35,1	100

Table 3-12 share of imported inputs in China's import (%) of 2007

2007	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	HT	MH	ML	LT	CIM	C	G	I	E	Fm	M
4	27,7	3,8	0,1	0,2	0,4	2,1	0,9	0,2	0,3	0,4	0,3	0,2	0,4	0,2	0,5	0,1	0,0	0,2	0,0	0,0	0,1	0,4	**1,2**	**3,3**	**1,8**	**32,2**	**38,5**	0,0	0,0	0,0	0,0	**61,5**	**100**
5	0,3	66,6	0,1	0,5	0,0	0,7	0,1	1,2	0,4	0,3	0,2	0,3	0,5	0,1	0,5	0,1	0,1	1,2	0,0	0,0	0,1	4,2	**0,4**	**2,9**	**2,5**	**71,7**	**77,5**	0,0	0,0	0,0	0,0	**22,5**	**100**
6	0,6	0,7	41,3	3,6	0,1	0,9	0,1	0,5	3,1	0,4	0,4	5,3	2,3	0,2	1,7	0,4	0,2	0,9	0,2	0,0	0,4	33,5	**0,9**	**6,2**	**9,9**	**79,7**	**96,7**	0,0	0,0	0,0	0,0	**3,3**	**100**
7	10,3	5,7	1,2	47,4	0,1	4,1	2,6	2,5	6,0	0,3	0,4	1,8	1,8	1,4	4,4	1,3	0,4	0,8	0,0	0,0	0,4	4,6	**5,7**	**11,6**	**11,1**	**69,2**	**97,6**	0,0	0,0	0,0	0,0	**2,4**	**100**
8	1,2	1,8	0,4	0,6	11,2	35,2	0,2	1,1	6,4	22,7	3,3	1,6	3,7	0,2	1,7	0,3	0,1	0,8	0,2	0,0	0,3	0,8	**0,7**	**41,6**	**46,5**	**4,8**	**93,6**	0,0	0,0	0,0	0,0	**6,4**	**100**
9	1,0	10,3	1,8	3,3	1,0	38,7	1,5	18,0	4,2	0,6	1,5	1,4	1,5	0,5	5,9	0,5	0,3	1,3	0,2	0,0	0,4	3,0	**2,6**	**47,7**	**26,9**	**19,3**	**96,6**	0,0	0,0	0,0	0,0	**3,4**	**100**
10	2,0	0,4	0,4	0,3	0,2	2,9	48,0	0,6	0,7	0,0	0,0	0,3	0,4	0,0	0,2	0,0	0,0	0,1	0,0	0,0	0,0	0,4	**48,0**	**3,7**	**1,9**	**3,5**	**57,2**	0,0	0,0	0,0	0,0	**42,8**	**100**
11	6,5	4,3	0,2	2,1	0,3	7,6	1,1	27,0	2,1	0,5	0,2	1,7	6,3	2,0	12,4	4,8	1,1	6,8	0,1	0,0	1,6	6,8	**9,0**	**34,8**	**31,9**	**19,9**	**95,5**	0,0	0,0	0,0	0,0	**4,5**	**100**
12	3,5	1,0	0,2	0,2	1,1	3,4	1,4	0,6	47,5	8,2	2,2	2,3	2,7	1,1	11,4	1,2	0,9	2,1	0,3	0,0	0,3	4,3	**4,5**	**19,9**	**62,2**	**9,2**	**95,8**	0,0	0,0	0,0	0,0	**4,2**	**100**
13	0,1	0,1	0,0	0,0	0,0	0,2	0,0	0,4	1,5	42,3	0,7	15,7	21,1	0,1	4,9	0,1	0,3	6,7	1,3	0,0	1,5	1,4	**0,6**	**34,3**	**61,9**	**1,6**	**98,4**	0,0	0,0	0,0	0,0	**1,6**	**100**
14	0,1	0,1	0,0	0,1	0,0	1,6	0,0	0,3	0,5	3,0	33,5	7,6	9,8	0,3	33,4	0,8	0,4	3,2	0,1	0,0	1,1	3,2	**1,5**	**49,1**	**45,0**	**3,6**	**99,2**	0,0	0,0	0,0	0,0	**0,8**	**100**
15	1,7	1,1	1,1	0,7	0,7	2,6	0,3	1,5	5,6	3,9	1,6	19,4	14,6	1,8	15,4	3,0	1,0	2,6	0,4	0,0	1,7	5,9	**6,1**	**36,9**	**33,2**	**10,6**	**86,8**	0,0	0,0	0,0	0,0	**13,2**	**100**
16	0,4	1,2	0,3	0,5	1,0	1,8	0,2	0,7	1,9	4,2	1,2	2,4	24,0	0,1	3,8	1,0	0,3	5,3	1,1	0,0	2,3	0,5	**1,5**	**37,2**	**12,4**	**2,8**	**54,0**	0,0	0,0	0,0	0,0	**46,0**	**100**
17	0,2	0,6	0,0	0,0	0,0	0,1	0,0	0,0	0,1	0,0	0,0	0,1	2,0	47,6	0,9	1,5	0,5	0,0	0,0	0,0	0,2	0,3	**49,6**	**3,3**	**0,2**	**1,2**	**54,4**	0,0	0,0	0,0	0,0	**45,6**	**100**
18	0,2	0,3	0,1	0,2	0,1	0,3	0,1	0,2	0,3	0,4	0,2	0,4	7,8	17,8	30,2	15,1	1,8	1,9	0,6	0,0	1,0	2,8	**34,8**	**41,1**	**2,2**	**3,5**	**81,6**	0,0	0,0	0,0	0,0	**18,4**	**100**
19	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,1	0,6	3,1	1,3	29,0	0,5	1,5	1,5	0,0	1,4	0,3	**32,7**	**4,8**	**1,7**	**0,4**	**39,5**	0,0	0,0	0,0	0,0	**60,5**	**100**
20	1,0	0,9	0,1	0,6	1,4	6,6	0,7	1,3	1,7	3,9	1,5	0,9	7,1	0,9	8,4	2,4	11,0	6,7	3,0	0,0	1,8	1,9	**14,9**	**30,7**	**13,8**	**4,6**	**64,0**	0,0	0,0	0,0	0,0	**36,0**	**100**
21	0,3	0,4	0,2	0,5	0,3	0,6	0,0	0,3	0,5	1,2	0,3	0,7	2,4	0,1	0,4	0,2	0,1	46,8	0,1	0,0	0,2	0,6	**0,4**	**50,3**	**3,4**	**1,8**	**56,0**	0,0	0,0	0,0	0,0	**44,0**	**100**
22	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,4	0,0	0,0	0,0	0,0	0,0	23,0	0,0	0,5	0,0	**0,0**	**0,9**	**23,0**	**0,0**	**23,9**	0,0	0,0	0,0	0,0	**76,1**	**100**
23	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	0,0	0,0	0,0	0,0	**0,0**	**0**
24	0,1	0,1	0,0	0,1	0,1	0,3	0,0	0,3	0,6	1,1	0,5	0,5	2,7	0,3	0,8	0,3	0,3	0,8	0,7	0,0	24,2	0,5	**1,0**	**28,8**	**3,7**	**0,7**	**34,2**	0,0	0,0	0,0	0,0	**65,8**	**100**
25	1,0	1,6	0,5	6,6	0,2	1,6	0,3	1,8	3,5	13,6	8,2	1,9	6,0	0,3	3,8	0,5	0,9	2,2	0,1	0,0	0,4	9,7	**2,0**	**14,0**	**29,3**	**19,3**	**64,6**	0,0	0,0	0,0	0,0	**35,4**	**100**
H	**0,5**	**0,5**	**0,1**	**0,2**	**0,5**	**2,4**	**1,5**	**0,5**	**0,6**	**1,4**	**0,5**	**0,4**	**3,4**	**17,3**	**3,7**	**9,6**	**4,2**	**2,8**	**1,5**	**0,0**	**1,1**	**0,9**	**32,5**	**13,4**	**5,5**	**2,2**	**53,6**	**0,0**	**0,0**	**0,0**	**0,0**	**46,4**	**100**
MH	**0,4**	**2,8**	**0,5**	**1,0**	**0,5**	**9,5**	**0,4**	**4,4**	**1,6**	**1,4**	**0,7**	**1,1**	**9,5**	**8,3**	**16,1**	**7,3**	**1,0**	**5,2**	**0,6**	**0,0**	**1,7**	**2,1**	**16,9**	**42,0**	**10,3**	**6,8**	**76,0**	**0,0**	**0,0**	**0,0**	**0,0**	**24,0**	**100**
MF	**1,3**	**1,0**	**0,2**	**0,5**	**1,4**	**6,2**	**0,2**	**4,3**	**3,1**	**13,4**	**14,9**	**8,4**	**11,0**	**0,6**	**18,5**	**1,3**	**0,5**	**4,1**	**0,7**	**0,0**	**1,2**	**3,2**	**2,6**	**40,9**	**46,2**	**6,2**	**95,9**	**0,0**	**0,0**	**0,0**	**0,0**	**4,1**	**100**
F	**8,0**	**20,1**	**1,6**	**7,3**	**0,2**	**1,7**	**0,6**	**1,3**	**2,1**	**5,2**	**3,1**	**1,1**	**2,7**	**0,3**	**2,1**	**0,4**	**0,4**	**1,3**	**0,1**	**0,0**	**0,2**	**6,2**	**1,7**	**8,0**	**13,2**	**43,2**	**66,1**	**0,0**	**0,0**	**0,0**	**0,0**	**33,9**	**100**
CIM	**1,4**	**4,1**	**0,5**	**1,5**	**0,6**	**7,2**	**0,6**	**3,5**	**1,7**	**3,4**	**2,9**	**2,0**	**8,1**	**7,7**	**13,1**	**6,0**	**1,3**	**4,3**	**0,7**	**0,0**	**1,4**	**2,6**	**15,5**	**34,0**	**14,8**	**10,1**	**74,4**	**0,0**	**0,0**	**0,0**	**0,0**	**25,6**	**100**

Table 3-13 share of each country in world export led by China's manufacturing exports to US

	US	EU15	GER	ESP	FRA	ITA	UK	Asia	JPN	KOR	HONG KONG	TW	IND	ASEAN	IDN	MAL	PHI	SING	THAI	VN	ROW	World
1995	9,00	9,59	3,55	0,38	1,30	1,55	0,66	64,18	24,95	13,41	7,32	11,05	0,59	6,85	2,17	1,93	0,19	0,92	1,38	0,24	17,23	100
1997	11,11	10,12	3,20	0,29	1,58	1,25	0,88	63,80	25,69	13,35	6,99	9,16	0,71	7,90	1,67	2,17	0,22	1,45	2,08	0,23	14,97	100
2000	9,68	10,87	3,76	0,34	1,72	0,99	0,96	64,99	27,21	13,05	5,22	8,86	0,88	9,77	1,79	2,48	0,92	1,61	2,45	0,45	14,47	100
2002	9,00	14,22	6,02	0,42	2,08	1,31	0,89	61,87	25,22	11,96	2,90	11,07	1,05	9,67	1,53	2,66	0,88	1,58	2,58	0,36	14,91	100
2005	7,17	13,83	6,15	0,60	1,50	1,35	0,85	64,20	24,67	14,84	1,11	11,62	1,99	9,97	1,23	2,16	1,42	1,92	2,89	0,34	14,80	100
2007	7,34	14,52	7,04	0,53	1,61	1,44	0,87	58,88	20,46	13,58	0,83	10,75	1,70	11,55	1,55	2,53	1,74	1,70	3,46	0,53	19,26	100
2010	7,09	14,84	8,02	0,36	1,34	1,11	0,78	57,85	19,02	14,82	0,45	9,02	1,69	12,84	1,36	3,42	1,73	1,58	3,76	0,89	20,22	100
2011	6,08	14,17	8,01	0,34	1,14	1,03	0,73	59,22	15,74	13,42	9,57	7,04	1,49	11,95	1,48	2,94	1,43	1,55	3,49	0,96	20,53	100
2012	6,66	14,24	7,85	0,32	1,17	1,08	0,80	57,76	16,59	16,80	0,95	8,08	1,28	14,06	1,53	3,10	2,25	1,73	4,02	1,31	21,34	100

Table3-14 share of China's imports from country k in overall imports from the world IMPk/IMPw (manufacturing)

	US	EU15	GER	ESP	FRA	ITA	UK	Asia	JPN	KOR	HONG KONG	TW	IND	ASEAN	IDN	MAL	PHI	SING	THAI	VN	ROW	World
1995	11,76	13,89	4,83	0,71	1,90	2,22	0,92	60,76	27,62	10,68	6,62	8,65	0,39	6,79	0,97	2,31	0,19	1,25	1,87	0,19	13,59	100
1997	12,82	12,68	3,86	0,35	2,50	1,88	0,98	61,15	25,07	13,55	6,10	7,94	0,76	7,73	1,21	2,46	0,23	1,60	2,04	0,11	13,36	100
2000	11,74	12,71	4,63	0,28	1,69	1,32	1,22	64,31	25,46	14,23	4,26	8,51	0,67	11,18	1,81	3,29	0,99	1,93	2,73	0,35	11,24	100
2002	11,35	13,93	6,00	0,33	1,47	1,77	0,91	62,16	23,58	13,53	2,56	9,60	0,81	12,08	1,61	4,28	1,55	1,79	2,57	0,25	12,56	100
2005	8,94	13,09	5,66	0,39	1,56	1,28	1,11	66,47	21,03	15,93	1,27	12,71	0,88	14,65	1,35	4,59	2,90	2,49	3,00	0,30	11,50	100
2007	9,60	14,36	6,26	0,41	1,93	1,37	1,16	64,13	19,42	14,77	0,86	12,51	0,77	15,81	1,31	4,68	3,54	2,45	3,46	0,35	11,91	100
2010	8,13	15,90	7,99	0,35	1,62	1,31	1,24	62,26	18,83	15,13	0,54	10,93	1,23	15,60	1,29	5,91	1,73	2,27	3,61	0,73	13,72	100
2011	7,20	15,92	8,15	0,34	1,66	1,27	1,25	62,71	15,81	13,32	8,82	8,53	1,32	14,92	1,30	5,55	1,42	2,24	3,47	0,87	14,17	100
2012	7,75	16,90	8,33	0,41	1,87	1,26	1,51	59,40	15,63	14,78	1,52	9,84	1,08	16,54	1,52	5,58	1,71	2,53	3,53	1,59	15,94	100

Table 3-15 share of each country in world export led by China's exports to US at each technology level in 2012

	US	EU15	GER	ESP	FRA	ITA	UK	Asia	JPN	KOR	HK	TW	IND	ASEAN	IDN	MAL	PHIL	SING	THAI	VN	ROW	World
M	6,66	14,24	7,85	0,32	1,17	1,08	0,80	57,76	16,59	16,80	0,95	8,08	1,28	14,06	1,53	3,10	2,25	1,73	4,02	1,31	21,34	100
HT	5,97	14,81	8,84	0,27	1,19	0,82	0,73	65,13	18,66	19,49	0,78	8,37	0,79	17,04	1,28	3,98	3,34	1,93	5,08	1,38	14,08	100
MHT	6,77	15,80	8,61	0,34	1,17	1,38	1,02	49,61	16,01	14,31	1,42	7,13	1,40	9,34	1,55	1,96	1,14	1,41	2,28	0,88	27,82	100
MLT	6,85	11,16	5,16	0,32	0,95	1,03	0,77	45,39	12,51	11,97	1,12	7,47	1,73	10,58	2,10	2,14	0,74	1,65	2,83	0,95	36,60	100
LT	8,59	12,06	5,11	0,44	1,22	1,60	0,77	49,40	12,59	13,34	0,85	8,54	2,48	11,60	2,02	2,09	0,78	1,52	3,22	1,75	29,94	100

Table 3-16 growth rate of each country's exports led by China's exports to the world in 2012 (1995=100)

Manufacturing		HT		MHT		MLT		LT	
Philippines	24984	Philippines	608843	Philippines	16089	Philippines	6359	Vietnam	5687
Vietnam	11524	Vietnam	269300	Vietnam	9773	India	5942	Philippines	3176
Thailand	6715	Thailand	145302	India	9555	Thailand	4560	India	2840
India	5961	Malaysia	111802	Thailand	5976	ROW	4216	Thailand	1565
Germany	5636	ASEAN	108006	ROW	4856	Vietnam	3769	Singapore	1472
ASEAN	4961	Korea	76395	ASEAN	4702	Malaysia	3113	Germany	1458
Singapore	4724	India	74223	Malaysia	4685	Germany	3097	ROW	1340
Malaysia	4273	Singapore	57340	Korea	4571	Singapore	2810	Spain	1298
EU15	3872	Germany	48195	Germany	4392	ASEAN	2706	ASEAN	1258
ROW	3574	Asia	32926	Singapore	3793	EU15	2532	EU15	1237
Korea	3202	Taiwan	32493	UK	3235	Korea	2475	UK	1072
UK	3189	Indonesia	31682	EU15	3193	World	2441	Italy	953
World	2667	EU15	31341	World	2851	UK	2234	France	914
France	2344	ROW	31185	Taiwan	2536	Taiwan	2093	World	774
Asia	2323	World	31178	Indonesia	2443	US	1788	Malaysia	758
Spain	2267	UK	24412	Asia	2341	Spain	1752	US	751
US	1976	US	19726	US	2058	Asia	1740	Indonesia	717
Taiwan	1975	France	18029	Italy	1940	France	1690	Korea	633
Italy	1937	Japan	17541	France	1766	Italy	1571	Asia	576
Indonesia	1847	Spain	13736	Spain	1649	Indonesia	1408	Taiwan	522
Japan	1724	Italy	12043	Japan	1445	Japan	1085	Japan	452
HongKong	374	HongKong	3589	HongKong	635	HongKong	669	HongKong	76

Table 3-17 share of each country in world export led by China's exports to the world

manufacturing				HT				MHT				MLT				LT			
1995		2012		1995		2012		1995		2012		1995		2012		1995		2012	
Asia	63,2	Asia	55,0	Asia	61,2	Asia	64,6	Asia	60,1	Asia	49,3	Asia	56,7	ROW	43,1	Asia	66,1	Asia	49,2
Japan	24,5	ROW	24,3	Japan	33,1	Korea	19,6	Japan	31,0	ROW	28,4	Japan	25,3	Asia	40,4	Japan	21,2	ROW	30,1
ROW	18,2	Korea	16,0	EU15	14,8	Japan	18,6	ROW	16,7	Japan	15,7	ROW	25,0	Japan	11,2	ROW	17,4	Korea	13,3
Korea	13,3	Japan	15,9	ROW	14,4	ASEAN	16,3	EU15	13,8	EU15	15,5	Korea	10,2	EU15	10,4	Korea	16,2	Japan	12,3
Taiwan	10,8	EU15	14,0	US	9,6	EU15	14,9	US	9,4	Korea	14,2	EU15	10,0	Korea	10,3	Taiwan	12,8	EU15	11,9
EU15	9,6	ASEAN	12,9	Taiwan	8,2	ROW	14,4	Korea	8,9	ASEAN	9,4	ASEAN	8,6	ASEAN	9,5	US	9,1	ASEAN	11,6
US	9,0	Taiwan	8,0	Korea	8,0	Germany	8,9	Taiwan	8,2	Germany	8,4	US	8,3	Taiwan	6,2	Hong Kong	8,1	US	8,8
Hong Kong	7,1	Germany	7,5	Hong Kong	6,9	Taiwan	8,6	Hong Kong	5,9	Taiwan	7,3	Taiwan	7,3	US	6,0	EU15	7,4	Taiwan	8,6
ASEAN	6,9	US	6,7	Germany	5,7	US	6,0	ASEAN	5,7	US	6,8	Hong Kong	4,6	Germany	4,8	ASEAN	7,2	Germany	4,9
Germany	3,6	Thailand	3,5	ASEAN	4,7	Thailand	4,7	Germany	5,4	Thailand	2,3	Indonesia	3,9	Indonesia	2,2	Germany	2,6	Thailand	3,2
Indonesia	2,3	Malaysia	2,8	Italy	2,2	Malaysia	3,9	Italy	2,0	Malaysia	2,0	Germany	3,8	Thailand	2,2	Indonesia	2,2	India	2,5
Malaysia	1,8	Philippines	1,9	France	2,1	Philippines	3,1	France	1,9	Indonesia	1,6	Italy	1,6	Malaysia	1,9	Malaysia	2,1	Malaysia	2,1
Italy	1,6	Singapore	1,7	Indonesia	1,2	Singapore	1,9	Indonesia	1,8	Singapore	1,5	Malaysia	1,5	India	1,8	Thailand	1,6	Indonesia	2,0
Thailand	1,4	Indonesia	1,6	Malaysia	1,1	Vietnam	1,4	Malaysia	1,2	Italy	1,4	France	1,2	Singapore	1,4	Italy	1,3	Vietnam	1,8
France	1,3	India	1,4	Singapore	1,0	Indonesia	1,3	Singapore	1,1	India	1,4	Singapore	1,2	Hong Kong	1,3	France	1,0	Italy	1,6
Singapore	0,9	Vietnam	1,2	Thailand	1,0	France	1,2	Thailand	1,1	Hong Kong	1,3	Thailand	1,2	Italy	1,0	Singapore	0,8	Singapore	1,5
UK	0,7	France	1,1	UK	0,9	Italy	0,8	UK	0,9	France	1,2	UK	0,8	Vietnam	0,9	India	0,7	France	1,2
India	0,6	Italy	1,1	Spain	0,6	India	0,8	Spain	0,6	Philippines	1,1	India	0,8	France	0,8	UK	0,5	Hong Kong	0,8
Spain	0,4	Hong Kong	1,0	India	0,3	Hong Kong	0,8	India	0,4	UK	1,0	Vietnam	0,6	Philippines	0,8	Spain	0,3	UK	0,8
Vietnam	0,3	UK	0,8	Philippines	0,2	UK	0,7	Vietnam	0,3	Vietnam	0,9	Spain	0,4	UK	0,7	Vietnam	0,2	Philippines	0,7
Philippines	0,2	Spain	0,3	Vietnam	0,2	Spain	0,3	Philippines	0,2	Spain	0,3	Philippines	0,3	Spain	0,3	Philippines	0,2	Spain	0,5
World	100	World	100	World	100	World	100	World	100	World	100	World	100	World	100	World	100	World	100

Table 3-18 growth rate of each country's exports led by China's exports to ASEAN countries in 2012 (1995=100)

M		HT		MHT		MLT		LT	
Philippines	28536,3	Philippines	1000203	Philippines	14615,4	Philippines	6285,35	Vietnam	12163,4
Vietnam	13251,8	Vietnam	473076	India	8831,35	India	5570,79	India	7821,99
Thailand	9916,76	Thailand	237323	Vietnam	8756,98	Thailand	5165,48	Philippines	7211,01
India	9401,2	Malaysia	195231	Thailand	5713,53	ROW	5005,77	Thailand	3591,12
Malaysia	7129,04	ASEAN	183190	ROW	4613,71	Vietnam	3875,1	Singapore	3564,41
ASEAN	6937,71	Korea	136305	ASEAN	4393,19	Malaysia	3373,07	Germany	3390,14
Germany	6648,36	India	134266	Malaysia	4383,51	Germany	3187,82	ROW	3331,05
Singapore	6067	Singapore	100273	Korea	4280,28	Korea	2881,77	Spain	3267,14
Korea	5687,73	Germany	85698	Germany	3855,58	ASEAN	2829,61	ASEAN	3173,65
ROW	5471,99	Taiwan	59007	Singapore	3690,42	World	2805,15	EU15	2954,69
EU15	4789,88	Asia	58049	EU15	2890,16	Singapore	2769,6	UK	2582,35
UK	4035,89	ROW	56329	UK	2886,03	EU15	2583,29	Italy	2467,85
World	4029,68	EU15	55782	World	2725,64	Taiwan	2434,14	France	2113,01
Taiwan	3589,84	Indonesia	55572	Taiwan	2512,34	UK	2212	Malaysia	2052,21
Asia	3577,31	World	55288	Asia	2260,22	US	2033,68	World	1994,7
France	2955,22	UK	43686	Indonesia	2247,02	Asia	1874,43	Indonesia	1906,21
US	2903,85	US	35277	US	1968,35	Spain	1719,99	US	1759,03
Spain	2770,62	France	32092	Italy	1704,89	France	1710,35	Korea	1711,87
Indonesia	2624,06	Japan	31077	France	1654,09	Italy	1628,07	Asia	1530,78
Italy	2552,19	Spain	24505	Spain	1538,04	Indonesia	1565,36	Taiwan	1451,92
Japan	2333,71	Italy	21729	Japan	1387,07	Japan	1125,08	Japan	1165,69
Hong Kong	664,911	Hong Kong	6418	Hong Kong	630,777	Hong Kong	706,742	Hong Kong	192,253

Table 3-19 share of each country in world export led by China's exports to ASEAN countries

manufacturing				HT				MHT				MLT				LT			
1995		2012		1995		2012		1995		2012		1995		2012		1995		2012	
Asia	60	Asia	53	Asia	61	Asia	64	Asia	59	Asia	49	Asia	55	ROW	48	Asia	64	Asia	49
Japan	26	ROW	27	Japan	33	Korea	20	Japan	30	ROW	29	ROW	27	Asia	37	Japan	21	ROW	30
ROW	20	Korea	15	EU15	15	Japan	19	ROW	17	Japan	15	Japan	26	Japan	10	ROW	18	Korea	13
EU15	11	Japan	15	ROW	14	ASEAN	16	EU15	14	EU15	15	EU15	11	EU15	9,7	Korea	15	Japan	12
Korea	11	EU15	14	US	9,6	EU15	15	US	9,4	Korea	14	Korea	9,1	Korea	9,3	Taiwan	12	EU15	12
US	9,2	ASEAN	12	Taiwan	8,2	ROW	15	Korea	9	ASEAN	9,5	ASEAN	8,8	ASEAN	8,9	US	10	ASEAN	12
Taiwan	8,7	Taiwan	7,8	Korea	8	Germany	8,9	Taiwan	8	Germany	8,1	US	7,4	Taiwan	5,5	EU15	7,9	US	9,1
ASEAN	7	Germany	7,3	Hong Kong	6,9	Taiwan	8,8	ASEAN	5,9	Taiwan	7,3	Taiwan	6,3	US	5,4	Hong Kong	7,7	Taiwan	8,7
Hong Kong	5,9	US	6,6	Germany	5,7	US	6,1	Germany	5,7	US	6,8	Indonesia	4,2	Germany	4,6	ASEAN	7,3	Germany	4,8
Germany	4,4	Thailand	3,1	ASEAN	4,7	Thailand	4,3	Hong Kong	5,6	Thailand	2,3	Hong Kong	4,2	Indonesia	2,4	Germany	2,8	Thailand	3,2
Indonesia	2,6	Malaysia	2,7	Italy	2,2	Malaysia	3,8	Italy	2,2	Malaysia	2	Germany	4	Thailand	1,8	Indonesia	2,1	India	2,5
Italy	1,8	Philippines	1,7	France	2,1	Philippines	2,9	Indonesia	1,9	Indonesia	1,6	Italy	1,7	India	1,7	Malaysia	2	Malaysia	2,1
Malaysia	1,5	Indonesia	1,7	Indonesia	1,2	Singapore	1,9	France	1,9	Singapore	1,5	Malaysia	1,4	Malaysia	1,7	Thailand	1,8	Indonesia	2
France	1,5	Singapore	1,6	Malaysia	1,1	Vietnam	1,3	Malaysia	1,3	India	1,4	France	1,3	Singapore	1,2	Italy	1,3	Vietnam	1,8
Thailand	1,3	India	1,4	Singapore	1	Indonesia	1,3	Singapore	1,1	Italy	1,3	Singapore	1,2	Hong Kong	1,1	France	1,2	Italy	1,6
Singapore	1,1	Vietnam	1,2	Thailand	1	France	1,2	Thailand	1,1	Hong Kong	1,3	Thailand	1	Italy	1	Singapore	0,8	Singapore	1,5
UK	0,8	Italy	1,1	UK	0,9	Italy	0,9	UK	0,9	France	1,1	India	0,8	Vietnam	0,9	India	0,6	France	1,2
India	0,6	France	1,1	Spain	0,6	India	0,8	Spain	0,6	Philippines	1,1	UK	0,8	Philippines	0,8	UK	0,6	UK	0,8
Spain	0,5	Hong Kong	1	India	0,3	Hong Kong	0,8	India	0,4	UK	1	Vietnam	0,6	France	0,8	Vietnam	0,3	Hong Kong	0,7
Vietnam	0,4	UK	0,8	Philippines	0,2	UK	0,8	Vietnam	0,3	Vietnam	0,9	Spain	0,4	UK	0,7	Spain	0,3	Philippines	0,7
Philippines	0,2	Spain	0,3	Vietnam	0,2	Spain	0,3	Philippines	0,2	Spain	0,3	Philippines	0,3	Spain	0,3	Philippines	0,2	Spain	0,5
World	100	World	100	World	100	World	100	World	100	World	100	World	100	World	100	World	100	World	100

LIST OF ABBREVIATIONS

Chapter 1:

CA	Cost Advantages
COMP	Compensation of employee
CPI	Consumer Price Index
e	nominal exchange rate
EMP	Person engaged
EMPE	Employee
EPL	Employment Protection Legislations
LAB	Labor Compensation
N	Number of person engaged or number of employee
NCA	Non-Cost Advantages
$P_{ci}CI$	Cost of intermediate inputs
P_kK	Cost of capital inputs (price of capital inputs multiplying the volume)
PPP	Purchasing Power Parity
P_0	Price for year 0
P_0Q	Real value of production for year 0
Q	Volume of production
RP	Relative labor Productivity
RTCR	Relative Trade Coverage Ratio
RULC	Relative Unit Labor Cost
RW	Relative Labor Compensation per capita
TCR	Trade Coverage Ratio
ULC	Unit Labor Cost
UTC	Unit Total Cost
VA	Value Added
VA/N	Labor productivity
W	Average annual labor compensations per person engaged or average annual wages and salaries per employee
WN	Total labor cost
ASEAN	The Association of Southeast Asian Nations
BLS	Bureau of Labor Statistics
CEPII	Le Centre d'Études Prospectives et d'Informations Internationales
EU KlEMS	Productivity in the European Union: A Comparative Industry Approach
GGDC	Groningen Growth and Development Centre, University of Groningen
ICOP	International Comparisons of Output and Productivity
ICP	International Comparison Project
ILC	International Labor Comparison
ILO	International Labor Organization
ISIC	International Standard Industrial Classification, United Nations system for classifying economic data
KILM	Key Indicators of the Labor Market, ILO
NAICS	North American Industry Classification System
NIE	New Industrialized Economies
OECD	Organisation de Coopération et de Développement Économiques

Chapter 2:

C	Consumption
CI	Intermediate Input Consumption (Intermediate use)
CIM	Imported Intermediate Input Consumption
DVA	Domestic Value Added
E	Real effective exchange rate
ERR	Error
EXP	Export
F	Final use
FVA	Foreign Value Added
G	Government expenditures
GDP	Gross Domestic Product
I	Investment
IMP	Import
I-O table	input-output table
ISIC	International Standard Industrial Classification, United Nations system for classifying economic data
P	Inflation price
P_m	Import price deflator
PPP	Purchasing Power Parity
P_x	Export price deflator
RCA	Revealed Comparative Advantage
RProd	Relative labor productivity
RW	Relative labor cost
VA	Value Added
VS	Vertical Specialization
VSS	Share of Vertical Specialization
W	World trade
X	Gross Output
Y	Domestic demand
Y_{wp}	Foreign demand

Chapter 3:

I-O table	Input-output table
ASEAN	The Association of Southeast Asian Nations
ROA	Rest Of Asia
ROW	Rest Of the World
CIM	Consumption of Imported intermediate Inputs
HT	High-Technology
LT	Low-Technology
MHT	Medium-High-Technology
MLT	Medium-Low-Technology
CA	Cost Advantages
NCA	Non-Cost Advantages