

Regional Economic Integration and Global Value Chains: An International Input-Output Analysis

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Abstract

The expanding cross-border activities of firms, like the so-called vertical specialization, outsourcing and fragmentation production, have boosted dramatic changes in the international economic interdependence among countries during the last two decades. In an attempt to understand the evolution of the interaction between countries, many trade statistics based indicators have been developed. However, most of them focus on showing the direct trade-specific-relationship between countries, rather than considering the roles that inter-country and inter-industrial production networks play in the international economic interdependence. Based the concept of Trade in Value Added measured by the OECD input-output tables and the end-use-level bilateral trade data, this paper provides some alternative indicators to show the evolution of regional economic integration and global value chains for more than 40 main economies at detailed industrial level from both demander and supplier's perspectives. In addition, this paper also provides an idea about how to evaluate the roles of intermediate goods and final goods separately in the measurement of global value chains by using an international input-output model.

Keywords: Global value chain, trade in value added, economic interdependence, input-output

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1. Introduction

The increasing presence of Global Value Chains (GVCs) has been considered one of the most important features of the rapid economic globalization. The representative phenomenon relating to the context of GVCs includes the so-called “Vertical Specialization”, “Fragmentation Production”, “Outsourcing”, “Supply Chains” and so on. Namely, much more intermediate goods and services, like parts and components are produced in sub-sequential stages or processes across different countries, and then exported to other countries for further production. The production systems of Apple’s products (see Linden et al., 2009; Dedrick et al., 2010 and Xing and Detert, 2010) and Boeing’s commercial airplanes Dream 787 are the most famous and widely quoted cases in the explanation of the rapidly spreading GVCs.

On the other hand, given the current difficulties and challenges of the WTO Doha Round negotiations, the discussion on regional economic integration, regional trade agreements (RTAs) and its impact has got much more attention from both academic and governmental sides (Murray, 2011, Neffke and Boschma, 2011, Sierra, 2011). Such movement is mainly due to the fact that, the interaction among countries within the same region or the interdependence in regional trade and production networks has very important implications not only for economic development, but also for the location of international business activity.

Given the importance of understanding the mechanism and structure of regional integration, a number of researches have been done in this field using different approaches and data sources. One of them is the politically based approach that employs macro-data to study the influence of harmonized laws and regulations (Murray, 2010, Cherry, 2011). The other approaches focus on the economic impacts when countries or economies are integrated by normalized economic agreements, like FTA, EPA and RATs (Dunning, 2007, Hiratsuka and Kimura, 2008, Volz, 2011, Batra, 2012). In addition, the data sources used in the previous studies vary according to the difference of model requirements and analysis purpose. For example, UNCTAD (2009), Pula and Peltonen (2009) use FDI and trade statistics to show the economic rationales of regional integration; Rugman and Verbeke (2004), Piekkari, et al. (2010) utilize firm-based data, such as foreign MNEs sales to analyze the regional integration from the viewpoint of firm’s perspective. However, just a few researches concentrate on the structural change of production networks, GVCs and industry cluster by using the international Input-Output (I-O) data when considering the impacts of regional integration (Kuroiwa and Heng, 2008).

This paper follows Kuroiwa and Heng’s (2008) approach, but much more newly developed measures

based on the I-O model are used for measuring the evolution of regional integration from the viewpoint of GVCs. For the recent I-O based GVCs indicators, one can refer to Hummels et al. (2001), Koopman et al. (2008, 2010), Uchida and Inomata (2009), Yang et al. (2009), Timmer (2010), Johnson and Noguera (2011), Yamano et al. (2011), Meng et al. (2011), Abdul et al. (2011), Sterher (2012) and so on.

The main objective of the paper is to use the newly developed I-O based GVCs indicators to show the mechanism and structure of the deepening regional economic integration of such as NAFTA, Europe and Asia from the viewpoint of production networks and international spillover effects. Comparing and measuring the process and degree of regional economic integration between these regions can provide us very constructive opinions for the future policy design concerning the economic development of Asian region.

The rest of the paper is organized as follows: Section 2 uses the up-to-date OECD Bilateral Trade Database by Industry and End-use, (BTD, 1988-2010) to show the evolution of global trade structure at both detailed industrial (ISIC 3.0 with 37 sectors) level and end-use category (separated as intermediate goods, final consumption goods, capital goods) level. We also use a simple model to show the contribution share of different countries and category in the growth of total international trade. In addition, grouping countries into different regions, detailed intra and inter-regional trade structure can be easily illustrated. Section 3 first explains how to use the international I-O framework to measure the Trade in Value Added (TiVA) from both “demander’s perspective” and “supplier’s perspective”. Then we propose an alternative measurement of comparative advantage based on the concept of TiVA. In addition, we also show how to use the I-O framework to measure “who produces intermediate goods for whom”. In Section 4, based on the calculation results of the measurement proposed in Section 3, we discuss the features and changing pattern of regional integration and global value chains. The conclusion remarks are given in Section 5.

2. Evolution of global trade and regional economic interdependence

2.1 Historical evolution of international merchandise trade

In the OECD Bilateral Trade Database by Industry and End-use (BTDIxE), commodities are grouped into the following categories: intermediate goods, household consumption goods, capital goods, passenger cars, personal computers, packed medicaments, personal phones, valuables and others. It should be noted that goods like passenger cars, personal computers, packed medicaments and personal phones can be used by firms as intermediated inputs or directly can be consumed by

households. Therefore, in the OECD BTDIxE, these items are grouped as individual category. In addition, since the price change of fuel related sectors is very unstable, we just use the non-fuel merchandise trade data in this section.

Figure 1 illustrates the historical evolution of trade in goods by different end-use category. It is apparent from the chart that the entire evolution from 1995-2010 can be divided into 3 main phases. In the first phase of 1995-2002, total trade in goods shows slow growth and a small peak in 2000. In the second phase of 2002-2008, world trade has significantly increased comparing with the first phase. In the third phase of 2008-2010, due to the financial crisis and the later world economic crisis (the Great Trade Collapse), world trade was heavily damaged but showed a “V” shaped quick recovery.

Comparing the movement of trade by category, it's easy to see that the trade in intermediated goods can be considered as a main driving power of world total trade in goods. Especially during the Crisis, it seems that trade in intermediate goods shows very sensitive changing pattern, which can be used to explain the main source that causes the “V” shaped recovery for the total trade. The movement of intermediate goods also clearly reflects increased globalization and the development of fragmentation productions in the manufacturing sectors. However, when we calculate the share of every category in total trade (see Figure 2), it's easy to confirm that all categories have remained very stable over the last 15 years. This fact indicates that at the absolute level of the contribution by different category in total trade is stable, but given the difference of their shares and growth rates, the relative level by category may show different pattern.

In order to provide much more detailed information on the contribution by category, we use the following simple model to calculate the relative contribution rate. The model gives the contribution of different category to the growth of total trade in goods by considering the absolute share of individual category in total trade and their growth rate together.

For simplicity, the growth rate of total trade in goods is given as the following form:

$$rq^t = \frac{q^t - q^{t-1}}{q^{t-1}} \quad (2.1)$$

where rq^t represents the growth rate of total trade q from the year of $t-1$ to t . q^t is the trade value for year t . The above equation can be easily rewritten as follows:

$$rq^t = \frac{\sum_i q_i^t - \sum_i q_i^{t-1}}{\sum_i q_i^{t-1}} \quad (2.2)$$

where q_i^t represents the trade value in terms of category i for year t . Further re-arranging the right side of the above equation, the growth rate of total trade can be given as follows:

$$rq^t = \sum_i \left[\frac{q_i^{t-1}}{\sum_i q_i^{t-1}} \cdot \frac{q_i^t - q_i^{t-1}}{q_i^{t-1}} \right] = \sum_i [sq_i^{t-1} \cdot rq_i^t] \quad (2.3)$$

$$sq_i^{t-1} = \frac{q_i^{t-1}}{\sum_i q_i^{t-1}} \quad (2.4)$$

$$rq_i^t = \frac{q_i^t - q_i^{t-1}}{q_i^{t-1}} \quad (2.5)$$

where, sq_i^t represents the share of category i in total trade for year t , rq_i^t is exactly the growth rate of trade in terms of category i from year $t-1$ to year t . Then we can easily define the contribution rate of trade by category i to the growth of total trade as

$$c_i^t = \frac{sq_i^{t-1} \cdot rq_i^t}{rq^t} \quad (2.6)$$

Obviously, $\sum_i c_i^t = 1$ and the relative contribution rate by category (c_i^t) not only depends on its share in total trade (sq_i^{t-1}) but also on its growth rate (rq_i^t).

Based on the above equations, the relative contribution by category is calculated and the result is shown in Figure 3. Clearly, trade in intermediated goods provides the dominant contribution to the growth of total trade for both periods (1996-2002 and 2002-2008) followed by household consumption and capital goods. When looking at the shares by different category over time, great changes can be observed. Intermediate goods enhanced their presence from 40.43% to 57.01%. This means that the rapid growth of global trade after 2002 mainly depends on the increasing performance of trade in intermediate goods. Comparing to the relatively stable tendency for household consumption goods, the contribution from capital goods doubled over time from 9.6% to 16.47%. This makes the capital goods become the second main source of the rapid growth of total trade in goods during 2002-2008. On the other hand, contributions from all the other categories, such as passenger cars, packed medicaments, personal computers went down over time.

There are several facts which can be used to explain the above dynamic changes in global trade. First, the continuous reduction of international trade cost including tariff and non-tariff costs is one of the

most important facts. Especially, it should be pointed that tariffs on intermediate goods, like parts and components, are usually lower than the tariffs on final goods during the last 20 years. This boosts the volume and diversity of parts and components being exchanged all over the world. The second fact is the free movement of capital, such as the foreign direct investment (FDI) which has played an important role in the expansion of trade in intermediated goods. At the same time, related to the first and second facts, the increasing fragmentation of value chains, especially the so-called intra-firm trade becomes possible to spread globally, and has led to an increase of trade flows in intermediate goods. Finally, domestic market-oriented economic reforms undertaken in some developing economies, such as China should also be considered a very important factor. Since their domestic economic reforms provide large opportunities for the countries or the multinational enterprises located there to be involved in global production networks.

Using the same method shown in the previous equations (let subscript i represent country name), the country-specific contribution rate can be also computed. Before we show the calculation results, we need give a short introduction on the trade data used here. It should be noted that trade data can be collected from two ways. One is from export statistics, the other one is from import statistics. Since in principle, import statistics follow the “rule of origin”, it is supposed that the so-called “mirror problem” (a country’s exports may not equal its partner’s imports) caused by re-export can be avoided by using import data. Therefore, in this chapter, the trade data (export or import) are both from c.i.f. price based import statistics.

The country-specific contribution can be illustrated from supply (export) and demand (import) sides respectively. For the supply side, the top 30 contributors are listed on the left side of Table 1. For both periods, without considering the contribution from the rest of the world, the top 30 countries/regions account for more than 90% of the total contribution. Looking at country-specific contributions, China shows the largest figure followed by Germany and the USA. Japan also enhanced its presence over time from 1.54% to 5.36%. This fact indicates that China, Germany, USA, Japan and France have played the most important role as exporters to make the global trade increase rapidly. On the other hand, the similar pattern can also be found on the right side of Table 2. Namely these main countries also make the dominant contribution to the growth of global trade as importers. However, comparing to supply side, much more dynamic changes can be found at the demand side. For example, the USA lost its dominant role from 34.59% to 9.15%; China’s figure also went down from 14.23% to 9.61% over the two periods. The lost shares by the USA and China have been occupied by other economics. This makes the distribution of country-specific contribution much flatter across countries. Especially, the fact that the contribution from the rest of the world increased rapidly from 5.54% to 12.88% over the two periods also can be considered the evidence

that much more small economies have been involved in global trade networks.

2.2 Global supply and demand centers

This section focuses on evaluating the movement of global trade hubs by using the “dominant links” (see Yamano et al., 2011) of trade flows in goods by different end-use categories. As a dominant link we consider a country’s exports in goods to a particular partner country exceeding a given threshold percentage of that country’s total imports. In the current exercise we use 10% as a threshold when exploring trade nodes. If relatively a large number of countries’ imports depend on the exports (supply of goods for foreign use) of a specific country, this country can be considered the supply center in global trade. In the same way, if a large number of countries’ exports depend on the imports (domestic demand on goods produced outside) of a specific country, this country can be considered the demand center.

Given the bilateral trade data for 65 countries by end-use categories, the supply and demand centers can be easily identified (see Figure 4). Obviously, larger industrialized economies are expected to be identified as dominant trade partners for smaller ones in respective regions, as differentiation and specialization take place around these larger economies. When looking closely at the figure, some features can be summarized below: (1) Germany maintains the leading position of trade center from both viewpoints of supply and demand sides during the last 15 years. For example, more than 35 countries heavily depend on Germany’s supply of intermediated goods. At the same time, more than 25 countries heavily depend on Germany’s demand of intermediated goods. The most important feature for Germany is that its leading position can be kept very stably over time. (2) The United States is one of the most important trade centers, but its presence decreased rapidly in the last 15 years. For example, there were more than 25 countries, whose over 10% exports of intermediated goods were shipped to the United States in 2000. However, the number of this kind of partner countries for the United States goes down rapidly to 10 in 2010. (3) Comparing with the United States, China shows very different movement. Especially China’s supply power increased dramatically after its accession of WTO in 2001. This situation can be easily confirmed from the supply of final consumption goods. In 1995, just 10 countries have relatively high dependency on China’s products of final goods. However, in 2010, more than 45 countries, whose more than 10% imports are from China. This fact also reflects why China has been called “world factory”. The increasing presence of China’s supply power can also be seen for intermediated goods and capital goods. In 2010, China has been the largest supply center for final consumption goods, and second largest supply center for intermediated and capital goods. On the other hand, China also has been the second largest demand center for intermediate goods. It is not a surprise since China has been deeply

involved in the global supply chains by the way of using much more imported intermediate goods to produce exporting goods for all over the world. However, unlike the case of Germany, China is not an important demand center yet for final consumption goods comparing with its supply power. There are several reasons which can be used to explain this phenomenon. This first one is that China's purchasing power on foreign consumption goods is still low because of its relatively lower per capital GDP. The second reason is that much more demand of consumption goods for China's domestic consumers can be satisfied by its domestic supply because of the relatively cheaper price and large production capacity of goods made domestically. (4) Japan's movement is similar to Germany, but its presence has decreased slowly over time.

In general, the United States and Japan's positions in global trade have been replaced by China to some extent. The United States lost its leading position for both supply and demand centers in terms of trade in goods is mainly because its economic (supply and demand) structure has become much service-oriented or service-specialized. The United Kingdom also lost its supply and demand power rapidly in global trade with very similar reason as pointed for the case of the United States. For the case of Japan, including the same reason shown above, its production capacity has moved to its neighbor countries, such as China by the way of FDI due to the increasing domestic labor cost and other market related reasons.

2.3 Inter and intra-regional trade pattern

In order to investigate the evolution of inter and intra-regional trade, we divide the whole countries covered in the OECD bilateral trade database into several groups. They are EU27 (including EU15 and the rest of EU27), NAFTA, South America, ERIA+ (including ASEAN, East Asia, and the rest of ERIA+), the rest of the world (ROW). For the detail of the member in region groups, one can refer to Appendix 1.

The upper and middle parts in Table 3 show the percentage share of inter and intra-regional trade in the global merchandise trade for 1995 and 2010 respectively. The bottom part of Table 3 shows the change rate of interregional trade share between 1995 and 2010. Obviously, the intra-regional trade flow within EU27, NAFTA and ERIA+ accounts for almost 50% of the total global trade. This fact clearly reflects the situation of deepening regional integration or a blocked world economy. However, when looking at the change rate of the intra-regional trade, it's easy to see that EU27 (from 26% to 20.7%) and NAFTA's (from 7.3% to 6.0%) figures decreased but ERIA+ (from 18% to 23%) increased in the last 15 years. According to this fact, it can be concluded that, although there is not any common custom union in ERIA+, but this region has experienced rapid economic integration by

the way of quickly expanded intra-regional production networks. In addition, although the absolute share of intra-regional trade within the rest of EU27 is still small, but its dramatic change (185.1%) over the last 15 years indicates that this region has been enhancing its intra-regional linkages rapidly. When looking at the changing pattern of interregional trade, some interesting features can be summarized as follows: (1) the presence of EU15 and NAFTA as both a supplier and demander in global trade decreased rapidly. This fact can be easily confirmed from Table 3. For example, the share of EU 15's exports decreased from 37.7% to 28.2% over the 15 years. A very similar situation can be found for NAFTA; (2) ERIA+ tends to import much more goods from the rest of EU27, South America, ROW and ERIA+ itself rather than from EU15 and NAFTA. ERIA+'s exports also show increasing tendency for almost all its partners except NAFTA; (3) ASEAN has been deeply involved in the production networks of ERIA+ region, since its interdependence on EU15 and NAFTA for both exports and imports has decreased over the last 15 years; (4) the global trade structure has become much flatter because of the increasing presence of the rest of EU27, South America, ERIA+ and ROW. Especially the expanding South-South trade has been an important symbol of the ongoing globalization and regional integration. For more detailed information on the evolution of interregional trade by end-use category, one can refer to the Appendix 2, 3 and 4.

3. Input-Output based measure of global value chains

3.1 The concept and measurement of trade in value added in a single national I-O framework

The TiVA can be simply defined as “domestic value added embodied in trade (export or import)”. If the “trade” mentioned here indicates a home country's export, the TiVA measures the home country's domestic value added embodied in its export. In turn, if the “trade” indicates a home country's import, the TiVA means its partner country's domestic value added embodied in home country's import.

For the ease of explanation on the concept of TiVA, we model a closed economy with just two countries (r and s) and n sectors for each country. At the first step, let's assume that we just know the information of country r's national I-O table with separate import matrix (see Figure 5). In this single national I-O framework, country r's total value added can be given as the following form based on the traditional I-O theory.

$$\begin{aligned}
 VA^r &= V^r \cdot (I - A^{rr})^{-1} \cdot FD^r \\
 &= V^r \cdot L^r \cdot (FD^{rr} + EX^{rs}) \\
 &= V^r \cdot L^r \cdot FD^{rr} + V^r \cdot L^r \cdot EX^{rs},
 \end{aligned}
 \tag{3.1}$$

where, VA^r represents country r 's total value added (scalar), V^r is the $(1 \times n)$ row vector of value added ratio (the share of domestic value added in total output) by sector for country r , A^{rr} is the $(n \times n)$ matrix of country r 's domestic input coefficients, FD^r is the $(n \times 1)$ column vector of country r 's total final demand, $L^r = (I - A^{rr})^{-1}$ is country r 's domestic Leontief inverse in a single national I-O framework, FD^{rr} is the column vector of country r 's domestic final demand, EX^{rs} is the $(n \times 1)$ vector of exports from country r to country s . Since there are just two countries in this economy, naturally, EX^{rs} is the total exports of country r .

Clearly, a country's total value added can be expressed by two parts. Namely, the value added induced by domestic final demand ($V^r \cdot L^r \cdot FD^{rr}$), and the value added induced by total exports ($V^r \cdot L^r \cdot EX^{rs}$). The second part can be tentatively considered a measurement of the TiVA for country r when just a single national I-O table is available for us. In addition, it should be noted that in a single national I-O framework, the following equation always holds:

$$(V + u \cdot M) \cdot L = u, \quad (3.2)$$

where, u is a $1 \times n$ unity vector, M is the $n \times n$ matrix constructed by intermediate import coefficients. Multiplying country r 's export vector to both sides of the above equation yields:

$$V^r \cdot L^r \cdot EX^{rs} + u \cdot M^r \cdot L^r \cdot EX^{rs} = u \cdot EX^{rs}. \quad (3.3)$$

It's easy to see that the second term on the left side of the above equation indicates the "import contents of export" (Hummel et al., 2001). Clearly, a country's domestic value added embodied in its export can be measured by the difference of its total exports ($u \cdot EX^{rs}$) and its import contents of export. In other words, if country r does not need any intermediate imports for production of exports, the measurement result of TiVA for country r should be the same figure of exports itself.

In addition, if the end-use based international trade statistics is available, country r 's total exports can be separated by intermediate and final goods as shown below:

$$EX^{rs} = FD^{rs} + u \cdot IMD^{rs}, \quad (3.4)$$

where, FD^{rs} and IMD^{rs} are respectively country r 's exports of final goods ($n \times 1$ column vector) and exports of intermediate goods ($n \times n$ matrix) shipped to country s . Still using the single national I-O framework, country r 's TiVA in terms of its exports of final goods and intermediate goods can be

tentatively defined as follows:

$$\text{TiVAF}^r = V^r \cdot L^r \cdot \text{FD}^{rs} \quad (3.5)$$

$$\text{TiVAI}^r = V^r \cdot L^r \cdot u \cdot \text{IMD}^{rs} \quad (3.6)$$

where, TiVAF^r and TiVAI^r represents the value added induced by country r 's exports of final goods (FD^{rs}) and intermediate exports (IMD^{rs}) respectively.

3.2 Measuring the TiVA in an international I-O framework

When we adopt the single national I-O framework for the measurement of TiVA, TiVAI^r can be easily measured since country r 's exports of intermediate goods are treated as exogenous variable. Here, an important question arises. Namely, if an international I-O framework is given, the export of intermediate goods should be considered endogenous variable, at this situation, how can we measure the trade in value added for intermediate goods? In order to answer this question, we extend the single national I-O framework of a closed economy used in Figure 5 to a two-country international I-O framework (see Figure 6) in which the trade of intermediate goods between these two countries is treated as an endogenous variable. Based on traditional I-O model, the total value added can be given as the following form:

$$\text{VA} = \text{diag}(V) \cdot L \cdot \text{FD}, \quad (3.7)$$

$$\text{VA} = \begin{pmatrix} \text{VA}^r \\ \text{VA}^s \end{pmatrix}, \quad V = (V^r, V^s), \quad L = \begin{pmatrix} L^{rr} & L^{rs} \\ L^{sr} & L^{ss} \end{pmatrix} = \left[I - \begin{pmatrix} A^{rr} & A^{rs} \\ A^{sr} & A^{ss} \end{pmatrix} \right]^{-1}, \quad \text{FD} = \begin{pmatrix} \text{FD}^{rr} \\ \text{FD}^{sr} \end{pmatrix} + \begin{pmatrix} \text{FD}^{rs} \\ \text{FD}^{ss} \end{pmatrix}.$$

where, VA^r is the $(n \times 1)$ column vector representing country r 's value added by sector, V^r is the $(1 \times n)$ row vector of value added ratio by sector for country r , L is the international Leontief inverse constructed by its sub-matrix L^{rs} . A^{rs} represents the $(n \times n)$ matrix of international input coefficients from country r to country s , FD^{rs} is the $(n \times 1)$ column vector representing country s 's final demand on the goods and services produced in country r . Following the definition of TiVA proposed by Johnson and Noguera (2009), it's easy to formulate country r 's value added exported to country s as shown below:

$$\begin{pmatrix} \text{TiVAC}^{rs} \\ 0 \end{pmatrix} = \begin{pmatrix} V^r & 0 \\ 0 & 0 \end{pmatrix} \cdot \begin{pmatrix} L^{rr} & L^{rs} \\ L^{sr} & L^{ss} \end{pmatrix} \cdot \begin{pmatrix} \text{FD}^{rs} \\ \text{FD}^{ss} \end{pmatrix} \quad (3.8)$$

Namely,

$$\text{TiVAC}^{rs} = V^r(L^{rr} \cdot \text{FD}^{rs} + L^{rs} \cdot \text{FD}^{ss}) \quad (3.9)$$

Since, the above concept represents country r's value added induced by country s's final demands, we call this type measure as demand-based TiVA. In order to understand the spatial structure of TiVA across countries in detail, the following decomposition technique can be applied to equation (3.9):

$$\text{TiVAC}^{rs} = V^r \cdot L^r \cdot \text{FD}^{rs} + V^r \cdot (L^{rr} - L^r) \cdot \text{FD}^{rs} + V^r \cdot L^{rs} \cdot \text{FD}^{ss} \quad (3.9')$$

The first term on the right side of the above equation indicates the induced TiVA through domestic production networks when a single national I-O framework is used; the second term can be considered the achieved TiVA through international feedback effect; the third term is clearly the induced TiVA through international spillover effect. The second and third terms can be aggregately regarded the induced TiVA through international production networks.

In addition, according to Miller and Blair (1985), the international Leontief inverse can be expressed by the following terms:

$$L^{rr} = (I - A^{rr})^{-1}[I + A^{rs} \cdot C^{-1} \cdot (I - A^{rr})^{-1}]$$

$$L^{rs} = (I - A^{rr})^{-1} \cdot A^{rs} \cdot C^{-1}$$

$$L^{sr} = C^{-1} \cdot A^{sr} \cdot (I - A^{rr})^{-1}$$

$$L^{ss} = C^{-1}$$

$$C = I - A^{ss} - A^{sr} \cdot (I - A^{rr})^{-1} \cdot A^{rs}$$

Using the above equations, TiVA^{rs} can be rewritten as follows:

$$\begin{aligned} \text{TiVAC}^{rs} &= V^r(L^{rr} \cdot \text{FD}^{rs} + L^{rs} \cdot \text{FD}^{ss}) \\ &= V^r(I - A^{rr})^{-1}[I + A^{rs} \cdot C^{-1} \cdot (I - A^{rr})^{-1}]\text{FD}^{rs} + V^r \cdot [(I - A^{rr})^{-1} \cdot A^{rs} \cdot C^{-1}]\text{FD}^{ss} \\ &= V^r(I - A^{rr})^{-1}[\text{FD}^{rs} + A^{rs} \cdot C^{-1} \cdot A^{sr} \cdot (I - A^{rr})^{-1} \cdot \text{FD}^{rs} + A^{rs} \cdot C^{-1} \cdot \text{FD}^{ss}] \\ &= V^r(I - A^{rr})^{-1}\text{FD}^{rs} + V^r(I - A^{rr})^{-1} \cdot A^{rs}(L^{sr} \cdot \text{FD}^{rs} + L^{ss} \cdot \text{FD}^{ss}) \\ &= \text{TiVAC}^{Frs} + \text{TiVAC}^{Irs} \end{aligned} \quad (3.10)$$

Obviously, TiVAC^{rs} can be separated into two parts. The first part TiVAC^{Frs} is exactly equal to TiVAF^r (see Equation 3.5). This part represents country r's value added induced by its exports of final goods shipped to country s (measured by the single national I-O model). The remaining part

TiVAC^{rs} may be defined as the value added induced by the trade flow of intermediates from country r to s. This trade flow is the indirectly induced intermediate goods by country s's final demand in the international I-O framework. Therefore, using this measurement, the contribution of trade in final goods and intermediate goods can be separately evaluated within the international I-O model.

Furthermore, at the product (sector) level, we can regard the induced value added in a specific sector j by a specific trade flow of final product i from country r to country s as "an individual TiVA linkage" which is defined as follows:

$$\text{TiVAC}_{ij}^{rs} = V_j^r (L^{rr} \cdot \text{FD}_i^{rs} + L^{rs} \cdot \text{FD}_i^{ss}) \quad (3.11)$$

Based on the above definition, country r's export of sector j's value added to country s (TiVAC_j^{rs}) and country r's export of value added to country s in terms of the trade flow of product i (TiVAC_i^{rs}) can be measured respectively as follows:

$$\text{TiVAC}_{j}^{rs} = \sum_i \text{TiVAC}_{ij}^{rs} \quad (3.12)$$

$$\text{TiVAC}_i^{rs} = \sum_j \text{TiVAC}_{ij}^{rs} \quad (3.13)$$

On the other hands, when considering the equation again from the supply-based aspect, country r's export of value added to country s can be defined as follows:

$$\begin{pmatrix} \text{TiVAP}^{rs} \\ 0 \end{pmatrix} = \begin{pmatrix} V^r & 0 \\ 0 & 0 \end{pmatrix} \cdot \begin{pmatrix} L^{rr} & L^{rs} \\ L^{sr} & L^{ss} \end{pmatrix} \cdot \begin{pmatrix} 0 \\ \text{FD}^{sr} + \text{FD}^{ss} \end{pmatrix} \quad (3.14)$$

Namely,

$$\text{TiVAP}^{rs} = V^r \cdot L^{rs} (\text{FD}^{sr} + \text{FD}^{ss}) \quad (3.15)$$

Using Miller and Blair's equation, TiVAP^{rs} can also be re-written as

$$\text{TiVAP}^{rs} = V^r (I - A^{rr})^{-1} \cdot A^{rs} \cdot L^{ss} \cdot (\text{FD}^{sr} + \text{FD}^{ss}) \quad (3.16)$$

The above TiVAP^{rs} represents the induced value added in country r when country s provides final products to all over the world. With the same manner as shown in equation 3.11, the individual

supply-based TiVA can be written as follows:

$$\text{TiVAP}_{ij}^{rs} = V_j^r \cdot L^{rs}(\text{FD}_i^{sr} + \text{FD}_i^{ss}) \quad (3.17)$$

$$\text{TiVAP}_{.j}^{rs} = \sum_i \text{TiVAP}_{ij}^{rs} \quad (3.18)$$

$$\text{TiVAP}_i^{rs} = \sum_j \text{TiVAP}_{ij}^{rs} \quad (3.19)$$

3.3 TiVA based indicator for the measurement of Revealed Comparative Advantage

The concept of RCA is mainly based on the theory of Ricardian comparative advantage. It represents the relative advantage or disadvantage of a certain country in international economics for a certain class of goods or services. The most widely used indicator of RCA (see Béla Balassa, 1965) is given as follows:

$$\text{RCA}_i^r = \frac{\text{EX}_i^r / \text{EX}^r}{\sum_r \text{EX}_i^r / \sum_r \text{EX}^r} , \quad (3.20)$$

where, EX_i^r represents country r 's exports of good i . EX^r is the total exports of country r . When all countries' exports just include their domestic contents, the above RCA can be considered a reasonable indicator of Comparative Advantage. However, as mentioned before, when much more intermediate imports are embodied in exports, this indicator may lose its original interpretability. Using the concept of sector-level or product-level TiVA proposed in the paper, a country's comparative advantage can be measured as the following two ways:

$$\text{RCAC}_{.j}^r = \frac{\text{TiVAC}_{.j}^r / \text{TiAVC}^r}{\sum_r \text{TiVAC}_{.j}^r / \sum_r \text{TiVAC}^r} \quad (3.21)$$

$$\text{RCAC}_i^r = \frac{\text{TiVAC}_i^r / \text{TiAVC}^r}{\sum_r \text{TiVAC}_i^r / \sum_r \text{TiVAC}^r} \quad (3.22)$$

$$\text{RCAP}_{.j}^r = \frac{\text{TiVAP}_{.j}^r / \text{TiAVP}^r}{\sum_r \text{TiVAP}_{.j}^r / \sum_r \text{TiVAP}^r} \quad (3.23)$$

$$\text{RCAP}_i^r = \frac{\text{TiVAP}_i^r / \text{TiAVP}^r}{\sum_r \text{TiVAP}_i^r / \sum_r \text{TiVAP}^r} \quad (3.24)$$

where,

$$\text{TiVAC}_{.j}^r = \sum_s \text{TiVAC}_{.j}^{rs} ,$$

$$\text{TiVAC}_i^r = \sum_s \text{TiVAC}_i^{rs} ,$$

$$\begin{aligned}
TiAVC^r &= \sum_s TiVAC^{rs} = \sum_j TiVAC_j^r = \sum_i TiVAC_i^r. \\
TiVAP_j^r &= \sum_s TiVAP_{j,s}^{rs}, \\
TiVAP_i^r &= \sum_s TiVAP_{i,s}^{rs}, \\
TiAVP^r &= \sum_s TiVAP^{rs} = \sum_j TiVAP_j^r = \sum_i TiVAP_i^r.
\end{aligned}$$

In the above definition, $RCAC_j^r$ represents the TiVA based comparative advantage of country r 's sector j from the aspect of global consumption on products produced in country r . The other indicators proposed here can also be easily explained by using the concept of TiVA.

3.4 Who produces intermediate products for whom?

In the previous section, we proposed some TiVA based indicators to measure spatial economic interdependency. These indicators are based on international I-O model. In this kind of model, both final demand item and value added item are treated as exogenous variables; trade of intermediate goods and services among countries is treated as an endogenous variable. That's why we can measure how a country's final demand affects other country's value added by the way of transaction of intermediate trade. However, the above indicator cannot show us how the intermediate trade plays what kind of role in international production networks in detail. Still using international I-O model, we propose a simply way to measure the function of intermediate trade in production networks.

Given the same two-country I-O model as shown in Figure 6, according to traditional demand-driven I-O model, the intermediate transaction from country 1 to country 2 (IMD^{12} : country 1's export of intermediate goods and services to country 2) can be formulated as follows:

$$u \cdot IMD^{12} \cdot u^t = u \cdot A^{12} \cdot (L^{21} \cdot FD^{11} + L^{21} \cdot FD^{12} + L^{22} \cdot FD^{21} + L^{22} \cdot FD^{22}). \quad (3.25)$$

Rearranging the above equation yields

$$\begin{aligned}
1 &= \frac{u \cdot A^{12} \cdot L^{21} \cdot FD^{11}}{u \cdot IMD^{12} \cdot u^t} + \frac{u \cdot A^{12} \cdot L^{21} \cdot FD^{12}}{u \cdot IMD^{12} \cdot u^t} + \frac{u \cdot A^{12} \cdot L^{22} \cdot FD^{21}}{u \cdot IMD^{12} \cdot u^t} + \frac{u \cdot A^{12} \cdot L^{22} \cdot FD^{22}}{u \cdot IMD^{12} \cdot u^t} \\
&= a' + b' + c' + d'.
\end{aligned} \quad (3.26)$$

Obviously, a' , b' , c' and d' provide us the information about how the intermediate exports from country 1 to country 2 end up or contribute to which country's final demand. This information can not only help us answer the question, like "who produces what for whom?", but also show us the spatial economic interdependence among countries from the viewpoint of the relationship between

intermediate and final products. The following equation gives the general form for calculating how the trade in intermediate products directly and indirectly contributes to different type of final demands across countries by the way of international supply chains.

$$WP_{rs}^{RS} = u \cdot A^{RS} \cdot L^{Sr} \cdot FD^{rs} / u \cdot IMD^{RS} \cdot u^t \quad (3.26')$$

where, WP_{rs}^{RS} shows the contribution rate of induced trade in intermediate products shipped from country R to S by country s's final demands on country r's products in total intermediate transaction from country R to S. When changing our viewpoint, the following indicator can also show us some alternative information on the aspect of "who produces intermediate goods for whom".

$$WP_{rs}^{*RS} = u \cdot A^{RS} \cdot L^{Sr} \cdot FD^{rs} / \sum_S \sum_R u \cdot A^{RS} \cdot L^{Sr} \cdot FD^{rs} \quad (3.26'')$$

where, WP_{rs}^{*RS} shows the contribution rate of induced trade in intermediate products from country R to S by country s's final demands on country r's products in total induced global trade by the same final demands.

If we pay more attention on the international transactions (without considering the domestic trade in intermediate and final products), the following two indicators can help us understand how inter-country trade in intermediate products are induced by inter-country trade in final products.

$$IWP_{rs}^{RS} = \frac{u \cdot A^{RS} \cdot L^{Sr} \cdot FD^{rs}}{\sum_{r \neq s} \sum_{S \neq r} u \cdot A^{RS} \cdot L^{Sr} \cdot FD^{rs}}, (R \neq S) \quad (3.27)$$

$$IWP_{rs}^{*RS} = \frac{u \cdot A^{RS} \cdot L^{Sr} \cdot FD^{rs}}{\sum_{R \neq S} \sum_{S \neq R} u \cdot A^{RS} \cdot L^{Sr} \cdot FD^{rs}}, (r \neq s) \quad (3.28)$$

where, IWP_{rs}^{RS} shows the contribution rate of country r's export of final products to country s in the inducement of international trade in intermediate products shipped from country R to S. IWP_{rs}^{*RS} shows the share of induced international trade in intermediate products shipped from country R to S in total inducement of international intermediate trade in terms of country s's final demand on the products made in country r.

4. Empirical results in measuring GVCs and regional integration

4.1 Demand and supply-based TiVA share across regions

Table 4 shows the share of demand-based transaction of embodied value added across regions For 1995 and 2005. From the column way, each figure shows how a specific region's domestic final demand contributes to (impacts on) other regions' value added. In other words, the figure seen column wise can be considered the imported value added of a specific region from other regions. While, each figure seen row wise shows how a specific region exports value added to others. Obviously, for most region or sub-region, the intra-regional transaction of value added accounts for relatively large share comparing with the inter-regional figure. Just focusing on the intra-regional transaction, EU27 accounts for almost 20.7% in global TiVA, followed by ERIA+'s 13.6%, NAFTA's 6.3% in 1995. This figure decreased for EU27, EU15, but increased for all the other regions, especially, for the rest of EU27, the rest of ERIA+ and East Asia between 1995 and 2005. This fact indicates that the relative presence of intra-regional value chains for most regions have become much more important. (For countries coverage in the OECD I-O database see Appendix 5)

When looking at the inter-regional TiVA, some interesting features can be summarized as follows: (1) EU15 lost both gain potential (see figures row wise) and give-out potential (see figure column wise) from other regions except for the rest of EU27. This clearly indicates that EU15's relative presence in global value chains has decreased, but its linkage with the rest of EU27 in terms of TiVA has become much stronger. (2) NAFTA lost its gain potential of TiVA, but enhanced its give-out potential over time. On one hand, this fact reflects the relative presence of NAFTA in the export of value added decreased rapidly. On the other hand it represents the increasing value added gain in developing economies by the way of TiVA with NAFTA. (3) The rest of EU27 shows rapid increasing tendency in both gain and give-out potential of TiVA with other regions. Although, the absolute share of the rest of EU27 in global TiVA is still small, but its good performance clearly illustrates how this region is benefited by the regional integration of EU. (4) ASEAN and East Asia, in general, lost both gain and give-out potentials over time in global TiVA. It seems that this fact cannot be supported by the conclusion obtained in Section 2, namely the increasing presence of ASEAN in global merchandise trade. Recalling the concept of TiVA, it is easy to know that even if a country has large scale of foreign trade, there is no guarantee that the country can get much more TiVA. This is because that the TiVA depends on not only the scale of trade but also the value added ratio and the position of a country in international production networks. (5) The presence of the rest of EU27, the rest of ERIA+ and the rest of the world in global TiVA shows strong increasing trend. This can be considered a strong piece of evidence that the distribution of TiVA at worldwide level has become much flatter with larger diversity.

When looking at the supply-based TiVA share (Table 5), very similar tendency as seen in the demand-based TiVA can be found. In general, the main finding is that the intra-regional economic

interdependency has become much more important with the comparison of interregional relationship in terms of TiVA in global production networks. In other words, the creation and distribution of value added by way of production networks has become more global at regional level (across regions), and more block-oriented within an integrated region.

4.2 Consumption and supply-based TiVA at country level

Figure 7 and 8 show the consumption and supply-based TiVA at country level for 2005. The main features of this figure can be summarized as follows: (1) the main sources of both give-out and gain potentials for most countries originate from the intra-regional TiVA. It's no surprise since the cost of organizing production networks depends on the geographic distance, the neighbor country should always be the first choice when looking for trade patterns if other conditions remain unchanged. This feature also reflects the magnitude of a country's participation degree in global value chains. (2) When comparing both potentials, it's easy to see that most countries export more value added to NAFTA than their imports from NAFTA. In other words, NAFTA's give-out potential is much stronger than its gain potential. This is mainly because that some of the USA's production capacity on merchandize goods has moved to developing economies by the way of FDI. (3) In addition, NAFTA has relatively closer relationship in terms of TiVA with ERIA countries with the comparison to EU27. This clearly reflects the strong linkage of production networks with the Asia-Pacific region (ERIA+ NAFTA). (4) ERIA has the similar or larger performance in EU27's value chains system comparing with NATFA.

If we just focus on the demand and supply of foreign goods without considering the influence of a country's domestic demand or supply on the goods produced by itself, the structure of international TiVA (induced value added) can be illustrated by Figure 9 and 10. Clearly, there are not large difference between Figure 7 and 9 in terms of demand-based TiVA. However, when comparing Figure 8 to Figure 10, it's easy to see that the presence of NAFTA in Asia's give-out and gain potential in terms of foreign supply-based TiVA is very small. This implies that Asian economies get much more value added by the way of their intra-regional production networks, in other words, when Asia countries produce much more exporting goods, much value added may remained inside the Asian region. In the same sense, it's easy to confirm from Figure 10, NAFTA's production of exporting goods brings relatively large value added to itself.

4.3 TiVA in terms of trade in final goods and intermediate goods

As mentioned in previous section, using an I-O based decomposition technique, the TiVA induced by

trade of final goods and intermediate goods can be measured separately. Table 6 and 7 show the interregional and intra-regional shares in total TiVA for final goods and intermediate goods respectively. The main features can be summarized as follows: 1) the TiVA in terms of trade in intermediate goods account for more than 60% in the total international TiVA, its presence also increased between 1995 and 2005. This indicates that the trade in intermediate goods has been playing an increasing and dominant role in the value creation system by the way of international trade. 2) for the exception of the rest of EU27 and the rest of ERIA, the gain and give-out potentials for most regions decreased rapidly not only for interregional, but also for intra-regional TiVA in terms of trade in final goods. On the other hand, for the exception of EU15 and NAFTA, both potential for most regions increased rapidly from both inter and intra-regional aspect concerning the TiVA induced by trade in intermediate goods. This clearly implies that the deepening regional integration is mainly driven by the expansion of intra-regional trade in intermediate goods from the view point of value creation and distribution, especially for the case of the rest of EU 27 and East Asia region. 3) Although, in total, the ERIA+ area shows increasing presence of intra-regional TiVA, the linkages between ASEAN and East Asia decreased between 1995 and 2005. This phenomenon indicates that the regional integration seen from trade flow can just provide us very direct and intuitive image, when considering the whole international production network, say, using TiVA measurement, we may have different results. ASEAN and East Asia have been linked by the way of international trade, but their relative interaction in terms of trade in value added shows lower performance. Comparing with the interaction between EU15 and the rest of EU27, it is easily to confirm how different the performance of regional integration between EU and Asia.

4.4 Who produces intermediate goods for whom?

As shown in previous sections, international trade data provides us very direct image of the evolution of regional integration. In order to measure the degree of regional integration from not only the direct but also indirect linkages, we propose to use the concept of TiVA. All the above measurements give us a kind of final image of regional integration, rather than show us the step by step interaction among countries within a target region. Using the measure proposed in section 3.4, more detailed image of regional integration can be captured.

Figure 11 and 12 show how the international trade in intermediated goods is induced by what kind of bilateral trade in final goods. In other words, these figures provide us detailed information about who produces intermediate goods for whom. For example, when France imports goods from Germany in 1995, the induced international trade in intermediate goods is concentrated in EU27 area surrounding some trade hubs, such as UK, Belgium, Netherlands and Luxembourg. In addition, this trade in final

goods happened inside EU27 (between France and Germany) also gives relatively large impacts on Japan and USA. Namely, when France imports much more final goods from Germany, more international trade in intermediate goods produced in Japan and USA will be induced. When comparing this situation with 2005, very dramatic change can be easily confirmed. For example, France's imports of final goods from Germany cause much more international trade in intermediate goods inside EU27, especially between EU15 and the rest of EU27. This clearly indicates the evolution of the ongoing regional integration inside EU. In addition, comparing to 1995, France's imports from Germany give much larger impacts on China's exports of intermediate goods to all over the world, especially to the intra-East Asia trade. This also provides us some additional information about the worldwide production networks, namely when with the deepening regional integration, the inter-regional relationship also shifts at the same time. Another example is about the impacts of Japan's imports of final goods from China (see Figure 12). Obviously, in 1995, when Japan imports final goods from China, the East Asia region tends to import much more intermediate goods from NAFTA, EU and East Asia itself. However, in 2005, the situation changed, the international trade inside Asian region (ERIA+) becomes much flatter. At the same time, the induced interregional trade in intermediate goods between Asia and EU decreased.

4.5 An alternative measurement of Revealed Comparative Advantage

As explained in previous section, the traditional indicator of comparative advantage proposed by Balassa (1965) is only based on international trade data. Since the increasing vertical specialization trade, fragmentation production in international production networks, this measure can no longer provides significant information since a country's exports tend to embody much more other country's contents (value added). Using the newly proposed measure of RCA based on the concept of TiVA, a new ranking of RCA across countries can be calculated. The main results for selected industries are shown in Table 8-11. It is easy to confirm, the new measure of RCA by TiVA provides very different information comparing with the traditional measure. For example, China ranks 9th using traditional indicator in 1995. However, TiVA based RCA for China shows lower ranking. This exactly reflects the fact that almost half of the exports of Office, accounting & computing machinery sector made in China is processing goods with large share of import contents. Therefore, if using the traditional RCA indicator, the relative ranking of China in terms of its comparative advantage maybe overestimated. When looking at the figure for 2005, the difference of China's ranking between these two measures narrowed. This may implies that China has been able to export much more domestic contents or gain more value added by exporting Office and computing machinery goods. In other words, this may reflects a kind of industrial upgrade in China has been achieved for the production of computing machinery.

5 Conclusion remarks

Given the increasing economic interdependence across countries caused by the extension of globalization and regional integration, international IO tables have been considered a very useful data source for the analyses of production networks, international fragmentation production, Global Value Chains and so on. This chapter uses a new concept of Trade in Value Added to provide some alternative measurements of regional integration. Comparing with the traditional measure based on international trade statistics, the TiVA based measure can provide us much more detailed image not only from the direct but also indirect interaction of countries in international production networks. In addition, using the I-O based decomposition technique, the TiVA measurement can be separated by the factor of trade in final goods and intermediate goods. This helps us understand how intermediate goods function and drive the evolution of regional integration. Furthermore, based on the traditional international I-O model, induced international trade in intermediate goods can be identified by different transaction of trade in final goods. This helps us capture more detailed information about who produces what for whom, and also provide us additional information which has been masked by the traditional trade statistics about regional integration.

Based on the empirical analysis, the main findings can be summarized as follows: 1) EU27 has been an high-level integrated region in terms of not only international trade but also the trade in value added. Especially, the emergence of the rest of EU27 brings very dynamic and dramatic impacts on EU's regional integration. The deepening and strengthening interaction between EU15 and the rest of EU27 has been the most important feature of the ongoing regional integration of EU area. 2) On the other hand, as a whole, the ERIA+ shows increasing presence of regional integration in terms of both real trade flow and trade in value added. When tracing more detailed interaction inside ERIA, the intra-regional interaction for ASEAN and East Asia shows increasing performance, but the interregional dependency in terms of Trade in Value Added between the two regions shows a decreasing tendency comparing with the situation of EU15 and the rest of EU27. This is one of the most important findings which can't be easily observed by the traditional measure based on trade statistics. 3) In the total international trade in value added, contribution coming from the trade in intermediate goods accounts for more than 65% in 2005. This clearly implies that the deepening regional integration is mainly driven by the expansion of intra-regional trade in intermediate goods from the view point of value creation and distribution. 4) From the structure change measured by the induced international trade in intermediate goods by selected bilateral trade in final goods, it is easy to confirm that integrated production networks within EU and Asia area have been enhanced between 1995 and 2005.

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Figure 1 Evolution of global trade in goods

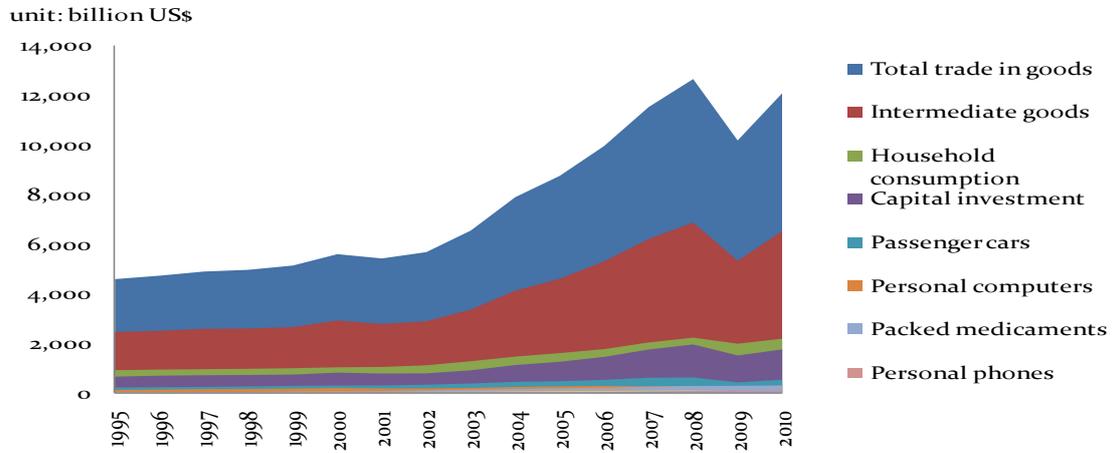


Figure 2 Share of different category in global trade

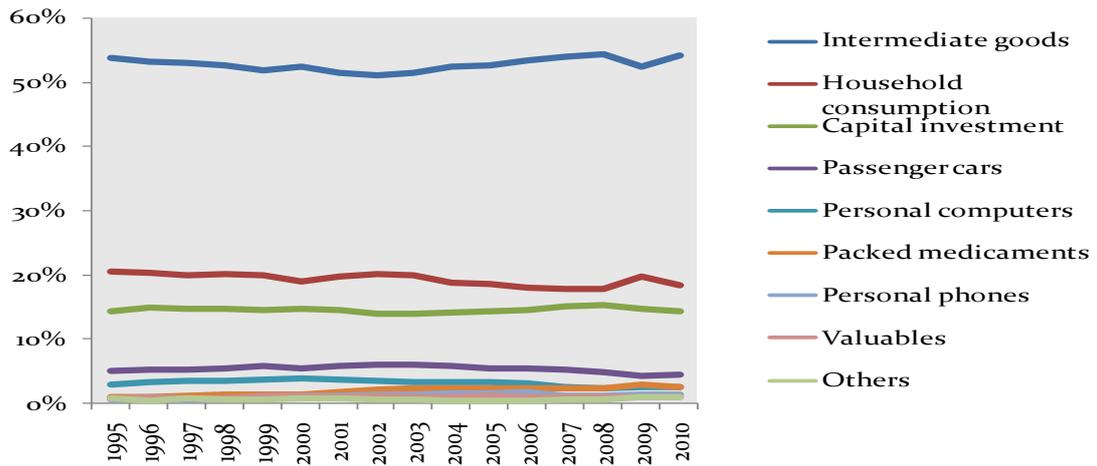


Figure 3 Relative contributions to the growth of total trade by end-use category

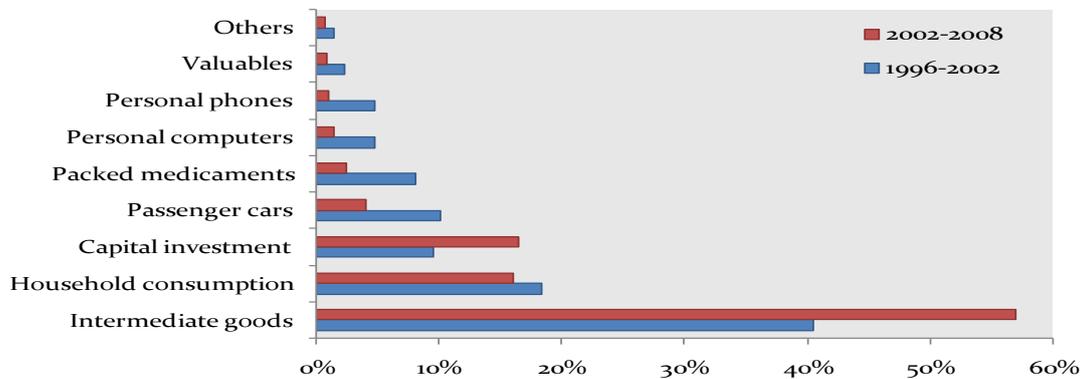


Table 1 Contribution by country on the growth of world trade (in terms of export)

Rank		1996-2002	2002-2008	Rank		1996-2002	2002-2008
1	China	24.84%	17.86%	16	Thailand	1.42%	1.64%
2	Germany	8.30%	11.52%	17	Canada	3.96%	1.58%
3	USA	5.80%	6.91%	18	India	1.24%	1.54%
4	Rest of world	4.28%	5.60%	19	Poland	1.69%	1.53%
5	Japan	1.54%	5.36%	20	Mexico	6.97%	1.46%
6	France	2.89%	4.05%	21	Malaysia	2.46%	1.39%
7	Italy	0.14%	3.57%	22	Sweden	-0.10%	1.36%
8	Korea	4.90%	3.50%	23	Czech Rep.	1.90%	1.32%
9	Netherlands	1.66%	3.09%	24	Austria	1.44%	1.28%
10	Belgium, Luxembourg	0.63%	2.45%	25	Australia	-0.10%	1.23%
11	Chinese Taipei	3.47%	2.26%	26	Singapore	-0.11%	1.11%
12	United Kingdom	0.61%	2.23%	27	Ireland	6.68%	1.00%
13	Spain	2.37%	2.01%	28	Russian Federation	0.56%	0.94%
14	Brazil	1.14%	1.94%	29	Turkey	1.46%	0.92%
15	Switzerland	0.06%	1.87%	30	Indonesia	1.13%	0.87%
					Sum	93.23%	93.39%

Table 2 Contribution by country on the growth of world trade (in terms of import)

Rank	Country name	1996-2002	2002-2008	Rank	Country name	1996-2002	2002-2008
1	Rest of world	5.54%	12.88%	16	India	1.38%	2.28%
2	China	14.23%	9.61%	17	Poland	1.81%	2.14%
3	USA	34.59%	9.15%	18	Singapore	-1.99%	1.98%
4	Germany	5.93%	8.33%	19	Mexico	8.62%	1.84%
5	France	2.43%	4.86%	20	Turkey	0.60%	1.55%
6	Netherlands	0.17%	3.68%	21	Brazil	-0.89%	1.55%
7	United Kingdom	6.52%	3.67%	22	Australia	0.73%	1.53%
8	Italy	3.43%	3.59%	23	Czech Rep.	1.53%	1.48%
9	Japan	-1.65%	3.55%	24	Switzerland	0.48%	1.43%
10	Belgium, Luxembourg	4.05%	3.41%	25	Austria	0.43%	1.42%
11	Russian Federation	0.47%	3.17%	26	Thailand	-1.03%	1.35%
12	Spain	3.85%	3.01%	27	Sweden	0.15%	1.31%
13	Hong Kong SAR of China	0.93%	2.87%	28	Chinese Taipei	0.76%	1.21%
14	Korea	-0.26%	2.77%	29	Indonesia	-1.70%	1.19%
15	Canada	5.49%	2.28%	30	Malaysia	-0.13%	1.00%
					Sum	96.47%	100.09%

Figure 4 Evolution of global trade hubs

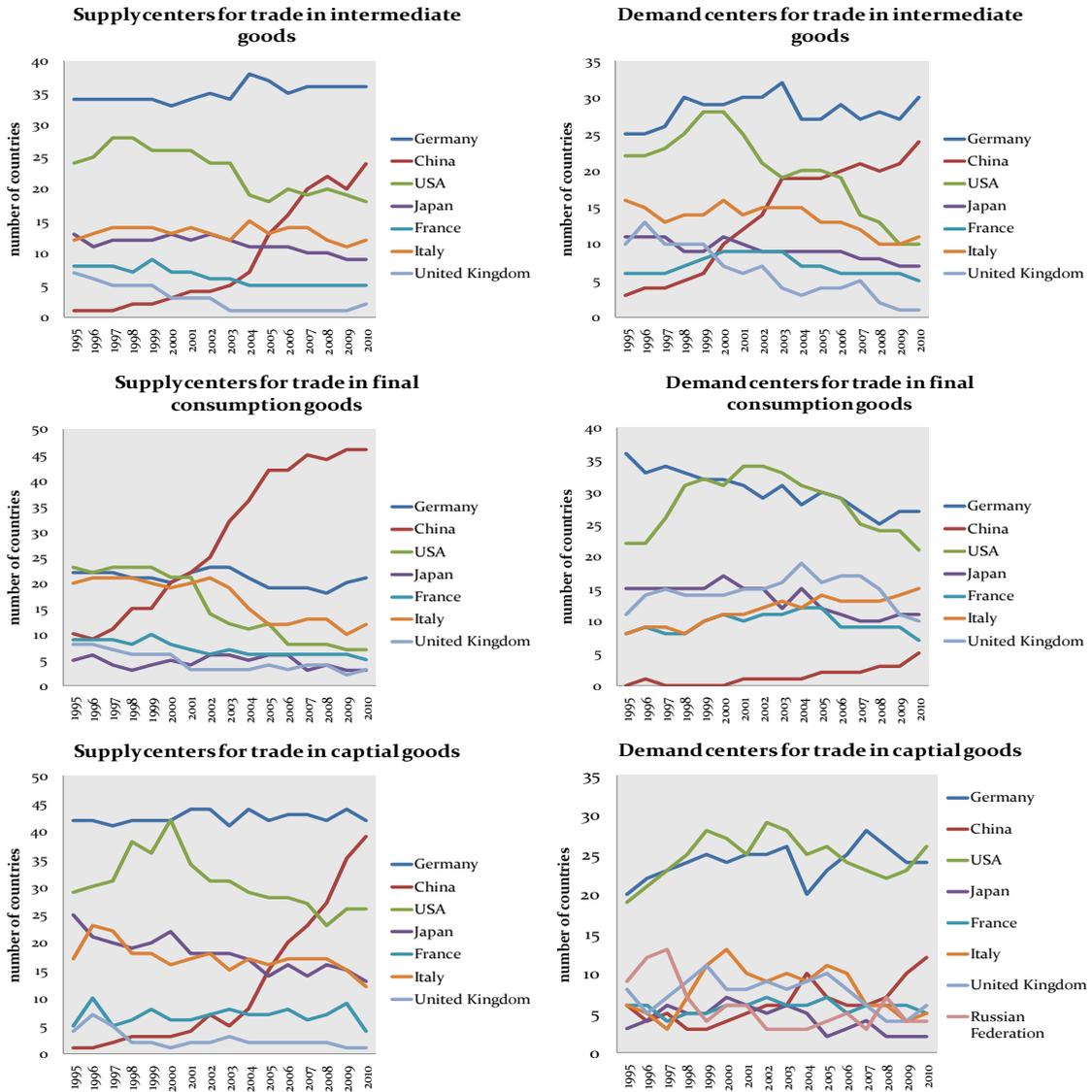


Table 3 Evolution of inter and intra-regional trade flow (%)

1995	EU27			NAFTA	South America	ERIA+			ROW	World	
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	26.0	24.6	1.4	3.3	0.5	4.6	1.0	3.2	0.4	5.3	40.4
EU15	24.5	23.3	1.2	3.2	0.5	4.4	1.0	3.1	0.4	5.0	38.2
Rest of EU27	1.5	1.3	0.2	0.1	0.0	0.1	0.0	0.1	0.0	0.4	2.2
NAFTA	3.1	3.0	0.1	7.3	0.3	6.9	1.4	5.3	0.3	2.0	19.6
South America	0.5	0.5	0.0	0.5	0.3	0.3	0.0	0.2	0.0	0.2	1.7
ERIA+	4.1	4.0	0.1	5.0	0.4	14.6	3.3	10.1	1.2	2.8	27.0
ASEAN	1.1	1.0	0.0	1.0	0.1	4.3	1.3	2.8	0.2	0.5	7.0
East Asia	2.5	2.5	0.0	3.5	0.3	9.5	1.9	6.8	0.8	2.1	17.9
Rest of ERIA+	0.5	0.5	0.0	0.4	0.0	0.8	0.2	0.5	0.1	0.3	2.1
ROW	5.9	5.6	0.3	1.6	0.3	2.4	0.4	1.7	0.3	0.9	11.2
World	39.6	37.7	1.9	17.6	1.8	28.8	6.2	20.5	2.1	11.3	100.0
2010	EU27			NAFTA	South America	ERIA+			ROW	World	
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	20.7	17.9	2.8	2.1	0.5	5.6	0.9	4.3	0.5	5.7	35.0
EU15	18.0	15.8	2.1	2.0	0.5	5.0	0.8	3.8	0.4	5.0	30.8
Rest of EU27	2.7	2.1	0.7	0.1	0.0	0.6	0.1	0.5	0.0	0.7	4.2
NAFTA	2.7	2.6	0.1	6.0	0.3	6.4	0.9	5.1	0.3	2.7	18.1
South America	0.4	0.4	0.0	0.4	0.3	0.6	0.1	0.5	0.1	0.3	2.0
ERIA+	3.2	3.1	0.2	3.0	0.8	18.0	4.6	11.6	1.7	6.1	31.1
ASEAN	0.6	0.6	0.0	0.6	0.1	4.3	1.5	2.5	0.3	0.9	6.5
East Asia	2.1	2.0	0.1	2.0	0.7	12.2	2.7	8.2	1.3	4.2	21.2
Rest of ERIA+	0.5	0.5	0.0	0.3	0.0	1.5	0.4	0.9	0.2	1.0	3.4
ROW	4.9	4.3	0.5	1.6	0.5	4.8	0.7	3.4	0.8	1.9	13.8
World	31.8	28.2	3.6	13.1	2.5	35.4	7.2	24.9	3.4	16.7	100.0
1995-2010	EU27			NAFTA	South America	ERIA+			ROW	World	
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	-20.5	-27.3	96.1	-35.2	0.6	22.8	-11.2	34.7	10.9	6.3	-13.3
EU15	-26.8	-32.2	78.6	-36.2	0.0	12.9	-16.6	22.5	8.0	0.8	-19.3
Rest of EU27	81.9	63.0	185.1	1.2	11.1	362.3	204.2	425.0	130.0	77.8	88.4
NAFTA	-14.0	-15.9	74.6	-17.9	12.1	-7.2	-33.2	-2.4	33.5	37.4	-7.5
South America	-23.1	-25.1	77.8	-19.8	14.2	128.0	85.7	130.4	200.0	25.0	12.8
ERIA+	-21.7	-24.1	108.1	-40.4	102.3	23.0	38.4	14.9	49.2	115.3	15.1
ASEAN	-44.1	-45.6	15.4	-40.1	11.1	0.4	20.3	-10.4	22.6	72.0	-7.1
East Asia	-15.8	-18.6	161.5	-42.3	124.0	27.9	39.5	20.5	64.6	105.7	18.2
Rest of ERIA+	-4.8	-7.2	133.3	-24.4	114.3	88.7	166.5	85.1	11.0	260.6	62.7
ROW	-17.0	-22.3	79.7	1.0	52.1	98.6	57.4	94.4	195.1	106.1	22.7
World	-19.6	-25.2	93.2	-25.7	35.9	23.1	16.3	21.4	59.5	47.7	0.0

Figure 5 A single national I-O framework

	country 1	country 1	country 2	
country 1	IMD ¹¹	FD ¹¹	EX ¹²	X ¹
country 2	IMD ²¹	FD ²¹		
	VA ¹			
	X ¹			

Figure 6 An international I-O framework (two-country case)

	country 1	country 2	country 1	country 2	
country 1	IMD ¹¹	IMD ¹²	FD ¹¹	FD ¹²	X ¹
country 2	IMD ²¹	IMD ²²	FD ²¹	FD ²²	X ²
	VA ¹	VA ²			
	X ¹	X ²			

Table 4 Demand-based TiVA share across regions (%)

1995	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	20.7	19.6	1.2	5.7	0.7	7.0	1.3	5.0	0.7	3.1	37.2
EU15	19.7	18.7	1.0	5.6	0.7	6.8	1.2	4.8	0.7	2.9	35.7
Rest of EU27	1.0	0.9	0.1	0.1	0.0	0.2	0.0	0.1	0.0	0.1	1.4
NAFTA	4.3	4.2	0.1	6.3	0.5	4.5	0.6	3.5	0.3	0.6	16.2
South America	0.5	0.5	0.0	0.5	0.3	0.5	0.1	0.4	0.0	0.1	1.9
ERIA+	5.8	5.6	0.2	7.7	0.5	13.6	3.2	9.5	1.0	1.1	28.7
ASEAN	0.9	0.9	0.0	0.9	0.1	2.5	0.5	1.9	0.1	0.2	4.6
East Asia	4.4	4.3	0.1	6.5	0.4	10.0	2.5	6.9	0.7	0.7	22.0
Rest of ERIA+	0.4	0.4	0.0	0.3	0.0	1.1	0.2	0.8	0.1	0.1	1.9
ROW	6.8	6.2	0.5	2.9	0.4	4.2	0.7	3.1	0.4	1.5	15.8
World	38.1	36.1	2.0	23.1	2.4	29.8	5.9	21.5	2.4	6.4	100.0
2005	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	19.3	17.6	1.7	4.9	0.5	4.3	0.5	3.0	0.8	3.5	32.5
EU15	17.6	16.1	1.5	4.7	0.5	4.2	0.5	2.9	0.7	3.3	30.3
Rest of EU27	1.7	1.4	0.3	0.2	0.0	0.2	0.0	0.1	0.0	0.2	2.3
NAFTA	3.3	3.1	0.2	6.4	0.4	3.7	0.4	2.8	0.4	0.6	14.4
South America	0.7	0.6	0.0	0.7	0.3	0.6	0.1	0.4	0.1	0.2	2.5
ERIA+	6.0	5.6	0.4	8.2	0.4	13.9	2.1	10.3	1.6	1.4	29.9
ASEAN	0.8	0.8	0.0	0.9	0.0	2.4	0.5	1.6	0.3	0.2	4.3
East Asia	4.4	4.1	0.3	6.7	0.3	10.3	1.4	7.8	1.1	1.1	22.8
Rest of ERIA+	0.8	0.8	0.0	0.6	0.0	1.3	0.2	0.8	0.2	0.2	2.9
ROW	8.0	7.4	0.6	4.9	0.4	5.9	0.7	4.1	1.1	1.6	20.8
World	37.3	34.3	2.9	25.1	2.0	28.4	3.8	20.6	4.0	7.3	100.0
1995-2005	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	-6.8	-10.2	41.7	-14.0	-28.6	-38.6	-61.5	-40.0	14.3	12.9	-12.6
EU15	-10.7	-13.9	50.0	-16.1	-28.6	-38.2	-58.3	-39.6	0.0	13.8	-15.1
Rest of EU27	70.0	55.6	200.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0	64.3
NAFTA	-23.3	-26.2	100.0	1.6	-20.0	-17.8	-33.3	-20.0	33.3	0.0	-11.1
South America	40.0	20.0	0.0	40.0	0.0	20.0	0.0	0.0	0.0	100.0	31.6
ERIA+	3.4	0.0	100.0	6.5	-20.0	2.2	-34.4	8.4	60.0	27.3	4.2
ASEAN	-11.1	-11.1	0.0	0.0	-100.0	-4.0	0.0	-15.8	200.0	0.0	-6.5
East Asia	0.0	-4.7	200.0	3.1	-25.0	3.0	-44.0	13.0	57.1	57.1	3.6
Rest of ERIA+	100.0	100.0	0.0	100.0	0.0	18.2	0.0	0.0	100.0	100.0	52.6
ROW	17.6	19.4	20.0	69.0	0.0	40.5	0.0	32.3	175.0	6.7	31.6
World	-2.1	-5.0	45.0	8.7	-16.7	-4.7	-35.6	-4.2	66.7	14.1	0.0

Table 5 Supply-based TiVA share across regions (%)

1995	EU27			NAFTA	South America	ERIA+	ERIA+			ROW	World
	EU15	Rest of EU27	ASEAN				East Asia	Rest of ERIA+			
EU27	21.2	20.0	1.2	5.1	0.6	6.6	1.2	4.7	0.7	2.4	35.9
EU15	20.1	19.1	1.1	5.0	0.6	6.4	1.1	4.6	0.7	2.3	34.4
Rest of EU27	1.1	0.9	0.2	0.1	0.0	0.2	0.0	0.1	0.0	0.1	1.5
NAFTA	5.1	5.0	0.1	6.3	0.4	4.6	0.7	3.7	0.3	0.5	16.9
South America	0.5	0.5	0.0	0.4	0.3	0.6	0.1	0.5	0.0	0.1	1.9
ERIA+	5.7	5.6	0.2	5.7	0.4	14.5	3.2	10.5	0.8	0.8	27.1
ASEAN	1.0	1.0	0.0	0.6	0.0	2.9	0.6	2.2	0.1	0.2	4.7
East Asia	4.2	4.1	0.1	4.7	0.3	10.3	2.4	7.3	0.5	0.5	20.0
Rest of ERIA+	0.5	0.5	0.0	0.3	0.0	1.2	0.2	0.9	0.1	0.1	2.1
ROW	8.1	7.5	0.7	3.0	0.5	5.3	0.8	4.0	0.5	1.3	18.2
World	40.6	38.6	2.2	20.5	2.2	31.6	6.0	23.4	2.3	5.1	100.0
2005	EU27			NAFTA	South America	ERIA+	ERIA+			ROW	World
	EU15	Rest of EU27	ASEAN				East Asia	Rest of ERIA+			
EU27	19.0	17.2	1.8	4.0	0.5	4.5	0.6	3.2	0.7	2.9	30.9
EU15	17.4	15.8	1.5	3.9	0.5	4.4	0.6	3.1	0.7	2.7	28.9
Rest of EU27	1.6	1.3	0.3	0.2	0.0	0.2	0.0	0.1	0.0	0.2	2.2
NAFTA	3.5	3.3	0.2	6.2	0.3	3.9	0.5	3.1	0.4	0.5	14.4
South America	0.6	0.6	0.0	0.6	0.3	0.7	0.1	0.6	0.1	0.1	2.3
ERIA+	4.9	4.5	0.4	5.8	0.3	15.9	2.4	12.0	1.4	1.0	27.9
ASEAN	0.7	0.6	0.0	0.6	0.0	2.8	0.6	1.9	0.3	0.1	4.2
East Asia	3.6	3.2	0.3	4.7	0.2	11.6	1.6	9.1	0.9	0.7	20.8
Rest of ERIA+	0.6	0.6	0.0	0.4	0.0	1.5	0.2	1.0	0.2	0.1	2.6
ROW	9.0	8.3	0.8	5.1	0.4	8.3	1.0	5.9	1.4	1.7	24.5
World	37.0	33.9	3.2	21.7	1.8	33.3	4.6	24.8	4.0	6.2	100.0
1995-2005	EU27			NAFTA	South America	ERIA+	ERIA+			ROW	World
	EU15	Rest of EU27	ASEAN				East Asia	Rest of ERIA+			
EU27	-10.4	-14.0	50.0	-21.6	-16.7	-31.8	-50.0	-31.9	0.0	20.8	-13.9
EU15	-13.4	-17.3	36.4	-22.0	-16.7	-31.3	-45.5	-32.6	0.0	17.4	-16.0
Rest of EU27	45.5	44.4	50.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0	46.7
NAFTA	-31.4	-34.0	100.0	-1.6	-25.0	-15.2	-28.6	-16.2	33.3	0.0	-14.8
South America	20.0	20.0	0.0	50.0	0.0	16.7	0.0	20.0	0.0	0.0	21.1
ERIA+	-14.0	-19.6	100.0	1.8	-25.0	9.7	-25.0	14.3	75.0	25.0	3.0
ASEAN	-30.0	-40.0	0.0	0.0	0.0	-3.4	0.0	-13.6	200.0	-50.0	-10.6
East Asia	-14.3	-22.0	200.0	0.0	-33.3	12.6	-33.3	24.7	80.0	40.0	4.0
Rest of ERIA+	20.0	20.0	0.0	33.3	0.0	25.0	0.0	11.1	100.0	0.0	23.8
ROW	11.1	10.7	14.3	70.0	-20.0	56.6	25.0	47.5	180.0	30.8	34.6
World	-8.9	-12.2	45.5	5.9	-18.2	5.4	-23.3	6.0	73.9	21.6	0.0

Figure 7 Demand-based TiVA share at country level (%)

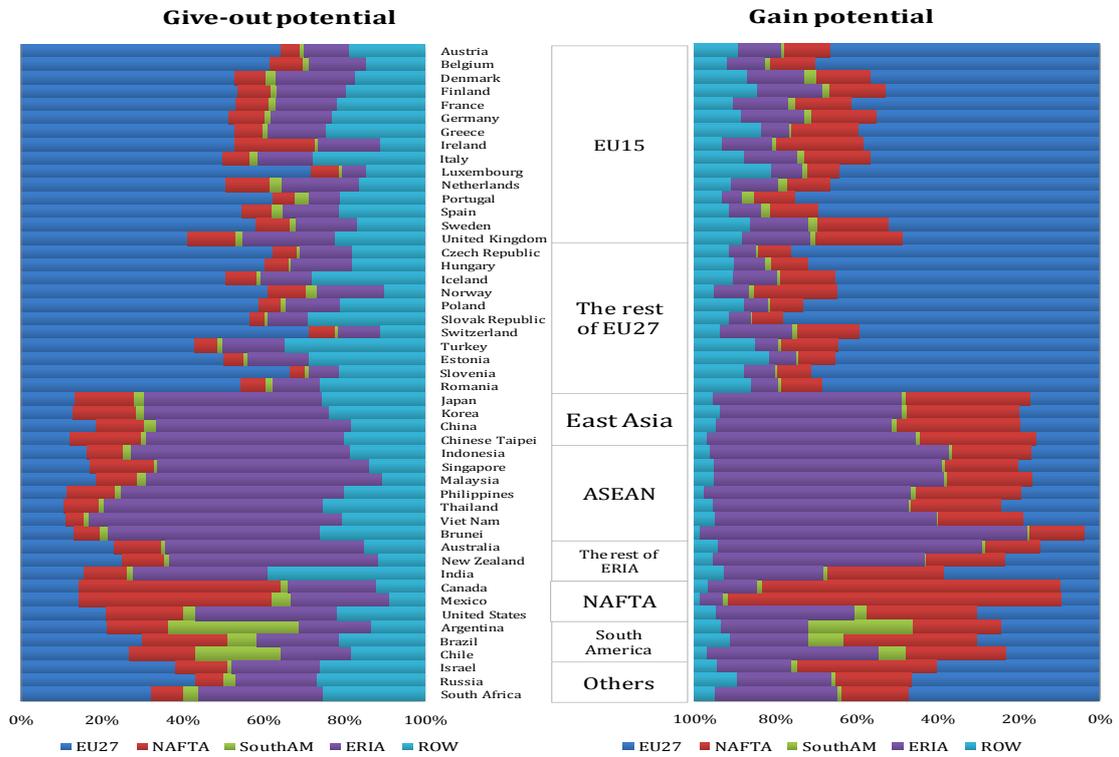


Figure 8 Supply-based TiVA share at country level (%)

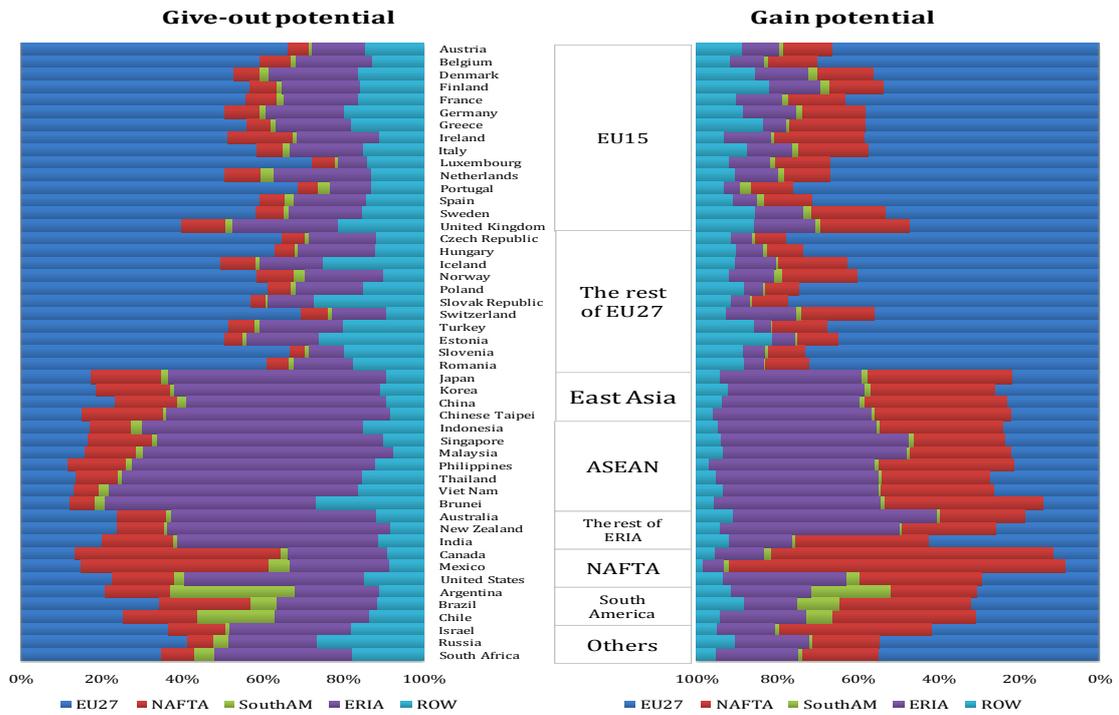


Figure 9 Foreign demand-based TiVA share at country level

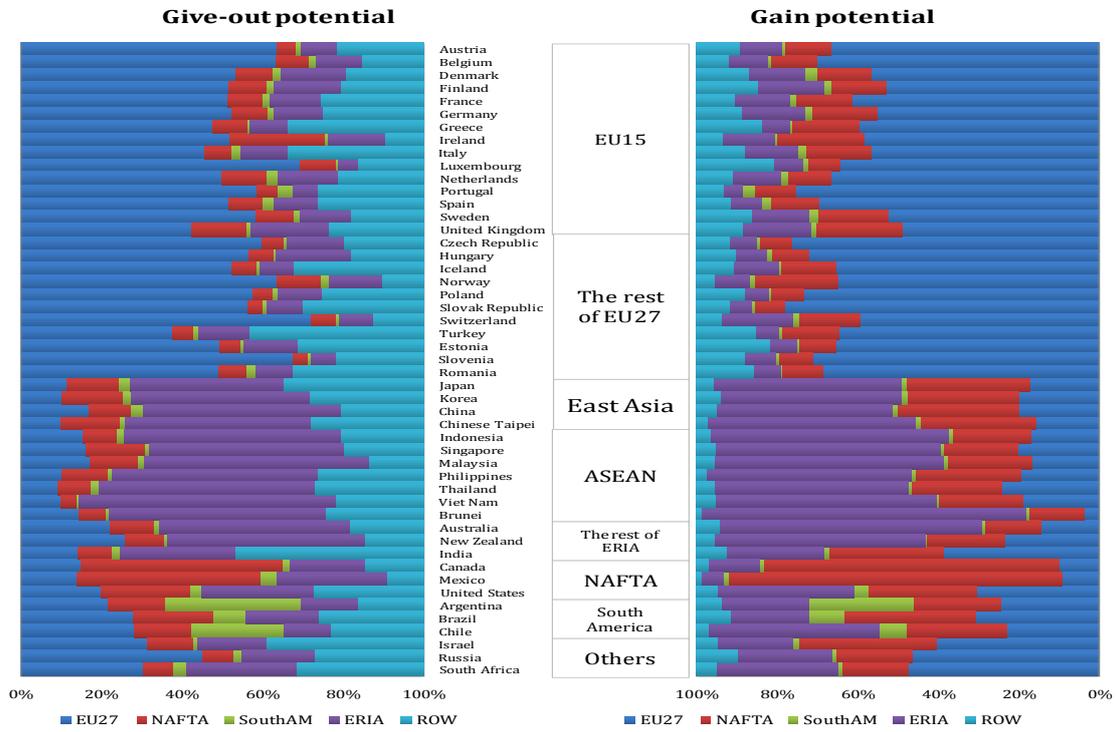


Figure 10 Foreign supply-based TiVA share at country level

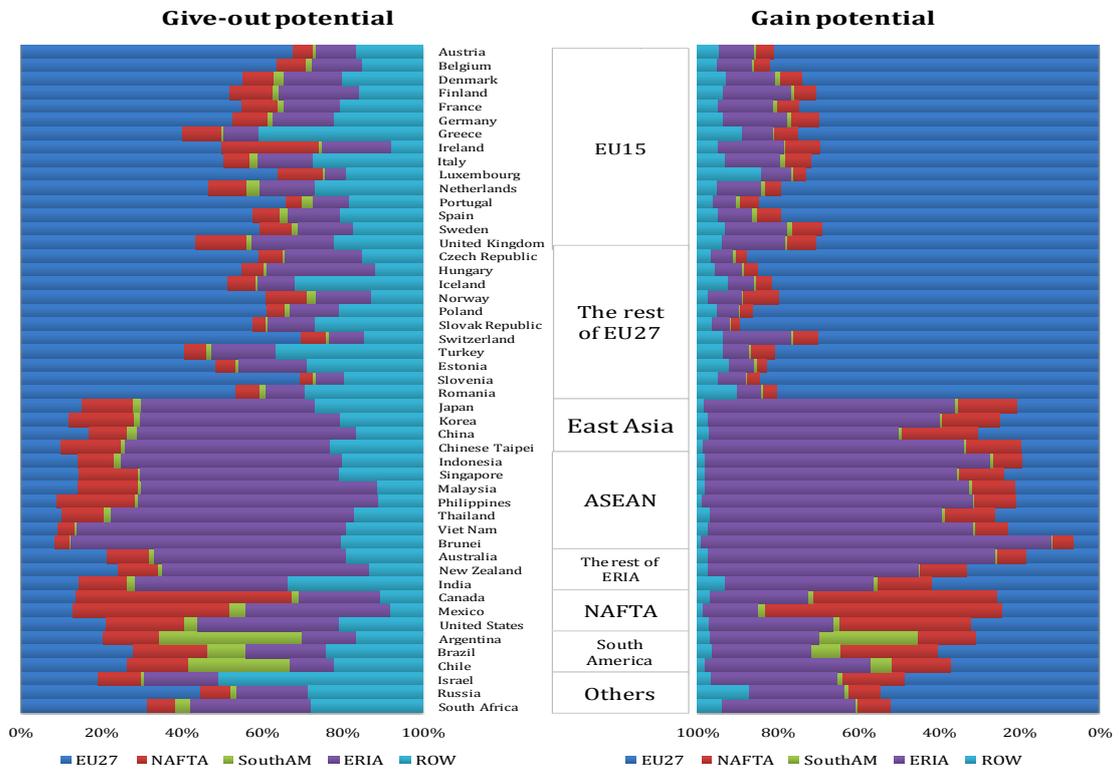


Table 6 TiVA in terms of trade in final goods across regions (%)

1995	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	8.2	7.8	0.4	1.9	0.3	2.5	0.5	1.7	0.2	1.4	14.3
EU15	7.8	7.4	0.4	1.9	0.3	2.4	0.5	1.7	0.2	1.3	13.8
Rest of EU27	0.4	0.3	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.5
NAFTA	1.1	1.1	0.0	2.9	0.2	1.6	0.3	1.2	0.1	0.3	6.1
South America	0.2	0.2	0.0	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.7
ERIA+	2.0	1.9	0.1	3.5	0.2	5.2	1.5	3.3	0.4	0.5	11.5
ASEAN	0.3	0.3	0.0	0.4	0.0	0.8	0.2	0.5	0.1	0.1	1.5
East Asia	1.6	1.6	0.1	3.1	0.2	4.1	1.2	2.6	0.3	0.4	9.3
Rest of ERIA+	0.1	0.1	0.0	0.1	0.0	0.3	0.1	0.2	0.0	0.1	0.6
ROW	1.8	1.6	0.2	0.8	0.1	0.8	0.2	0.6	0.1	0.7	4.2
World	13.3	12.6	0.7	9.4	0.9	10.2	2.5	6.9	0.9	2.9	36.7
2005	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	7.2	6.5	0.7	1.6	0.2	1.2	0.2	0.8	0.2	1.4	11.5
EU15	6.5	6.0	0.6	1.5	0.2	1.2	0.2	0.8	0.2	1.3	10.7
Rest of EU27	0.7	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.8
NAFTA	0.9	0.9	0.0	2.6	0.1	1.2	0.2	0.8	0.2	0.2	5.0
South America	0.2	0.2	0.0	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.7
ERIA+	2.3	2.2	0.1	3.5	0.1	4.3	0.9	2.8	0.6	0.6	10.9
ASEAN	0.3	0.3	0.0	0.4	0.0	0.6	0.2	0.4	0.1	0.1	1.4
East Asia	1.7	1.6	0.1	2.9	0.1	3.3	0.6	2.3	0.4	0.5	8.5
Rest of ERIA+	0.3	0.3	0.0	0.3	0.0	0.3	0.1	0.2	0.1	0.1	1.1
ROW	1.9	1.8	0.1	1.0	0.1	0.5	0.1	0.3	0.1	0.5	3.9
World	12.5	11.5	1.0	8.9	0.6	7.2	1.3	4.8	1.1	2.8	32.0
1995-2005	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	-12.2	-16.3	60.5	-18.1	-38.5	-52.8	-66.7	-55.2	-4.2	-1.4	-19.6
EU15	-16.5	-20.0	52.6	-19.5	-38.5	-52.5	-67.9	-54.8	-4.3	-3.0	-22.4
Rest of EU27	80.6	71.0	120.0	66.7	0.0	-60.0	0.0	-50.0	0.0	50.0	58.8
NAFTA	-21.9	-23.4	33.3	-10.0	-35.0	-26.6	-40.7	-30.3	33.3	-20.0	-17.8
South America	22.2	23.5	0.0	22.2	-21.4	-15.4	-33.3	-22.2	0.0	33.3	7.2
ERIA+	15.4	12.9	85.7	-0.8	-38.1	-17.1	-42.8	-13.5	48.8	21.6	-5.1
ASEAN	11.1	7.7	0.0	0.0	0.0	-17.1	-21.7	-28.6	100.0	-22.2	-8.6
East Asia	4.3	0.6	100.0	-7.2	-38.9	-18.7	-50.8	-10.5	37.5	30.6	-9.4
Rest of ERIA+	183.3	175.0	0.0	163.6	0.0	3.1	0.0	-19.0	75.0	50.0	69.4
ROW	7.3	9.2	-6.7	18.5	-45.5	-41.7	-35.3	-52.5	25.0	-31.8	-7.8
World	-5.8	-8.6	46.4	-5.1	-35.9	-29.3	-47.0	-30.4	29.1	-5.5	-12.9

Table 7 TiVA in terms of trade in intermediate goods across regions (%)

1995	EU27			NAFTA	South America	ERIA+	ERIA+			ROW	World
	EU15	Rest of EU27	ASEAN				East Asia	Rest of ERIA+			
EU27	12.5	11.8	0.7	3.8	0.5	4.5	0.7	3.2	0.5	1.7	22.9
EU15	11.9	11.3	0.6	3.7	0.5	4.3	0.7	3.2	0.5	1.6	22.0
Rest of EU27	0.7	0.6	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	1.0
NAFTA	3.2	3.1	0.1	3.4	0.3	2.9	0.4	2.3	0.2	0.3	10.2
South America	0.3	0.3	0.0	0.3	0.2	0.4	0.1	0.3	0.0	0.1	1.3
ERIA+	3.8	3.7	0.1	4.1	0.3	8.4	1.6	6.3	0.5	0.6	17.2
ASEAN	0.7	0.6	0.0	0.5	0.0	1.8	0.3	1.4	0.1	0.1	3.1
East Asia	2.8	2.7	0.1	3.4	0.2	5.9	1.2	4.3	0.4	0.4	12.8
Rest of ERIA+	0.3	0.3	0.0	0.2	0.0	0.8	0.1	0.6	0.1	0.1	1.4
ROW	5.0	4.6	0.4	2.1	0.3	3.4	0.5	2.6	0.3	0.9	11.7
World	24.9	23.5	1.3	13.8	1.5	19.6	3.3	14.7	1.6	3.6	63.3
2005	EU27			NAFTA	South America	ERIA+	ERIA+			ROW	World
	EU15	Rest of EU27	ASEAN				East Asia	Rest of ERIA+			
EU27	12.1	11.1	1.0	3.3	0.4	3.1	0.4	2.2	0.5	2.1	21.1
EU15	11.1	10.2	0.9	3.2	0.4	3.0	0.3	2.1	0.5	2.0	19.6
Rest of EU27	1.1	0.9	0.2	0.1	0.0	0.1	0.0	0.1	0.0	0.2	1.5
NAFTA	2.4	2.3	0.1	3.8	0.2	2.5	0.2	2.0	0.3	0.4	9.3
South America	0.4	0.4	0.0	0.5	0.2	0.4	0.0	0.4	0.0	0.1	1.6
ERIA+	3.7	3.4	0.2	4.7	0.2	9.6	1.2	7.4	1.0	0.8	19.0
ASEAN	0.5	0.5	0.0	0.5	0.0	1.7	0.3	1.2	0.2	0.1	2.9
East Asia	2.7	2.5	0.2	3.8	0.2	7.0	0.8	5.5	0.6	0.6	14.3
Rest of ERIA+	0.4	0.4	0.0	0.3	0.0	0.9	0.1	0.7	0.1	0.1	1.8
ROW	6.1	5.6	0.5	3.9	0.3	5.4	0.6	3.8	1.0	1.2	16.9
World	24.7	22.8	1.9	16.2	1.3	21.1	2.4	15.9	2.9	4.6	68.0
1995-2005	EU27			NAFTA	South America	ERIA+	ERIA+			ROW	World
	EU15	Rest of EU27	ASEAN				East Asia	Rest of ERIA+			
EU27	-3.5	-6.3	41.4	-10.8	-20.5	-29.8	-50.5	-30.8	5.7	24.7	-8.1
EU15	-7.0	-9.5	36.3	-12.8	-21.0	-31.0	-50.5	-32.0	3.5	21.3	-10.9
Rest of EU27	59.8	57.1	76.7	81.0	0.0	13.1	0.0	21.3	0.0	88.6	57.7
NAFTA	-25.1	-27.4	81.0	11.7	-18.2	-14.5	-39.2	-14.7	27.2	7.3	-8.4
South America	31.0	28.4	0.0	62.9	-11.9	13.7	-36.0	15.0	0.0	59.1	27.7
ERIA+	-2.9	-6.1	92.2	12.9	-13.4	14.3	-26.7	18.8	84.5	41.5	10.6
ASEAN	-22.8	-24.3	0.0	4.2	0.0	-1.0	1.7	-11.0	133.3	-7.9	-5.5
East Asia	-2.9	-6.7	110.6	11.0	-12.5	17.6	-37.1	28.6	71.0	54.2	11.9
Rest of ERIA+	38.8	37.2	0.0	68.0	0.0	23.4	13.1	17.4	90.1	53.1	34.7
ROW	22.5	22.2	25.4	82.8	0.9	60.2	16.3	50.3	206.7	35.2	44.8
World	-0.5	-3.0	43.9	18.0	-13.4	7.9	-26.9	8.0	77.3	28.8	7.4

Figure 11 Induced trade in intermediate goods by France's imports from Germany (1995, 2005)

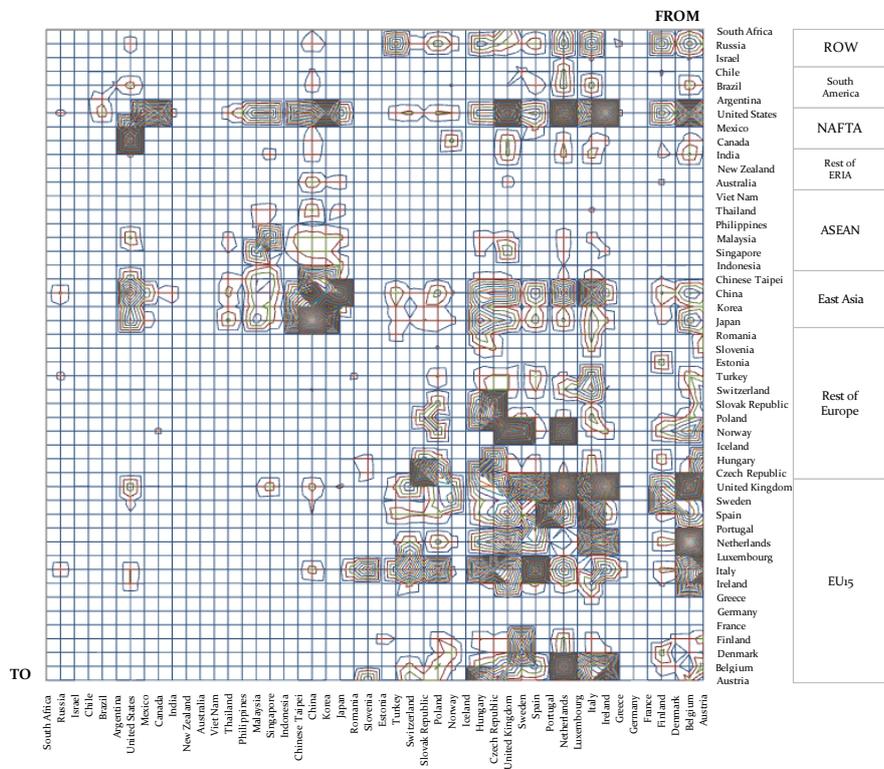
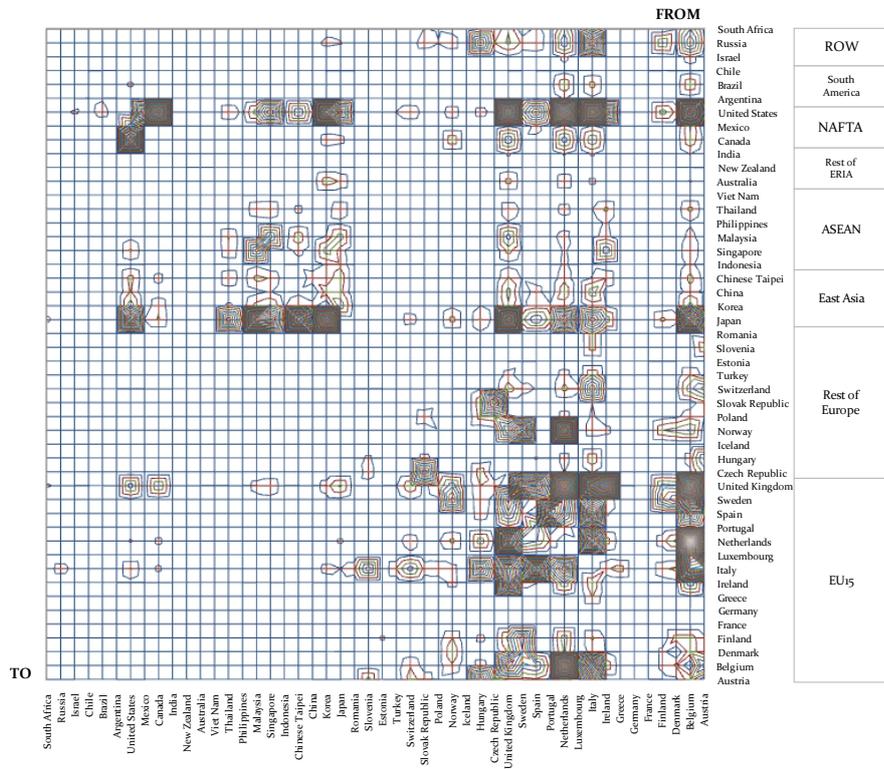


Figure 12 Induced trade in intermediate goods by Japan's imports from China (1995, 2005)

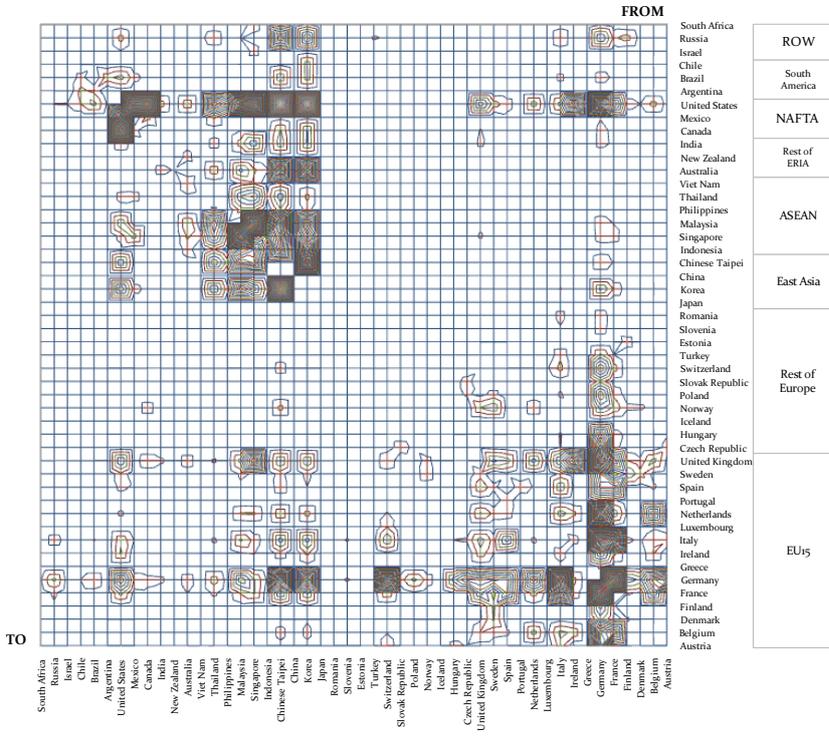
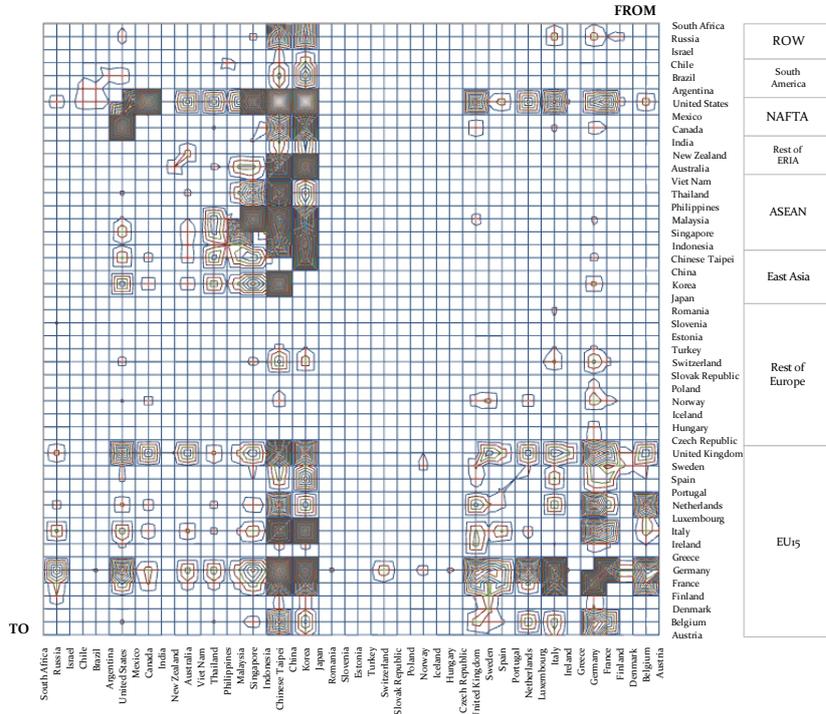


Table 8 Competitive advantage indicator based on TiVA concept for selected industries (1995)

1995	Textiles, textile products, leather and footwear				Office, accounting & computing machinery				Electrical machinery & apparatus, nec			
Rank	Country	RCA	Country	RCA by TiVA	Country	RCA	Country	RCA by TiVA	Country	RCA	Country	RCA by TiVA
1	Portugal	4.13	Portugal	4.99	Singapore	6.80	Ireland	9.55	Korea	3.88	Korea	4.44
2	Hong Kong	3.82	Hong Kong	4.64	Ireland	5.27	Singapore	6.50	Singapore	3.36	Singapore	3.62
3	China	3.54	Romania	3.77	Chinese Taipei	3.60	Chinese Taipei	3.21	United States	1.89	United States	2.00
4	Romania	3.41	China	3.19	Mexico	3.16	Mexico	2.86	Japan	1.45	Japan	1.46
5	Turkey	3.26	Turkey	3.18	Japan	2.13	Poland	1.95	Mexico	1.34	Germany	1.38
6	India	2.85	Thailand	3.04	United States	1.59	Japan	1.81	Portugal	1.14	Slovenia	1.22
7	Philippines	2.65	Philippines	2.55	Hong Kong	1.49	United Kingdom	1.52	Germany	1.12	Portugal	1.04
8	Thailand	2.38	Italy	2.31	United Kingdom	1.47	United States	1.52	Hong Kong	1.12	Mexico	1.03
9	Viet Nam	2.19	India	2.17	China	1.06	Hong Kong	1.47	Czech Republic	1.07	Austria	0.95
10	Korea	2.17	Indonesia	2.17	Poland	0.92	RoW	1.03	Slovenia	1.00	Hong Kong	0.88
11	Italy	2.09	Korea	2.14	Korea	0.83	France	0.97	Canada	0.91	Canada	0.85
12	Indonesia	2.07	Slovenia	1.87	France	0.80	Korea	0.53	Malaysia	0.91	China	0.83
13	Estonia	2.04	Estonia	1.75	Canada	0.57	Australia	0.47	Austria	0.87	Hungary	0.81
14	RoW	1.71	Chinese Taipei	1.58	Australia	0.46	Spain	0.47	Chinese Taipei	0.84	Finland	0.80
15	Slovenia	1.67	Poland	1.42	Spain	0.39	China	0.47	China	0.83	Romania	0.77
16	Chinese Taipei	1.57	Hungary	1.37	Finland	0.33	Germany	0.42	Finland	0.82	France	0.75
17	Argentina	1.27	Viet Nam	1.36	Netherlands	0.32	Netherlands	0.34	France	0.80	United Kingdom	0.74
18	Poland	1.11	Argentina	1.29	Italy	0.31	Romania	0.33	Romania	0.74	Chinese Taipei	0.73
19	Greece	1.09	Mexico	1.19	Germany	0.28	Italy	0.31	Ireland	0.71	Czech Republic	0.69
20	Austria	0.96	Greece	1.07	Romania	0.28	Sweden	0.27	Italy	0.70	Italy	0.66
21	Brazil	0.95	Austria	1.00	Sweden	0.15	Finland	0.24	Hungary	0.69	Spain	0.65
22	Czech Republic	0.91	Brazil	0.97	Norway	0.13	Argentina	0.19	Thailand	0.66	Belgium	0.62
23	Mexico	0.89	Czech Republic	0.92	Argentina	0.13	Canada	0.17	United Kingdom	0.63	Malaysia	0.58
24	Belgium	0.86	Spain	0.90	RoW	0.13	Slovak Republic	0.14	Spain	0.61	Sweden	0.56
25	Hungary	0.84	Belgium	0.87	Hungary	0.10	Norway	0.12	Sweden	0.61	Denmark	0.53
26	Spain	0.79	Slovak Republic	0.85	Czech Republic	0.08	Slovenia	0.11	Slovak Republic	0.55	Thailand	0.50
27	Israel	0.69	RoW	0.81	Switzerland	0.08	Denmark	0.10	Denmark	0.52	Slovak Republic	0.45
28	New Zealand	0.64	Israel	0.80	Estonia	0.08	Estonia	0.10	Estonia	0.46	Estonia	0.45
29	Slovak Republic	0.63	Luxembourg	0.63	Denmark	0.06	Czech Republic	0.09	New Zealand	0.45	Ireland	0.37
30	France	0.60	France	0.61	Brazil	0.06	Hungary	0.09	Belgium	0.44	Brazil	0.35

Table 9 Competitive advantage indicator based on TiVA concept for selected industries (1995)

1995	Radio, television & communication equipment				Medical, precision & optical instruments				Motor vehicles, trailers & semi-trailers			
Rank	Country	RCA	Country	RCA by TiVA	Country	RCA	Country	RCA by TiVA	Country	RCA	Country	RCA by TiVA
1	Malaysia	7.64	Malaysia	7.65	Switzerland	5.68	Israel	5.40	Mexico	3.01	Mexico	4.50
2	Thailand	3.65	Japan	3.27	Israel	4.50	Switzerland	4.63	Spain	2.69	Japan	2.47
3	Chinese Taipei	2.94	Chinese Taipei	2.99	Hong Kong	2.41	United States	2.22	Canada	2.45	Germany	2.42
4	Japan	2.84	Hong Kong	2.56	United States	2.01	Hong Kong	2.09	Japan	2.39	Spain	2.30
5	Philippines	2.47	Thailand	2.53	Japan	1.59	Ireland	1.72	Germany	2.00	Canada	2.05
6	Hong Kong	2.42	Israel	2.11	Slovenia	1.34	United Kingdom	1.36	Belgium	1.76	Sweden	1.80
7	Estonia	1.78	Philippines	1.73	Sweden	1.30	Sweden	1.34	Sweden	1.61	Belgium	1.47
8	Finland	1.63	Singapore	1.67	Ireland	1.28	Slovenia	1.33	Slovenia	1.32	Korea	1.27
9	Singapore	1.61	Finland	1.50	United Kingdom	1.27	Denmark	1.27	France	1.20	Poland	1.14
10	Sweden	1.44	China	1.17	Denmark	1.20	Hungary	1.27	Austria	1.17	Austria	1.10
11	Israel	1.39	Austria	1.15	Germany	1.11	Germany	1.20	Portugal	1.06	France	0.99
12	China	1.31	Sweden	0.96	France	1.00	France	1.19	Poland	0.98	Hungary	0.97
13	Austria	1.00	United Kingdom	0.88	Hungary	0.96	Japan	1.15	Hungary	0.94	Brazil	0.90
14	Korea	0.95	Netherlands	0.85	Italy	0.81	Austria	0.82	United States	0.94	United Kingdom	0.83
15	United Kingdom	0.95	Korea	0.67	Thailand	0.80	Thailand	0.80	Italy	0.84	Argentina	0.77
16	Hungary	0.86	Romania	0.62	Finland	0.77	Finland	0.79	Korea	0.84	Italy	0.72
17	Portugal	0.82	France	0.60	Austria	0.72	Italy	0.78	Brazil	0.84	Slovenia	0.64
18	Netherlands	0.67	Hungary	0.56	Estonia	0.65	Estonia	0.68	United Kingdom	0.81	Portugal	0.63
19	France	0.64	United States	0.53	Chinese Taipei	0.63	Singapore	0.61	Argentina	0.78	South Africa	0.57
20	Ireland	0.59	Ireland	0.49	China	0.61	Slovak Republic	0.56	South Africa	0.72	United States	0.50
21	Indonesia	0.51	Slovenia	0.49	Slovak Republic	0.51	Netherlands	0.52	Czech Republic	0.56	Czech Republic	0.44
22	Romania	0.46	Portugal	0.47	Argentina	0.50	Portugal	0.52	Slovak Republic	0.49	Turkey	0.43
23	United States	0.45	Belgium	0.46	Korea	0.47	Chinese Taipei	0.45	Netherlands	0.35	China	0.42
24	Slovenia	0.44	Denmark	0.46	Netherlands	0.47	Korea	0.44	Turkey	0.32	Chinese Taipei	0.41
25	Germany	0.40	Germany	0.38	Portugal	0.46	China	0.42	India	0.28	Slovak Republic	0.37
26	Spain	0.40	Italy	0.38	Singapore	0.43	Czech Republic	0.38	Chinese Taipei	0.26	India	0.31
27	Denmark	0.39	Estonia	0.37	Spain	0.39	Argentina	0.38	China	0.21	Netherlands	0.30
28	Italy	0.37	Spain	0.34	Australia	0.31	Brazil	0.37	Australia	0.19	Thailand	0.28
29	RoW	0.37	Switzerland	0.32	Czech Republic	0.30	Spain	0.33	Romania	0.18	Finland	0.27
30	Belgium	0.35	Indonesia	0.29	RoW	0.29	Belgium	0.27	Finland	0.17	Malaysia	0.27

Table 10 Competitive advantage indicator based on TiVA concept for selected industries (2005)

2005 Rank	Textiles, textile products, leather and footwear				Office, accounting & computing machinery				Electrical machinery & apparatus, nec			
	Country	RCA	Country	RCA by TiVA	Country	RCA	Country	RCA by TiVA	Country	RCA	Country	RCA by TiVA
1	Turkey	4.47	Turkey	5.59	Mexico	5.48	Singapore	7.93	Japan	4.43	Japan	4.29
2	Viet Nam	3.50	Portugal	4.09	Singapore	4.49	Thailand	5.81	China	2.57	Hungary	3.12
3	Hong Kong	2.99	Romania	3.61	Ireland	4.03	Mexico	4.84	Hungary	1.91	Romania	1.96
4	Romania	2.97	China	2.81	China	4.01	Hong Kong	4.65	Hong Kong	1.60	China	1.84
5	China	2.94	Hong Kong	2.78	Thailand	3.88	Ireland	3.81	Czech Republic	1.58	Czech Republic	1.74
6	Portugal	2.88	Greece	2.53	Hong Kong	3.71	China	2.66	Romania	1.57	Slovak Republic	1.74
7	India	2.36	Viet Nam	2.50	Czech Republic	1.91	Hungary	2.24	Slovak Republic	1.47	Germany	1.67
8	Indonesia	2.05	Indonesia	2.48	Hungary	1.72	Philippines	1.92	Mexico	1.38	Slovenia	1.51
9	Italy	1.97	Thailand	2.22	Japan	1.26	Japan	1.24	Slovenia	1.25	Hong Kong	1.21
10	Greece	1.85	Italy	2.14	Philippines	1.04	United States	0.86	Germany	1.16	Estonia	1.14
11	RoW	1.72	Philippines	2.11	Chinese Taipei	0.83	United Kingdom	0.67	Estonia	1.05	Malaysia	1.14
12	Estonia	1.60	Estonia	1.97	United States	0.69	Korea	0.55	Poland	1.03	Thailand	1.05
13	Thailand	1.44	India	1.89	Korea	0.47	Germany	0.48	Malaysia	1.00	Finland	1.03
14	Slovenia	1.26	Slovenia	1.41	United Kingdom	0.41	Chinese Taipei	0.48	Denmark	0.92	Mexico	1.01
15	Philippines	1.05	Slovak Republic	1.30	Germany	0.30	RoW	0.46	Austria	0.90	Poland	1.01
16	Mexico	0.95	Brunei	1.21	India	0.30	India	0.39	Thailand	0.90	Italy	0.99
17	Spain	0.85	Mexico	1.16	Netherlands	0.26	Czech Republic	0.35	Italy	0.87	Austria	0.98
18	Korea	0.83	Korea	1.11	France	0.25	Sweden	0.31	Finland	0.86	Korea	0.89
19	Poland	0.80	Spain	1.05	Canada	0.23	France	0.30	Portugal	0.85	Portugal	0.87
20	Slovak Republic	0.80	RoW	1.01	Spain	0.20	Spain	0.27	France	0.82	France	0.80
21	Chinese Taipei	0.79	Argentina	1.00	Sweden	0.17	Netherlands	0.25	Switzerland	0.80	Denmark	0.75
22	Argentina	0.77	Poland	0.98	Italy	0.13	Canada	0.20	Spain	0.70	Spain	0.68
23	Brunei	0.74	Czech Republic	0.89	Brazil	0.13	Denmark	0.19	Sweden	0.62	Sweden	0.61
24	Czech Republic	0.72	Chinese Taipei	0.89	Portugal	0.12	Italy	0.16	United Kingdom	0.55	United Kingdom	0.61
25	Brazil	0.67	Brazil	0.88	Denmark	0.09	Portugal	0.16	Chinese Taipei	0.53	Belgium	0.60
26	Belgium	0.63	Belgium	0.72	Poland	0.08	Poland	0.15	Korea	0.50	United States	0.54
27	France	0.60	Hungary	0.72	RoW	0.08	Slovenia	0.15	Turkey	0.49	Chinese Taipei	0.52
28	Hungary	0.59	France	0.64	Austria	0.07	Slovak Republic	0.14	United States	0.45	Brazil	0.50
29	Austria	0.53	Austria	0.63	Slovenia	0.06	Austria	0.10	Indonesia	0.43	Turkey	0.49
30	New Zealand	0.51	Luxembourg	0.61	Slovak Republic	0.05	Switzerland	0.10	Belgium	0.37	Indonesia	0.49

Table 11 Competitive advantage indicator based on TiVA concept for selected industries (2005)

2005 Rank	Radio, television & communication equipment				Medical, precision & optical instruments				Motor vehicles, trailers & semi-trailers			
	Country	RCA	Country	RCA by TiVA	Country	RCA	Country	RCA by TiVA	Country	RCA	Country	RCA by TiVA
1	Chinese Taipei	6.30	Chinese Taipei	9.10	Switzerland	6.78	Switzerland	6.36	Mexico	2.75	Mexico	3.83
2	Philippines	6.12	Philippines	8.60	Philippines	4.79	Philippines	6.27	Japan	2.46	Japan	3.02
3	Korea	4.60	Finland	5.44	Israel	3.66	Israel	6.01	Germany	2.44	Germany	2.85
4	Malaysia	3.89	Korea	5.29	Ireland	2.44	Ireland	4.00	Spain	2.33	Hungary	2.49
5	Finland	3.78	Singapore	4.62	Hong Kong	2.32	Hong Kong	2.20	Slovak Republic	2.18	Czech Republic	2.30
6	Hong Kong	3.56	Malaysia	4.32	United States	1.61	Germany	1.95	Canada	2.13	Korea	2.14
7	Hungary	3.22	Hong Kong	3.80	Germany	1.55	Denmark	1.82	Hungary	2.06	Spain	2.11
8	Singapore	3.00	Israel	3.13	United Kingdom	1.44	United Kingdom	1.62	Czech Republic	1.93	Turkey	1.72
9	Estonia	2.61	Hungary	2.40	China	1.36	France	1.60	Poland	1.79	Sweden	1.67
10	Thailand	1.59	Sweden	1.47	Denmark	1.28	Finland	1.47	France	1.76	Slovak Republic	1.60
11	Israel	1.42	United States	1.27	France	1.26	Singapore	1.46	Sweden	1.66	Austria	1.58
12	Sweden	1.26	Austria	0.97	Sweden	1.21	Sweden	1.45	Austria	1.65	Canada	1.57
13	United States	1.13	Ireland	0.97	Slovenia	1.20	United States	1.45	Turkey	1.52	Poland	1.48
14	Portugal	1.04	Indonesia	0.87	Finland	1.15	Slovenia	1.41	Korea	1.51	France	1.23
15	Slovak Republic	1.00	Estonia	0.80	Italy	1.10	Italy	1.08	Portugal	1.43	Belgium	1.18
16	Indonesia	0.81	Thailand	0.79	Japan	1.07	Austria	0.99	Belgium	1.41	Portugal	1.13
17	Czech Republic	0.76	China	0.69	Singapore	0.78	Japan	0.91	Slovenia	1.38	Romania	1.09
18	China	0.76	Czech Republic	0.62	Chinese Taipei	0.75	Hungary	0.89	Brazil	1.30	Slovenia	0.96
19	Turkey	0.58	France	0.59	Czech Republic	0.74	Czech Republic	0.86	United States	1.01	Argentina	0.91
20	France	0.57	Canada	0.58	Estonia	0.74	China	0.84	Argentina	0.93	Brazil	0.89
21	Austria	0.53	Germany	0.56	Iceland	0.73	Netherlands	0.77	South Africa	0.91	Thailand	0.89
22	Poland	0.51	Italy	0.53	Malaysia	0.70	Estonia	0.77	Thailand	0.83	South Africa	0.80
23	Japan	0.49	Portugal	0.52	Austria	0.64	Iceland	0.72	Italy	0.80	United States	0.69
24	Canada	0.46	Slovak Republic	0.45	Korea	0.63	Korea	0.69	Romania	0.58	Italy	0.67
25	Ireland	0.46	Turkey	0.44	Netherlands	0.60	Malaysia	0.64	Netherlands	0.49	Philippines	0.57
26	Netherlands	0.46	Slovenia	0.43	Thailand	0.57	Thailand	0.60	United Kingdom	0.49	Netherlands	0.48
27	India	0.46	Switzerland	0.40	Hungary	0.51	Luxembourg	0.59	Philippines	0.47	United Kingdom	0.47
28	Germany	0.45	United Kingdom	0.37	Greece	0.50	Greece	0.53	India	0.33	Estonia	0.43
29	Spain	0.38	Japan	0.36	Spain	0.48	Slovak Republic	0.53	Australia	0.28	New Zealand	0.35
30	Brazil	0.37	Belgium	0.33	Australia	0.44	Poland	0.51	Estonia	0.27	Finland	0.29

Appendix 1 Country groups

	EU27	EU15	the rest of EU27	NAFTA	South America	ERIA+	ASEAN	East Asia	the rest of ERIA+	ROW	World
1 Australia						1				1	
2 Austria	1	1									
3 Belgium	1	1									
4 Canada				1							
5 Chile					1						
6 Czech Rep.	1		1								
7 Denmark	1	1									
8 Estonia	1		1								
9 Finland	1	1									
10 France	1	1									
11 Germany	1	1									
12 Greece	1	1									
13 Hungary	1		1								
14 Iceland											1
15 Ireland	1	1									
16 Israel											1
17 Italy	1	1									
18 Japan						1		1			
19 Korea						1		1			
20 Luxembourg	1	1									
21 Mexico				1							
22 Netherlands	1	1									
23 New Zealand							1			1	
24 Norway											1
25 Poland	1		1								
26 Portugal	1	1									
27 Slovakia	1		1								
28 Slovenia	1		1								
29 Spain	1	1									
30 Sweden	1	1									
31 Switzerland											1
32 Turkey											1
33 United Kingdom	1	1									
34 USA				1							
35 Argentina					1						
36 Brazil					1						
37 China						1		1			
38 Chinese Taipei						1		1			
39 India						1			1		
40 Indonesia						1	1				
41 Russian Federation											1
42 Singapore						1	1				
43 South Africa											1
44 Hong Kong						1		1			
45 Malaysia						1	1				
46 Philippines						1	1				
47 Thailand						1	1				
48 Romania	1		1								
49 Viet Nam						1	1				
50 Saudi Arabia											1
51 Brunei Darussalam						1	1				
52 Bulgaria	1		1								
53 Cyprus	1		1								
54 Latvia	1		1								
55 Lithuania	1		1								
56 Malta	1		1								
57 Cambodia						1	1				
58 Albania											1
59 Bosnia & Herzegovina											1
60 Croatia											1
61 Macedonia, The Fmr.											1
62 Moldova, Rep. of											1
63 Montenegro											1
64 Serbia											1
65 Serbia & Montenegro											1
66 Unspecified											1
67 Rest of world											1
68 World											1
Sum	27	15	12	3	3	16	8	5	3	17	1

Appendix 2 Evolution of inter and intra-regional trade in intermediate goods (%)

1995	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	25.5	23.9	1.6	3.6	0.7	3.4	0.8	2.3	0.4	6.6	40.6
EU15	23.9	22.7	1.3	3.6	0.6	3.3	0.8	2.2	0.4	6.1	38.2
Rest of EU27	1.6	1.3	0.3	0.1	0.0	0.1	0.0	0.1	0.0	0.5	2.4
NAFTA	2.9	2.8	0.1	7.7	0.3	5.0	1.0	3.9	0.2	2.3	18.3
South America	0.4	0.4	0.0	0.5	0.3	0.2	0.0	0.2	0.0	0.3	1.8
ERIA+	3.4	3.3	0.1	5.4	0.6	15.7	4.0	10.4	1.4	4.2	29.6
ASEAN	1.0	1.0	0.0	1.2	0.1	5.1	1.5	3.3	0.3	0.7	8.2
East Asia	2.0	1.9	0.1	3.8	0.4	9.9	2.2	6.7	1.0	3.0	19.2
Rest of ERIA+	0.5	0.4	0.0	0.4	0.0	0.7	0.2	0.4	0.2	0.4	2.1
ROW	5.0	4.7	0.3	1.6	0.4	1.7	0.4	1.1	0.2	1.0	9.8
World	37.2	35.2	2.0	18.8	2.3	26.2	6.2	17.7	2.3	14.5	100.0
2010	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	19.0	16.5	2.5	2.0	0.6	4.0	0.8	2.8	0.4	7.2	33.4
EU15	16.2	14.4	1.8	1.9	0.6	3.5	0.7	2.3	0.4	6.3	29.0
Rest of EU27	2.7	2.1	0.7	0.1	0.0	0.6	0.1	0.5	0.0	0.9	4.4
NAFTA	2.3	2.2	0.1	6.0	0.4	3.9	0.6	3.1	0.2	3.5	16.2
South America	0.4	0.3	0.0	0.4	0.3	0.6	0.1	0.4	0.1	0.4	2.0
ERIA+	2.6	2.5	0.1	3.2	1.2	20.6	5.9	12.4	2.4	8.7	36.5
ASEAN	0.6	0.6	0.0	0.8	0.1	5.3	1.9	3.0	0.4	1.3	8.1
East Asia	1.7	1.6	0.1	2.2	1.0	14.0	3.4	8.7	1.8	6.0	25.0
Rest of ERIA+	0.3	0.3	0.0	0.2	0.1	1.3	0.5	0.6	0.2	1.4	3.5
ROW	4.0	3.6	0.4	1.4	0.5	3.8	0.6	2.5	0.6	2.1	11.9
World	28.3	25.1	3.2	13.0	3.0	32.9	8.0	21.2	3.7	22.0	100.0
1995-2010	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	-25.5	-31.0	56.3	-44.4	-14.3	17.6	0.0	21.7	0.0	9.1	-17.7
EU15	-32.2	-36.6	38.5	-47.2	0.0	6.1	-12.5	4.5	0.0	3.3	-24.1
Rest of EU27	68.8	61.5	133.3	0.0	0.0	500.0	0.0	400.0	0.0	80.0	83.3
NAFTA	-20.7	-21.4	0.0	-22.1	33.3	-22.0	-40.0	-20.5	0.0	52.2	-11.5
South America	0.0	-25.0	0.0	-20.0	0.0	200.0	0.0	100.0	0.0	33.3	11.1
ERIA+	-23.5	-24.2	0.0	-40.7	100.0	31.2	47.5	19.2	71.4	107.1	23.3
ASEAN	-40.0	-40.0	0.0	-33.3	0.0	3.9	26.7	-9.1	33.3	85.7	-1.2
East Asia	-15.0	-15.8	0.0	-42.1	150.0	41.4	54.5	29.9	80.0	100.0	30.2
Rest of ERIA+	-40.0	-25.0	0.0	-50.0	0.0	85.7	150.0	50.0	0.0	250.0	66.7
ROW	-20.0	-23.4	33.3	-12.5	25.0	123.5	50.0	127.3	200.0	110.0	21.4
World	-23.9	-28.7	60.0	-30.9	30.4	25.6	29.0	19.8	60.9	51.7	0.0

Appendix 3 Evolution of inter and intra-regional trade in consumption goods (%)

1995	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	28.6	26.5	2.0	1.7	0.6	6.5	1.4	4.3	0.8	5.4	43.0
EU15	27.3	25.5	1.8	1.6	0.5	6.4	1.4	4.2	0.8	5.2	41.2
Rest of EU27	1.3	1.1	0.2	0.1	0.0	0.2	0.0	0.1	0.0	0.2	1.8
NAFTA	2.7	2.6	0.1	4.6	0.5	9.4	2.0	6.9	0.5	2.5	19.7
South America	0.2	0.2	0.0	0.3	0.4	0.3	0.0	0.2	0.0	0.2	1.3
ERIA+	3.1	3.0	0.0	3.4	0.2	15.2	3.0	11.1	1.1	1.3	23.2
ASEAN	0.5	0.5	0.0	0.5	0.0	2.4	1.0	1.1	0.2	0.2	3.5
East Asia	2.3	2.2	0.0	2.7	0.2	12.1	1.8	9.6	0.6	0.9	18.2
Rest of ERIA+	0.3	0.3	0.0	0.3	0.0	0.8	0.1	0.4	0.2	0.1	1.5
ROW	6.3	5.9	0.4	1.5	0.4	3.5	0.9	2.1	0.5	1.0	12.7
World	40.9	38.3	2.6	11.5	2.0	34.9	7.3	24.6	3.0	10.4	100.0

2010	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	25.0	21.1	3.8	1.3	0.5	10.1	1.4	7.8	0.9	4.9	41.9
EU15	22.0	19.2	2.9	1.2	0.5	9.5	1.3	7.3	0.9	4.6	37.9
Rest of EU27	2.9	2.0	1.0	0.1	0.0	0.6	0.1	0.5	0.0	0.4	4.0
NAFTA	2.2	2.1	0.1	5.2	0.4	11.9	2.0	9.2	0.7	2.2	21.8
South America	0.2	0.2	0.0	0.2	0.3	0.6	0.1	0.5	0.0	0.1	1.3
ERIA+	2.5	2.4	0.1	2.0	0.4	13.1	2.9	9.2	1.0	1.6	19.5
ASEAN	0.4	0.4	0.0	0.3	0.0	2.5	1.1	1.2	0.3	0.2	3.5
East Asia	1.7	1.7	0.1	1.4	0.3	9.0	1.5	7.0	0.5	1.1	13.6
Rest of ERIA+	0.4	0.4	0.0	0.3	0.0	1.5	0.3	1.0	0.2	0.2	2.4
ROW	5.0	4.4	0.6	1.3	0.9	6.1	1.2	3.7	1.1	2.2	15.5
World	34.9	30.2	4.7	9.9	2.4	41.7	7.6	30.4	3.8	11.0	100.0

1995-2010	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	-12.6	-20.4	90.0	-23.5	-16.7	55.4	0.0	81.4	12.5	-9.3	-2.6
EU15	-19.4	-24.7	61.1	-25.0	0.0	48.4	-7.1	73.8	12.5	-11.5	-8.0
Rest of EU27	123.1	81.8	400.0	0.0	0.0	200.0	0.0	400.0	0.0	100.0	122.2
NAFTA	-18.5	-19.2	0.0	13.0	-20.0	26.6	0.0	33.3	40.0	-12.0	10.7
South America	0.0	0.0	0.0	-33.3	-25.0	100.0	0.0	150.0	0.0	-50.0	0.0
ERIA+	-19.4	-20.0	0.0	-41.2	100.0	-13.8	-3.3	-17.1	-9.1	23.1	-15.9
ASEAN	-20.0	-20.0	0.0	-40.0	0.0	4.2	10.0	9.1	50.0	0.0	0.0
East Asia	-26.1	-22.7	0.0	-48.1	50.0	-25.6	-16.7	-27.1	-16.7	22.2	-25.3
Rest of ERIA+	33.3	33.3	0.0	0.0	0.0	87.5	200.0	150.0	0.0	100.0	60.0
ROW	-20.6	-25.4	50.0	-13.3	125.0	74.3	33.3	76.2	120.0	120.0	22.0
World	-14.7	-21.1	80.8	-13.9	20.0	19.5	4.1	23.6	26.7	5.8	0.0

Appendix 4 Evolution of inter and intra-regional trade in capital goods (%)

1995	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	21.6	20.9	0.7	3.9	0.1	4.7	0.6	4.0	0.1	2.2	32.9
EU15	19.7	19.1	0.6	3.8	0.1	4.5	0.6	3.9	0.1	2.1	30.5
Rest of EU27	1.9	1.8	0.1	0.1	0.0	0.2	0.0	0.1	0.0	0.1	2.4
NAFTA	4.1	4.1	0.0	7.5	0.1	6.9	0.9	5.9	0.1	0.5	19.3
South America	0.9	0.9	0.0	0.8	0.2	0.4	0.0	0.3	0.0	0.1	2.4
ERIA+	7.6	7.5	0.1	6.2	0.0	14.9	2.2	12.5	0.3	0.8	29.7
ASEAN	2.3	2.3	0.0	1.5	0.0	5.5	1.0	4.4	0.1	0.2	9.6
East Asia	4.4	4.4	0.0	4.0	0.0	8.5	1.0	7.4	0.1	0.5	17.6
Rest of ERIA+	0.9	0.9	0.0	0.7	0.0	0.9	0.1	0.7	0.1	0.1	2.6
ROW	8.3	8.1	0.2	2.0	0.2	4.4	0.4	3.9	0.1	0.7	15.6
World	42.6	41.5	1.1	20.4	0.7	31.4	4.1	26.7	0.6	4.4	100.0
2010	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	17.7	15.8	2.0	2.8	0.2	7.0	0.7	6.2	0.2	1.9	29.7
EU15	15.3	13.7	1.6	2.6	0.2	6.3	0.6	5.5	0.1	1.7	26.1
Rest of EU27	2.4	2.1	0.4	0.2	0.0	0.7	0.1	0.7	0.0	0.2	3.6
NAFTA	3.4	3.2	0.2	6.4	0.2	7.7	1.0	6.5	0.2	0.6	18.3
South America	0.7	0.7	0.0	0.6	0.4	0.8	0.1	0.7	0.0	0.1	2.6
ERIA+	5.7	5.6	0.2	4.2	0.1	18.0	2.6	15.2	0.3	2.1	30.2
ASEAN	1.0	0.9	0.0	0.8	0.0	4.1	1.0	3.0	0.1	0.2	6.1
East Asia	3.9	3.8	0.1	2.8	0.0	12.4	1.2	11.1	0.1	1.8	20.9
Rest of ERIA+	0.8	0.8	0.0	0.6	0.0	1.6	0.4	1.1	0.1	0.2	3.2
ROW	7.9	7.3	0.6	2.3	0.4	7.4	0.7	6.3	0.4	1.2	19.2
World	35.5	32.7	2.9	16.3	1.1	41.0	5.0	34.9	1.0	5.9	100.0
1995-2010	EU27			NAFTA	South America	ERIA+				ROW	World
	EU15	Rest of EU27	ASEAN			East Asia	Rest of ERIA+				
EU27	-18.1	-24.4	185.7	-28.2	100.0	48.9	16.7	55.0	100.0	-13.6	-9.7
EU15	-22.3	-28.3	166.7	-31.6	100.0	40.0	0.0	41.0	0.0	-19.0	-14.4
Rest of EU27	26.3	16.7	300.0	100.0	0.0	250.0	0.0	600.0	0.0	100.0	50.0
NAFTA	-17.1	-22.0	0.0	-14.7	100.0	11.6	11.1	10.2	100.0	20.0	-5.2
South America	-22.2	-22.2	0.0	-25.0	100.0	100.0	0.0	133.3	0.0	0.0	8.3
ERIA+	-25.0	-25.3	0.0	-32.3	0.0	20.8	18.2	21.6	0.0	162.5	1.7
ASEAN	-56.5	-60.9	0.0	-46.7	0.0	-25.5	0.0	-31.8	0.0	0.0	-36.5
East Asia	-11.4	-13.6	0.0	-30.0	0.0	45.9	20.0	50.0	0.0	260.0	18.8
Rest of ERIA+	-11.1	-11.1	0.0	-14.3	0.0	77.8	300.0	57.1	0.0	100.0	23.1
ROW	-4.8	-9.9	200.0	15.0	100.0	68.2	75.0	61.5	300.0	71.4	23.1
World	-16.7	-21.2	163.6	-20.1	57.1	30.6	22.0	30.7	66.7	34.1	0.0

Appendix 5 Country groups

	EU27	EU15	the rest of EU27	NAFTA	South America	ERIA+	ASEAN	East Asia	the rest of ERIA+	ROW
1 Australia						1			1	
2 Austria	1	1								
3 Belgium	1	1								
4 Canada				1						
5 Czech Republic	1		1							
6 Denmark	1	1								
7 Finland	1	1								
8 France	1	1								
9 Germany	1	1								
10 Greece	1	1								
11 Hungary	1		1							
12 Iceland										1
13 Ireland	1	1								
14 Italy	1	1								
15 Japan						1		1		
16 Korea						1		1		
17 Luxembourg	1	1								
18 Mexico				1						
19 Netherlands	1	1								
20 New Zealand						1			1	
21 Norway										1
22 Poland	1		1							
23 Portugal	1	1								
24 Slovak Republic	1		1							
25 Spain	1	1								
26 Sweden	1	1								
27 Switzerland										1
28 Turkey										1
29 United Kingdom	1	1								
30 United States				1						
31 Argentina					1					
32 Brazil					1					
33 China						1		1		
34 Chinese Taipei						1		1		
35 India						1			1	
36 Indonesia						1	1			
37 Israel										1
38 Russia										1
39 Singapore						1	1			
40 South Africa										1
41 Hong Kong						1		1		
42 Chile					1					
43 Estonia	1		1							
44 Slovenia	1		1							
45 Malaysia						1	1			
46 Philippines						1	1			
47 Thailand						1	1			
48 Romania	1		1							
49 Viet Nam						1	1			
50 Saudi Arabia										1
51 Brunei						1	1			
52 Bulgaria	1		1							
53 Cyprus	1		1							
54 Latvia	1		1							
55 Lithuania	1		1							
56 Malta	1		1							
57 RoW										1
Sum	27	15	12	3	3	15	7	5	3	9