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## Working Paper

# The impact of the increasing international division of labour on Europe's foreign trade

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# Arbeitspapiere/ Working Papers

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The Impact of the Increasing  
International Division of Labour  
on Europe's Foreign Trade

## Abstract

What are the consequences of European economies' goods structure for their exports as they face Asian competition? Over the last 30 years, the share of East Asian nations in international merchandise trade has been growing noticeably. This rise is often explained by the notion that Asian countries developed a network in which the production of mainly machinery goods has been split up along the production chain over different (Asian) countries and firms. Even though European imports from and exports to Asian countries currently account for only a relatively small fraction of Europe's total trade, this share is increasing. Thus, the question regarding export perspectives of the European industry facing Asian competition arises. Based on the goods structure of eleven European and five Asian economies as well as the USA using the Standard International Trade Classification at the 1- and 2-digit level, similarities, differences and trends over time are analysed. The additional distinction of the export structure by stage of production (on the basis of the Broad Economic Categories of the United Nations) provides some information with respect to whether an economy is more assembly-based and less research-based or not. Moreover, special attention is given to the share in high-tech goods of the selected countries. Exports of high-tech products expand more strongly with spill-over effects on other sectors of an economy. A look at the development of trade balances completes the picture, which of the European economies considered have more favourable export perspectives in the medium term and which ones less so.

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# The impact of the increasing international division of labour on Europe's foreign trade

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## 1. Introduction

Over the last 30 years, the main feature of international trade has been the integration of East Asian economies into world trade. The emergence of China on the world trade stage in the eighties seems to have brought an additional boost to the international division of labour. Further advances in the lowering of trade barriers for goods as well as in communication technology and lower transport costs are thought to have supported this development. As Asia's share in world trade has significantly increased, a first chapter deals with the changes in export and import shares as well as the importance of Asian economies as export and supply markets, also for Europe's industry. In the subsequent chapters, the focus is set on the export and import structure of European and Asian countries. Based on that structure, the specialisation of export industries in these two regions is analysed. Looking ahead, do European economies still have favourable export perspectives given the comparative advantages of Asian economies?

This paper is based on a report presented to the AIECE spring meeting, Geneva, 12-13 May 2005 on behalf of the Working Group on Longer-Term Prospects and Structural Change.

## 2. The development of international trade and the rise of Asian nations

### 2.1. The development of international trade shares

One of the most prominent features in international economics is the fact, that growth rates in international merchandise trade are about 2.5 times higher than those of GDP.<sup>1</sup> Growth in GDP seems to be coupled with an even stronger international division of labour, and a rising share in international trade can signal an above average economic performance. From post-war years until the beginning of the seventies world trade was – according to the classification and nominal data from UNCTAD – mainly a matter of developed countries. Its share rose to about 75% of total merchandise trade at the expense of developing economies.

*Figure 1: Shares in World Merchandise Exports 1*

The growing importance of Japan and post-war European countries were clearly reflected by their increasing trade-shares. This period ended with the first oil-crisis and the break-down of the Bretton Woods monetary system<sup>2</sup>. It was replaced by the most important development over the

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<sup>1</sup> Long term average annual growth rate of merchandise trade is 9.8%, of GDP 3.7%.

<sup>2</sup> As provided by UNCTAD data are nominal and in US-Dollar terms. Consequently, exchange rate fluctuations esp. between the US-Dollar and European currencies affect their trade shares.

last 30 years, the growing share of East Asian nations in the exchange of goods. Starting from as low as 5.4% in 1971, its export share reached 20.7% in 2003. In the same period the fraction of developed countries decreased to about 65%, 10 percentage points (PP) lower than in 1971. The remaining difference of 5 PP stems from African developing countries. Over this long period it can be seen that Europe as well as the US are on a downward trend, even though the US share stabilised in the nineties. Japan's share peaked in the mid-eighties. On the import side this overall picture changes only a little, with the major exceptions that US imports tended to increase and Asia's import capacity was seriously damaged by the currency crisis in 1997/98.

*Figure 2: Shares in World Merchandise Exports 2*

## 2.2. The structure of Asian trade

Rising shares in international exports imply above world average export growth rates. These differences (standardised to zero)<sup>3</sup> allow a more exact view at the integration of Asian countries into world markets. Whereas Japan started into the post-war period with very strong export growth, East Asian countries' integration (without China) – on average – began in the late seventies and accelerated until the mid eighties, to lose pace significantly over the last ten years. This development can be further differentiated. The now called Newly Industrialised Economies (NIE) – here represented by South Korea, Taiwan and Hongkong – began their rise in the early sixties, about ten years earlier than the ASEAN states.<sup>4</sup> Export performance of both groups started slowing, relative to world exports, in the eighties due to the influence of China's entry into world markets. China alone increased its export share in 2003 to 5.9%, just 0.5 PP lower than that of Japan.

*Figure 3: Differences to World Export Growth Rates 1*

*Figure 4: Differences to World Export Growth Rates 2*

The rise in trade shares of Asian countries, especially that of China, is often explained by a hypothesis dubbed «triangular trade pattern». This notion states, that Asian countries developed a network in which the production of mainly machinery goods has been split up along the production chain over different countries and firms. Producing the parts as well as assembling the components to the final goods take place in accordance with the respective comparative advantages<sup>5</sup>. Japan and the NIEs export capital goods and more sophisticated intermediate goods to China and other less developed Asia countries, where they are processed to intermediate goods or assembled to final goods to be exported to industrialised countries, mainly the US and Europe.

This thesis can be supported and exemplified by the following aspects:

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<sup>3</sup> i.e.  $(g^{\text{ex}}(\text{country}) - g^{\text{ex}}(\text{world average})) / g^{\text{ex}}(\text{world average}), g^{\text{ex}}(\text{world average}) > 0$

<sup>4</sup> Except for this chart, the NIEs comprise South Korea, Taiwan, Hongkong and Singapore, the ASEAN4 states are Malaysia, Philippines, Thailand and Indonesia.

<sup>5</sup> This does not exclude the relevance of other approaches like spatial economics.

The possibility of splitting up the production process into technologically separate operations depends on the features of the good in question. Machinery, especially electric and electrical machinery seem to be quite suitable in this respect. In fact, export quotas of the SITC 7 category “Machinery and transport equipment” (Standard International Trade Classification, Rev. 3) in Asian states are among the highest in the world.

*Figure 5: Machinery And Transport Equipment*

East Asian intraregional trade grew strongly. Export shares from Asian countries into the region are now between 45% - 50%, except China whose share remained at about 33%. Japan and the NIEs increased their share in comparison with 1980 by 20 – 25 PP. In the same period export shares to the developed countries decreased to around 45%, once again except China, whose share is as high as 56%. Intraregional imports increased to about 45%, while imports from developed countries declined to about the same fraction.

*Figure 6: Development of Asian Trade with Industrialised Countries and within the Region*

The thesis above implies, that exports and imports and therefore the trade balances in different stages of production can not be in equilibrium. Of course, China’s imports are strongly biased in favour of intermediate goods<sup>6</sup> (60.9% in 2002), whereas exports are mainly final goods (62,2%), esp. consumption goods. The surplus in China’s trade balance in consumption goods is at highest with North America, followed by other industrialised countries. Deficits in intermediate goods are highest with Japan and the NIE, followed by ASEAN4.

On the other hand Japan and the NIEs share similar characteristics. Final goods are delivered predominantly to North America and Europe whereas they show a trade deficit in this category with China. Intermediate goods are shipped to China and ASEAN4 as well as from Japan to the NIEs.

*Figure 7: China’s Trade by Stage of Production*

*Figure 8: Contributions of Intermediate Goods (IG) and Final Goods (FG) to Various Trade Balances*

The rise of Asian countries in world trade share has resulted in an increasing importance for Europe’s external trade. But in comparison with Japan or the US, EU 25 shares remained on a lower level. In 2003 exports of EU 25 going to East Asia summed up to 5.4%, imports to 9.5%. The significance for EU 10 is even lower. For the USA these export and import quotas amount to 19% vs. 27%, for Japan to 46% vs. 44%. Despite these differences in quotas, the absolute value of EU exports to East Asia developed quite similar to that of the US. In 2003 the export value from EU 25 exceeded that of the US by 22%, but EU import value reached only 82% of the US expenses. For Japan the export value is even higher, import lower compared with the EU or the US.

*Figure 9: Trade Shares and Values with East Asia*

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<sup>6</sup> Following Gaulier et al. (2004) we regroup the SITC headings on the basis of the Broad Economic Categories (BEC) of the United Nations.

### **3. State and development of the trade structure in selected countries**

In most regions of the world the structure of national economies – defined as relative shares of agriculture, industry and services in national output – has changed during the past decades. As the level of development increases, the share of agriculture decreases and the share of industry increases to a certain point. Thereafter the share of services has increased at the expense of the other two sectors. While high income OECD countries, like the US, Japan and most EU nations, are well advanced in this process of «de-industrialisation» (share of services in GDP, 2003: USA 75%, Japan 68% and EMU 70%), many Southeast Asian countries are still in the process of industrialising (e.g. share of services in GDP: China 33%) or at the beginning of the next stage.

On the other hand, this structural change of national economies is not or only partly reflected in trade data. After some increases in the eighties the shares of commercial services relative to total trade have remained rather constant. The average share of exports and imports respectively in world trade have been about 19%. Although these numbers can vary significantly from country to country, on average the export rates for NAFTA and EU15 are slightly higher, those of Asian countries somewhat lower.

Thus with a share of over 80% merchandise trade remains the driving force for international trade. In the following sections we will therefore focus solely on the structure of traded goods leaving services aside. Nevertheless we have to keep in mind, that for instance the EU15 world market share in commercial services is at about 45%, twice as high as the rate of the NAFTA and Asia respectively. The corresponding number for ASEAN countries is about 6%. Considering a possible liberalisation in financial services by the WTO, this could play a key role in the further development of trade structures.

#### **3.1. Trade structure by industries**

To get an overall picture of the trade structure of selected European, Asian and American countries we first examine the sectoral distribution of their ex- and imports basically at the 1- and 2-digit Standard International Trade Classification (SITC) level. As database we use the International Trade by Commodities Statistics (SITC Rev. 3) by the OECD. For our analysis we use nominal data for the period 1992 to 2002, all converted in US-Dollars. Therefore they remain vulnerable to exchange rate and price level fluctuations respectively.

##### **3.1.1. Export and import structure relative to the world (SITC)**

With a few exceptions international trade is dominated by machinery and transport equipment (SITC7). Further major product groups are chemicals and related products (SITC5), manufactured goods (SITC6) and miscellaneous manufactured articles (SITC8). On average these four groups account for close to 90% of all exports and 80% of all imports respectively in our country sample.<sup>7</sup>

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<sup>7</sup> Our country sample encompasses in addition to Switzerland the following EU member states: The Czech Republic, Finland, France, Germany, Hungary, Ireland, Italy, Poland, Spain and the United Kingdom. China, Hongkong, Japan, South Korea and the United States of America complete the sample. Occasionally Greece and Norway are mentioned for illustrating reasons.



For illustrating purposes the five remaining groups – food and live animals (SITCo), beverages and tobacco (SITC1), crude material (SITC2), mineral fuels (SITC3), animal and vegetable oils (SITC4) and not classified commodities (SITC9) – are taken together to the «sum of remaining goods».

Although there are sizeable differences in export and import shares in our country sample, compared to the mid-eighties the overall trade structure has considerably converged. At that time, for instance, SITCo to SITC4 accounted for more than 60% of Chinas exports compared to 10% today, whereas this proportion remained relative constant in high income countries like the four large EU states, USA or Japan.

Nevertheless, looking at the structure of total exports and leaving aside the new EU members (NEU) – Poland, the Czech Republic and Hungary – it is apparent that SITC5 plays a more vital role in European countries, particularly Ireland and Switzerland, compared to the Asian economies. On the other hand, the Asian economies (except China and Hongkong), the NEU and the USA have a higher share in SITC7 than the European average. As regards Germany, France, Spain, the Czech Republic and Japan it has to be mentioned that this category is strongly influenced by the subgroup «road vehicles». In contrast, SITC7 exports from the Asian continent are led by the development in computers, telecommunication and other electrical apparatus. Hongkong and China have by far the largest export share in SITC8, as a result of their strong market position in apparel, footwear and toys – typically labour intensive low technology products. Interestingly they are followed by Switzerland in this ranking. Contrary to China and Hongkong, strong exports in watches and jewellery are the reason for this position. On the other hand Italy's high export share in SITC8 is due to apparel, footwear and furniture. The importance of Italy's textile industry is also reflected in SITC6 (textile yarn and related products). Finland's strong position in SITC6 is due to the paper industry whereas it's the metal industry in Poland and the Czech Republic that is significant. Furthermore European economies and the USA tend to have a higher export share of SITCo. Especially Spain, Greece, Poland and Hungary are marked by agriculture. As a special case, Norway's external trade is dominated by crude oil, which accounts for 50% to 60% of total exports.

*Figure 10 and Figure 11: Export and Import structure total trade, 2002*

The import side mainly reflects the export structure in each country, as some imported goods precede the production process of the exported ones. Again the NIEs, China, Hungary and (newly) Ireland have the highest share in SITC7 imports. Eye-catching is the relatively big import share of the «sum of remaining goods», especially in Japan and South Korea. This represents the fact that all of the observed countries – except the UK – are strong net oil importers.

### **3.1.2. Development from 1992 to 2002 (SITC)**

Looking at the period 1992 to 2002 we see a remarkably stable trade structure in most of the high income countries – especially the big ones. Exceptions on the export side are Ireland and Switzerland where exports in organic chemicals and pharmaceutical products increased the SITC5 market shares by 23 PP and 11 PP, the former mainly at the expense of SITCo (-16 PP). Another special case is Finland, which experienced a boom in telecommunication equipment and other electronic products that led to a sharp increase in SITC7 (15 PP). Albeit not as strong, the same

applies for Ireland. Altogether a process of specialisation tend to emerge in the small, high income European countries.

Unlike most of the high income nations, the NIE countries, China and the NEU all went through a major change in their trade structure during the 10-year period. All of them increased their share in SITC7 significantly. In Poland, Hungary and the Czech Republic this was mainly due to road vehicles as well as, to a lesser extend, office and automatic data processing machines. This shift in the goods structure happened predominantly at the expense of SITCo and SITC2. On the Asian continent the rising share of SITC7 was the result of higher trade in office and automatic data processing machines, telecommunication equipment and other electrical devices. At the same time and unlike the NEU, SITC8 experienced the most significant loss attributed to articles of apparel and clothing accessories. Recapitulating these changes, they could be a sign that the less developed countries' comparative advantage has been shifting from low-wage, labour-intensive to more capital- and technology-intensive manufacturing industries.

*Figure 12 and Figure 13: Change in export and import structure total trade, 1992 to 2002*

With respect to imports, the analysis shows that structural changes are on average noticeably smaller than on the export side. Japan, where import shares of SITC2 and SITC3 dropped by 5.4% and 3.3% respectively, is the only mentionable exception. The latter is most likely the consequence of Japan's poor economic performance, which overcompensated the price effect of higher oil notations at the beginning of the 21st century. Nonetheless Japan's ratio of crude oil to total imports of about 20% remains by far the highest of all industrialised countries. In general, the changes in the import structures reflect the trends on the export side, i.e. a higher share of SITC7 at the expense of SITCo and SITC6.

### **3.1.3. Export and import structure relative to Southeast Asia (SITC)**

As already mentioned, bilateral trade between Europe and Asia is still on a relatively low level, but exports to and especially imports from Asia are growing above average and it can be assumed, that this process will last for some time. As a consequence external trade structure relative to these countries will gain growing importance in the future. To reveal and assess the relative importance of foreign trade with Asian countries, namely for the European countries, we have built the subgroup «Southeast Asia» (SeA), which includes China, Hongkong, India, Malaysia, the Philippines, South Korea, Singapore, Thailand and Taiwan.

For the year 2002 a comparison of each country's trade structure vis-à-vis world market and SeA reveals some notable differences. In virtually every European country export as well as import shares in SITC7 are by far higher in trade with SeA. The same holds true for SITC8 imports, nevertheless this share has notably been shrinking since 1992. Compared to total trade the importance of SITC8 exports to SeA are below average for the NEU and Italy. Trade shares in SITC5 and SITC6 are also below world-level. Differences can be partly explained by the obviously limited trade in SITCo between European and SeA countries. All in all it is striking, that differences in the trade structure are lower on the export than on the import side.

*Figure 14 and Figure 15: Export and Import share (SITC), comparison: Southeast Asian vs. total trade (2002)*

### **3.2. Trade structure by stage of production**

The above analysis was based on the sectoral distribution of each countries structure in international trade. Next we try grouping international trade data in terms of stage of production, to get an overview of the principal use of the traded products. Following Gaulier et al. (2004) we reclassify the SITC headings on the basis of the Broad Economic Categories (BEC) of the United Nations. As a result we get the following groups: Primary goods, intermediate goods (divided in semi-finished goods and parts and components) as well as final goods (divided in capital goods and consumption goods).

#### **3.2.1. Export and import structure relative to the world (BEC)**

Looking at the export side, although differences between various countries are visible it remains difficult to categorise them in a reasonable manner. The export shares of final goods fluctuate between 50% and 60%, and between 40% and 50% for intermediate goods respectively. Outliers are Finland, Ireland, Spain as well as China and Taiwan. On the one hand the first two countries have a high share in semi-finished goods whereas in Taiwan the exceedingly high share in intermediate goods is caused by parts and components. On the other hand Spain's exports are heavily dominated by motor cars, food and beverages, whereas China's world leader position in clothing and toys becomes also visible in a large share of exported consumption goods. Trade in primary goods is with the exception of fuel imports negligible. Taking into account the rest of the import side the picture becomes clearer. As expected and contrary to the high income countries, the NIEs (excluding Hongkong), China and the NEU have only a small share in consumption goods imports. In return, this group imports relatively more intermediate goods.

*Figure 16 and Figure 17: Export and Import structure total trade by stage of production, 2002*

#### **3.2.2. Development from 1992 to 2002 (BEC)**

In the period 1992 to 2002 a shift in the export of final goods occurred. In the NIEs, China as well as Hungary and Ireland capital goods exports (which includes office machines) have risen more rapidly in contrast to consumption goods. Moreover parts and components made up an increasing share of exports as well as in imports. With the exclusion of some countries the opposite is true for semi-finished goods. For the less developed countries this shift in trade structure indicates their increasing ability to produce technologically more sophisticated products. Parallel to the SITC classification, shifts in the trade structure of high income countries were relatively small.

*Figure 18 and Figure 19: Change in export and Import structure total trade by stage of production, 1992 to 2002*

### 3.2.3. Export and import structure relative to Southeast Asia (BEC)

If we only take bilateral trade with SeA into account, changes are markedly more pronounced for Europe. Especially for the NEU export shares of semi-finished goods sharply declined in favour of parts and components as well as capital goods. In Europe the share of imported consumption goods from SeA declined by 15 PP on average. On the other hand parts and components as well as capital goods from this region became more important. These are also the two categories where European countries' export shares to SeA lie above world average. The same can be said for the import side, even though the picture for consumption goods remains to some extent heterogeneous. In Hungary, the Czech Republic and namely Ireland the share of consumption goods imports is more pronounced in SeA than total trade.

*Figure 20 and Figure 21: Export and import share (BEC), comparison: Southeast Asian vs. total trade (2002)*

### 3.3. The role of future-oriented goods

Question: What are the key products that will dominate the trade dynamics in the middle range and who is going to produce them?

#### 3.3.1. The importance of high-tech products

Why does high-technology, or high-tech products, play an important role in growth and trade? According to Hatzichronoglou (1997, p. 4), „[f]irms which are technology-intensive innovate more, win new markets, use available resources more productively and generally offer higher remuneration to the people that they employ. High technology industries are those expanding most strongly in international trade and their dynamism helps to improve performance in other sectors (spillover).“

In order to catch the important characteristics of their relevance in the future, how could high-tech products be defined? We use the classification drawn up by the OECD Secretariat in collaboration with Eurostat (Hatzichronoglou, 1997, p. 3). It takes both the level of technology specific to the sector (measured by the ratio of R&D expenditure to value added) and the technology embodied in purchases of intermediate and capital goods. Since we want to allow for a detailed analysis of trade, we use the product approach (instead of a sectoral approach), which is based on the Standard International Trade Classification (SITC Rev. 3; using data of the period 1988-95). It encompasses 9 subgroups of products:

1. Aerospace
2. Computers-office machines
3. Electronics-telecommunications
4. Pharmacy
5. Scientific instruments
6. Electrical machinery
7. Chemistry
8. Non-electrical machinery
9. Armament

Because of a relatively low ratio of R&D expenditure to the value added, the automobile industry was classified as medium-high in the sectoral approach. In order to avoid differences between the sectoral and the product approach, the automobiles were excluded from the list of high-tech products.

### **3.3.2. Limits of the high-tech categories**

Of course, export values do not necessarily reflect production processes, which require high skill labour and vast amounts of capital investments. It depends on how many intermediate goods are imported and on the technology content of the production processes. Structural analysis of the industry sector involved as well as the analysis of the trade in intermediate and finished goods might help reveal the value added (for the latter see the box below on the value-added chain in the computer industry).

### **3.3.3. Growth dynamics of high-tech goods: Evidence for their importance in foreign trade**

From 1997 to 2002, our country sample exhibited an average growth of total exports of roughly 2.5%. On the other hand, high-tech exports grew twice as much. Electronics and products for telecommunication, the largest subgroup of high-tech products which accounts for 8% of total exports, grew with 6% per year during the same time period. The same is true for aerospace, the third largest subgroup. Pharmaceuticals only account for about 1% of total trade, but this group of products with an average annual growth of 10% is by far the most dynamic group of all high-tech goods. Despite the IT boom of the nineties, computers and office machines, the second largest subgroup of high-tech products, did not perform better than general exports of goods in terms of average growth rates from 1992 to 2002. One explanation certainly is the price decline in computers which partially compensates the growth in quantity by a decline in value.

The data do not yet encompass the revival of exports after the burst of the IT bubble, but preliminary results from several countries show about the same dynamic of the high-tech products subgroups in 2003 as before.

*Figure 22: Average growth dynamics of high-tech products and their share of total exports*

The growth dynamics of high-tech exports does not follow a general pattern. It is rather country-specific. During the last years, the new members of the European Union show the strongest growth. This is particularly true for Hungary and the Czech republic, both of which already have a high-tech share in exports of more than 10 percent. But it is also true for Poland, which still has a very small fraction of high-tech exports relative to total exports.

Due to an intensive specialisation in computers and office machines, mainland China and Hongkong have reached a high-tech share of total exports which is of the same size as the one of Japan.

*Figure 23: Growth dynamics of high-tech products and their share of total exports, by country*

### 3.3.4. Competition for high-tech goods

In our country sample, the USA export almost one fourth of all high-tech exports. Due to the fact that automobiles are excluded from our list of high-tech goods, Germany and Japan are far behind with somewhat above ten percents. After the UK, China already is the fifth largest exporter of high-tech goods, closely followed by Hongkong, Taiwan and Korea. Italy, similar to the other southern European countries, only accounts for a small fraction of total high-tech exports, despite its similar economic size compared to the UK.

*Figure 24: Country shares in the world wide trade in high-tech goods*

The relative importance of a country in the field of high-tech exports depends – besides of its economic size and openness, of course – on the share of high-tech exports relative to total trade. While the old member states of the European Union in middle and northern Europe as well as Switzerland have a large share of high-tech exports, these goods only account for a small fraction of total exports in the southern member states Italy and Spain (and also Greece, not shown). Due to its computer and pharma industry, Ireland has reached an unusually high share of over 35% of total exports. IT is also the dominant subgroup for the UK and Hungary, both of which have a high-tech share of over 20%. Equally, all Asian countries have reached a high-tech share of 20% up to 40% in the case of China, due to the computer industry. The share of high-tech goods in Germany and Italy are considerably reduced due to the facts that exports of automobiles are not counted in this category, as already mentioned.

*Figure 25: Share in high-tech products relative to total exports*

The average share of high-tech exports of the selected countries is 21% (weighed by total exports), whereas the average share of high-tech exports of computers, office machines, electronics and telecommunications (mainly information and communication technologies, furtheron called „ICT“) is 14%. „ICT“ thus accounts for about two thirds of all high-tech exports.

### 3.3.5. Specialisation in subgroups of high-tech goods

If we want to single out the impact on high-tech (or even total export) growth of the different subgroups of high-tech goods, we need to combine their share and their growth rate and calculate the corresponding contributions to growth. We did so using average growth rates for 1997 until 2002 and average shares in high-tech of the different subgroups. Most of the analysed countries depend on one or two subgroups of high-tech goods for their overall contribution of high-tech to total export growth. These are either electronics and telecommunication or computers and office machines. Switzerland is about the only country which relies on another subgroup. Pharmaceuticals almost entirely account for the growth in high-tech goods.

Ireland, UK, Finland, Hungary, the Czech Republic as well as all the main exporters in the Far East are concentrating in „ICT“ exports. Among them, Finland is particularly focused on the production of telecommunication products.

Specialisation in one sector makes a country vulnerable to shifts in the production strategy of international companies or cyclical movements (e.g. swings in the IT cycle). That was the case after

the burst of the IT bubble, when some large producer moved their production away from Ireland to some Central European countries. The need for up-to-date-equipment of computer assembly plants allows to quickly move manufacturing from one location to another without losing valuable long term investments. But very often, a country just moves up the value-added chain and focuses on higher qualified labour (see box).

### 3.3.6. Conclusion with respect to the importance and the dynamics of high-tech products

In many countries, the high-tech share of total exports is about 20% or more and is growing twice as fast compared to total exports. Not computers and office machines, but pharmaceuticals followed by electronics and telecommunication are most dynamic subgroups. Nonetheless, the main drivers of export growth is mostly information and telecommunication technology.

#### **BOX: The value-added chain in the computer industry**

The subgroup „computers and office machines“ accounts for one forth of all high-tech exports and is of crucial importance in several European countries (above all Ireland, Hungary and the Czech Republic) and many Asian countries. Therefore, it is appropriate to analyse how international competition influences the production of computers and how the companies split up the production process over different countries.

For computers, the SITC category 752 summarises the bulk of the trade in final goods (automatic data processing machines), whereas the category 75997 stands for the corresponding intermediate goods (parts and accessories). Today, countries like Spain, Italy, Poland or Switzerland, which do not have an own computer industry, import parts and components for computers worth roughly 25-50% of the category 752, i.e. computers.

If we look at typical computer producing countries, we get the following trade shares for parts and components relative to the trade of office machines for the year 2002:

	Ireland	UK	Hungary	Czech Republic	China	Taiwan	Korea	Hong-kong	Japan	Indonesia	Malaysia	Philip-pines	Singapore
Import	129	50	109	32	137	23	59	160	48	19	277	2865	206
Export	79	64	27	29	65	82	95	172	108	81	123	55	63

Footnote: Data for Indonesia, Malaysia, the Philippines and Singapore are drawn from the UNCTAD on a SITC 3 level basis, therefore SITC-Category 759 was chosen instead of 75997, including other minor subgroups and items and thus slightly overestimating the share of parts and components.

Clearly, the production process of computers is split up over different countries. Several countries import far more parts and components than computers, which indicates locations of assemblage. This is the case for the Philippines, Malaysia, Singapore, Hongkong and China, and to a lesser degree for Hungary and Ireland.

Hungary and the Philippines are by far net importers of parts and components which confirms the hypothesis that they primarily host assemblers of computers. For Hungary, OECD data for 2001

show a added value in office, accounting and computing machinery of only 7%, significantly less than most other countries.

Japan and to a much lesser extent Hongkong are the only net importers of computers in East Asia. While Japan has specialised in the production of parts and components (and also has, as a highly industrialised country, a strong demand for computers), Hongkong is strongly intertwined in all processes of computer manufacturing.

The main exporters of computer parts and components are China, Japan, Hongkong, Malaysia and Singapore (between 15-12% of our country sample), followed by Korea, the UK (Scotland) and Ireland. China is not only the most important exporter of computers, but also exports more parts and components than any other country of our sample. Although China might be engaged in intermediate assembling processes in the production of parts and components, too, the finding does not seem to confirm the hypothesis of China solely being an assembler of computers while buying parts and components in other Asian countries.

The most important step in the production of computers is the manufacturing of parts and components, because most of the innovation is now carried out by components' suppliers (Barry and Curran, 2004). The manufacturing of parts and components appears to be more globalised than that of computer assemblers, and so the production tends to be shifted to the newly industrialised countries in Asia. Malaysia, for instance, already has a share of total exports of parts and components similar to the one of Japan.

But the traditional producers of IT as the US or more recently Ireland move up the value-added chain, producing the more complex components, persuing research activities and testing. More than 80% of OECD R&D spending in the computer hardware sector continuous to take place in the US and Japan (Barry and Curran, 2004).

#### **4. Consequences of the goods structure for European countries's exports**

Question: Is there any future for a European export industry?

##### **4.1. Export perspectives of European economies facing Asian competition**

Even though European imports from and exports to Asian countries currently account for only a relatively small share of Europe's total trade, this share is increasing. Thus, based on the goods structure of Asia and Europe, the export perspectives of European economies challenged by Asian competitors are to be questioned. In doing so, the focus is on goods which account for a relatively large share of exports. Furthermore, a framework is defined in accordance with two main features of international trade.

First, there is the inter-industry specialisation between countries. This is not only the case within Asia, but also among European countries as well as between Asian and European economies, as pointed out in the previous chapters. The development of the goods structure in Europe on the one hand, in SeA on the other hand points to the fact that for some goods European economies have a



comparative advantage to produce and export them, for others it is SeA. Typically, more labour-intensive products are produced and exported from SeA, whereas research-based goods requiring a high skill level are produced and exported from Europe. Thus, export performance perspectives are relatively favourable for those European countries which have a relative large share of latter products in total exports. Such goods are special machinery (SITC72) and other industrial machinery and parts (SITC74). But European economies with a sector specialisation on textiles (SITC84) and/or toys, sports articles (SITC894) face a hard time ahead. Given the important role of high-tech products for overall economic growth, a country is likely to be better positioned with a large share of these products in total trade. Several European economies have a relatively strong specialisation in medicinal and pharmaceutical products as well as chemicals (pharma, SITC52 and 54) and in power generating machinery and equipment (SITC71) as well as in other transport equipment (SITC79), of which parts of it are classified as high-tech products, too (see chapter 3.3).

Second, the intra-industry specialisation has to be taken into consideration. In some countries of SeA the share of high-tech goods is as large as in more developed economies, mainly due to office machines and telecommunication (SITC75 and 76). As pointed out in the previous chapter, Asian countries do not only export labour-intensive, low technology goods, but their share of more technology-intensive products in total trade has been increasing over the last decade – and hence a growing number of product categories for the world market is being produced in SeA. Thus, trade relations between Asian and European economies are not limited to SeA exporting mainly cheap, common goods, and Europe more sophisticated technology-intensive goods. Similar to Asian companies taking advantage of location specific advantages, European companies divide their production process in multiple steps at different locations in Europe, and also in Asia. Two points have to be made in this context. First, the large share of high-tech products in total exports of some Asian economies, notably China, may be at least partly misleading. The development of new computers is knowledge-based, whereas the assembly of many parts to a computer is not. The same is true for telecommunication products. Thus, the assembly of computers or mobile phones in an European economy is likely to be under increased competitive pressure from SeA. Second, the production of electrical apparatus (SITC77) seems to be quite suitable for being divided in various steps, as mentioned in chapter 2, and a significant part of the production is done in Asia. European countries which still have a large export share in these goods may have less favourable export perspectives.

This intra-industry specialisation of European (and US) companies involving Asian locations has increased. Firms implement intra-industry specialisation (= vertical specialisation) as a strategy to keep their price-competitiveness by optimising the production cost structure in order to remain in business or ideally even expand it. Generally, the division is made in accordance to the determinants of the inter-industry specialisation, i.e. comparative advantages. While labour-intensive production steps are located in low cost economies, research-intensive steps will be concentrated in more mature economies.<sup>8</sup> A relatively larger share of intermediate goods than final

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<sup>8</sup> Geographic proximity, however, is likely to play a more important role in vertical specialisation than in inter-industry specialisation.

goods in total imports might be an indicator for this intra-industry specialisation, as data presented in the previous chapter show. NEU and Ireland have such a relatively higher share. If only the trade with SeA is considered, Hungary and Ireland still have a larger share of intermediate goods. Another strategy is product differentiation within the same industry. Hence, it is also an intra-industry specialisation, but with the aim to make the product different to the one of competitors (= imperfect substitute), so as to be able to ask a higher price.

#### 4.2. Which economies have relatively favourable export perspectives?

The above presented framework is now applied to the European economies. According to the data of year 2002, the following qualification can be made

Germany, France and the UK have a rather favourable goods structure, as their export share in SITC71, 72, 74 and 79, here defined as «European goods» are approximately 20% of their total exports and the respective share in SITC75, 76, 84 and 894, hereafter called «Asian goods» is relatively low. Moreover, the export share in pharma, in which European countries seem to have a comparative advantage, accounts for another 3% to 6%. At the same time, the high-tech share of this three economies is reasonable large, particularly in the UK. At first sight, Germany's high-tech share disappoints with a rather low 14%. However, road vehicles that can be considered as medium-tech account for close to 20% of total exports, which obviously reduces the shares of other goods categories. Some German car makers are likely to have been successful with product differentiation.

*Figure 26: «European goods» and road vehicles (2002)*

From the big 4, Italy's good structure gives some reason for concern. Even though its export share in «European goods» accounts for 20% of total exports, too, Italy has a very low high-tech share. Moreover, its export concentration on «Asian goods» with a share of 14% is rather large. To what extent Italian producers have managed to differentiate textiles and shoes so as to be imperfect substitutes to Asian competition can not be concluded from the data. In addition, pharma is not an important export industry in Italy. Spain, too, has a low high-tech share of 5%, and «European goods» make up only 10%. Even by taking into account that road vehicles account for a large 23% of total exports and that the shares in manufactured goods (SITC6) and food (SITCo) remain relatively large with 17% and 12% respectively, the good structure of exports does not look very favourable.

*Figure 27: «Asian goods» (2002)*

Ireland and Switzerland's common point is a large high-tech share in total exports (35% resp. 20%), as pharma is a dominant export product (17% resp. 18%). In the case of Ireland, office machinery is also responsible for the large high-tech share. The Finnish economy has a small share in pharma (2%). But due to large exports of telecommunication products, it has a high-tech share similar to Switzerland, even though exports of manufactured goods account for over 30% of total exports.

*Figure 28: Chemicals and related products, pharma (2002)*

Regarding the NEU, Hungary stands out with a comparable high export share of 20% in «European goods» and a high-tech share of 22% – close to the 24% in the UK. The high-tech share is mainly driven by telecommunication, and as it is pointed out in chapter 3.3, the value added part is limited (i.e. principally assembly production). Nevertheless, this industry is positioned in a dynamic sector. When interpreting the data of Poland and the Czech Republic, we have to keep in mind that exports of manufactured goods accounts for about 25% of their total exports, which is quite large. Thus, a share of approximately 16% and 13% respectively in «European goods» still is rather favourable. Moreover, their exports of «Asian goods» are below average. Nevertheless, whereas 16% of total Czech exports are road vehicles and further 12% high-tech goods, Poland's export industry with a high-tech share of only 5% has the image of not being very technology intensive. With respect to the export of electrical apparatus (SITC77), only the Czech Republic, Hungary and Ireland have a somewhat larger share of 10% or slightly above that.

### 4.3. Trade balances

The thesis that European countries have a comparative advantage in producing the «European goods» is supported by the development of the trade balances between the respective European countries and SeA. Keeping in mind that exchange rate fluctuations, price changes and business cycles influence trade balances, some general comments can be made. For most of the period 1992 to 2002, France, Finland, Germany, Italy, Switzerland, the Czech Republic and the UK had a trade balance surplus in SITC72, 74 and partly in 79. The trade balance of Germany in SITC78 was positive, and also of the Czech Republic. However, the fact that Germany's trade balance in road vehicles with Asia is positive should not be over-interpreted, as private consumption in Germany has been subdued for many years. On the other hand, negative trade balances resulted in SITC75, 76, 84 and 894 for all European countries considered but Finland. The latter economy has a trade balance surplus in SITC76. Another interesting point is, that Ireland and Hungary managed to have a positive trade balance in SITC 76 with the world.

*Figure 29: Trade balance with SeA (1992, 1997 and 2002)*

*Figure 30: Trade balances with SeA (2002)*

A further piece of information is given by the trade balances on the basis of the BEC groups. They add some characteristics to the overall picture: Except Switzerland, all European economies had a negative trade balance with SeA in consumption goods. Switzerland's export exposure in pharma and watches combined with a weak private consumption is likely to be responsible for Switzerland's positive trade balance. With respect to capital goods, the picture is mixed. Finland, France (but with a downward trend), Hungary, Italy and Switzerland had a positive trade balance. Germany's trade balance, however, was in deficit in the period 1998 to 2002. The German economy was more affected by the Asian crisis than e.g. France. Regarding parts and components as well as semi-finished goods, the Czech Republic, Poland and Ireland – three out of the four countries with a relatively large share of intermediate goods in total imports – had a negative trade balance. This may be an indicator that they are to a large extent assembly economies. However, at least Ireland is moving up the value-added chain (see chapter 3.4). Finland, Spain and the UK, too, had a trade

deficit in parts and components. Except Finland, all these countries have a negative trade balance in capital goods, too.

*Figure 31: Trade balance with SeA: Parts & components, 1992 to 2002*

#### **4.4. Structural changes**

These favourable and less favourable export prospects are to a certain extent a mirror image of the ongoing structural adjustment depicted in chapter 3.1, with the shift in relative shares of agriculture, industry and services in national output of European and Asian economies. More mature economies, e.g. the UK, France, Germany and Italy have already a large share of value added in the service sector (approx. 65% of GDP). The Czech Republic and Poland still have an important industry sector, as manufacturing still accounts for a large share, and foreign firms established production sites in these economies. Finland and Ireland – to name two other examples – with their specialisation on telecommunication and office machines as well as paper and pharma respectively, have also a relatively high value added in the industry sector.

#### **5. Final remarks**

The emergence of Asia as an important player in world trade brings about chances and challenges for European industries. Apparently most of these countries follow a growth strategy based on exports to Europe and the USA. New business opportunities arise, while other firms are under increased competitive pressure – if they are still in business. Industries in European countries producing «European goods» are likely to be less pressured by Asian competitors. Moreover, they benefit from the industrialisation in SeA. The European economies analysed having a relatively large share in high-tech, and hence, in dynamic sectors, are better positioned to absorb labour force redundancies due to the on-going structural changes.

Finally, rising income per capita in SeA is likely to increase Asian demand for diversified products, which may also be beneficial for European consumption goods exports. This may at least partly correct the trend of an increasing trade balance deficit in consumption goods with China over the long run.

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# Annex

Figure 1

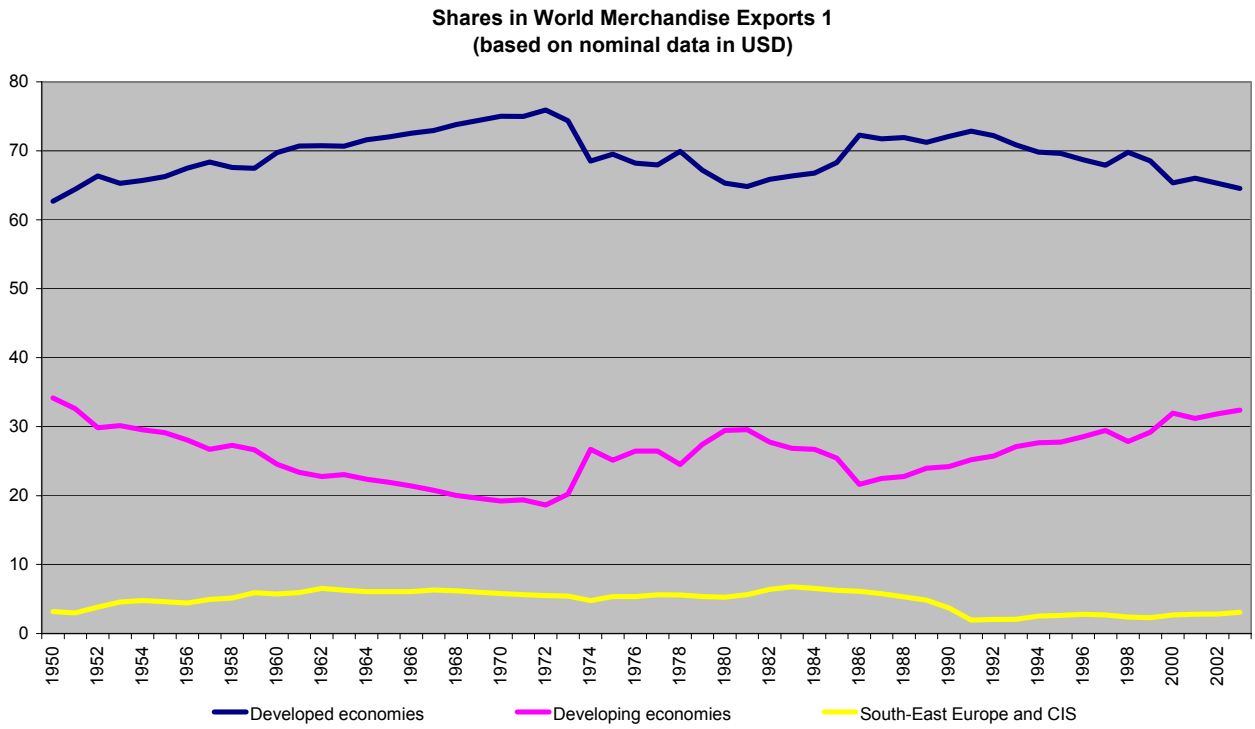


Figure 2

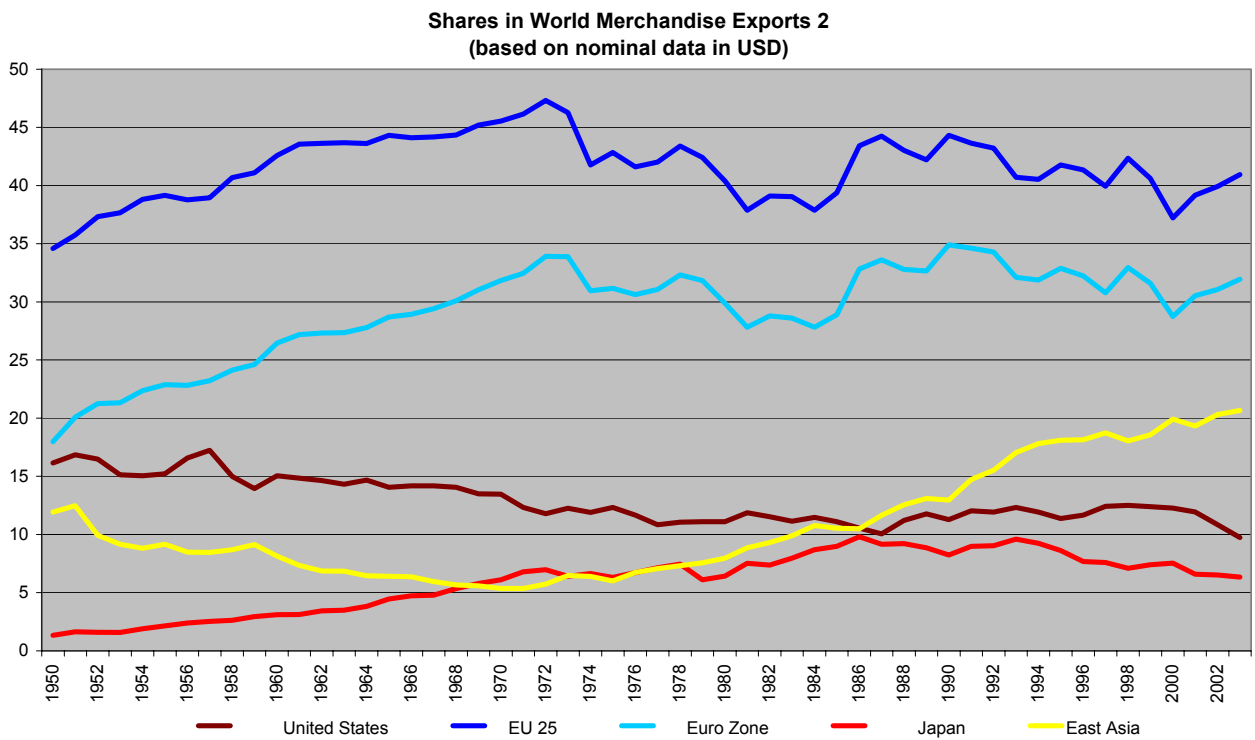


Figure 3

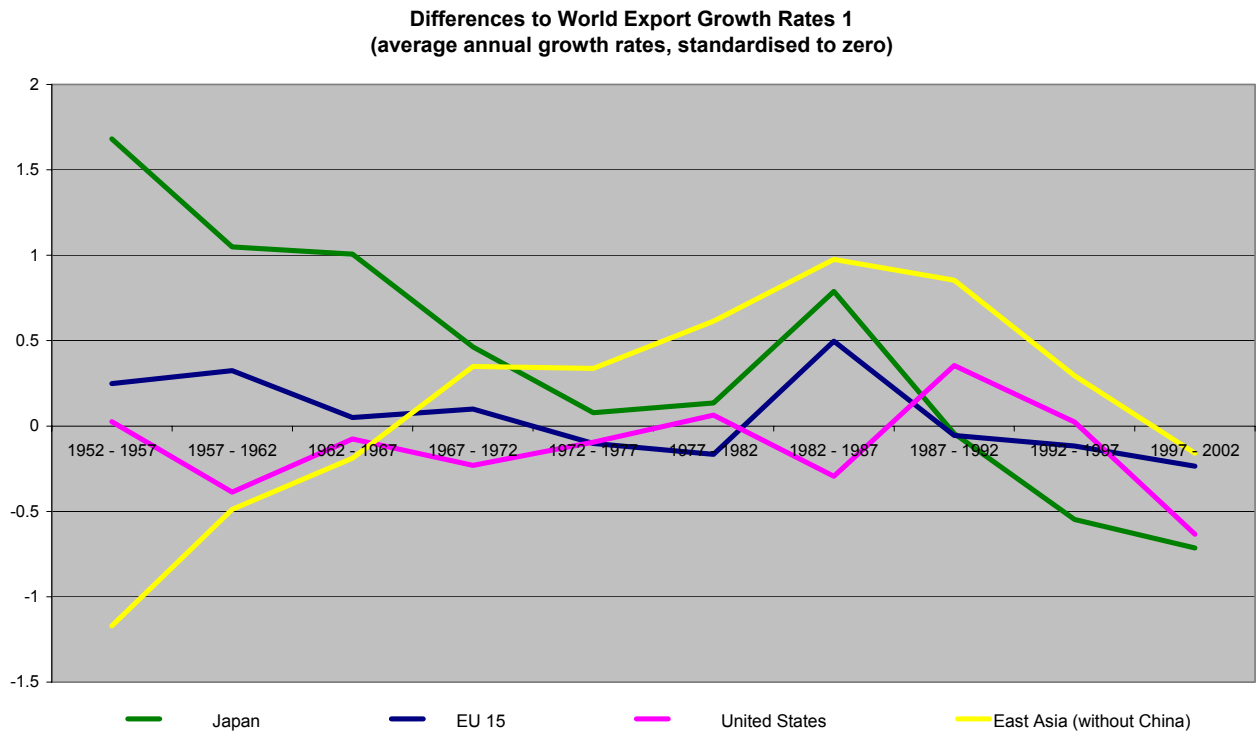


Figure 4

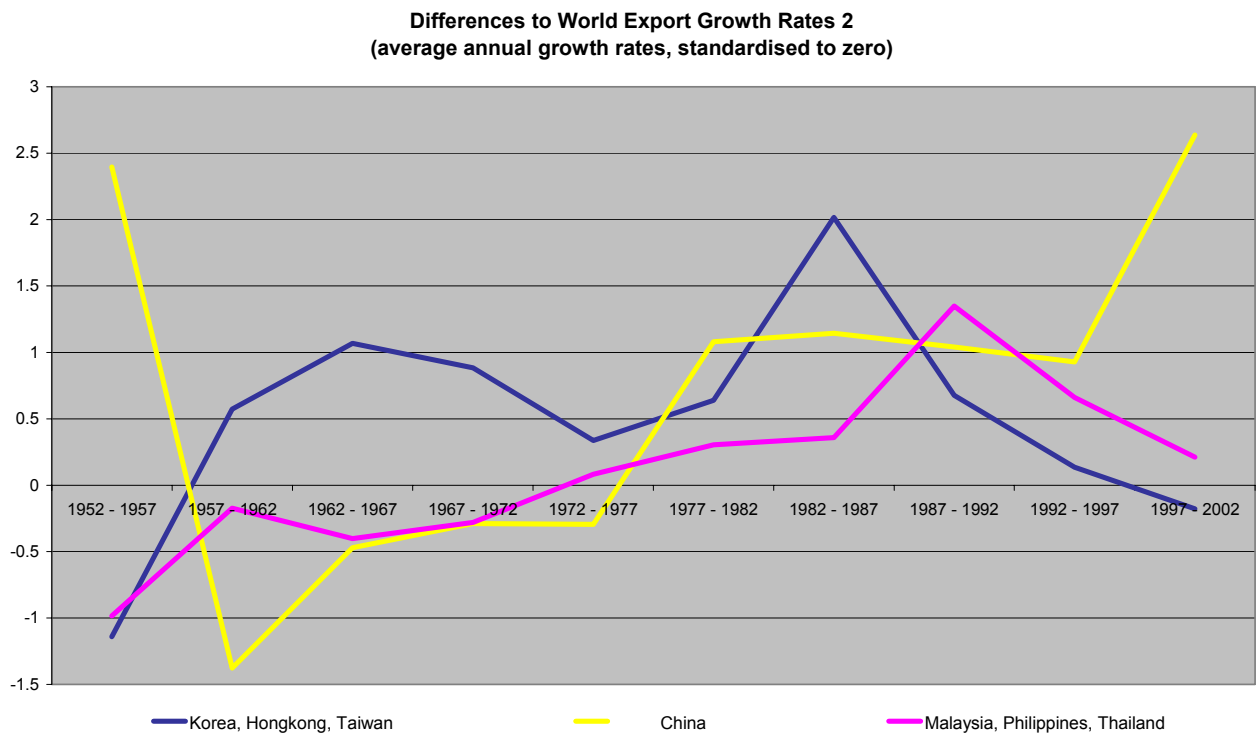


Figure 5

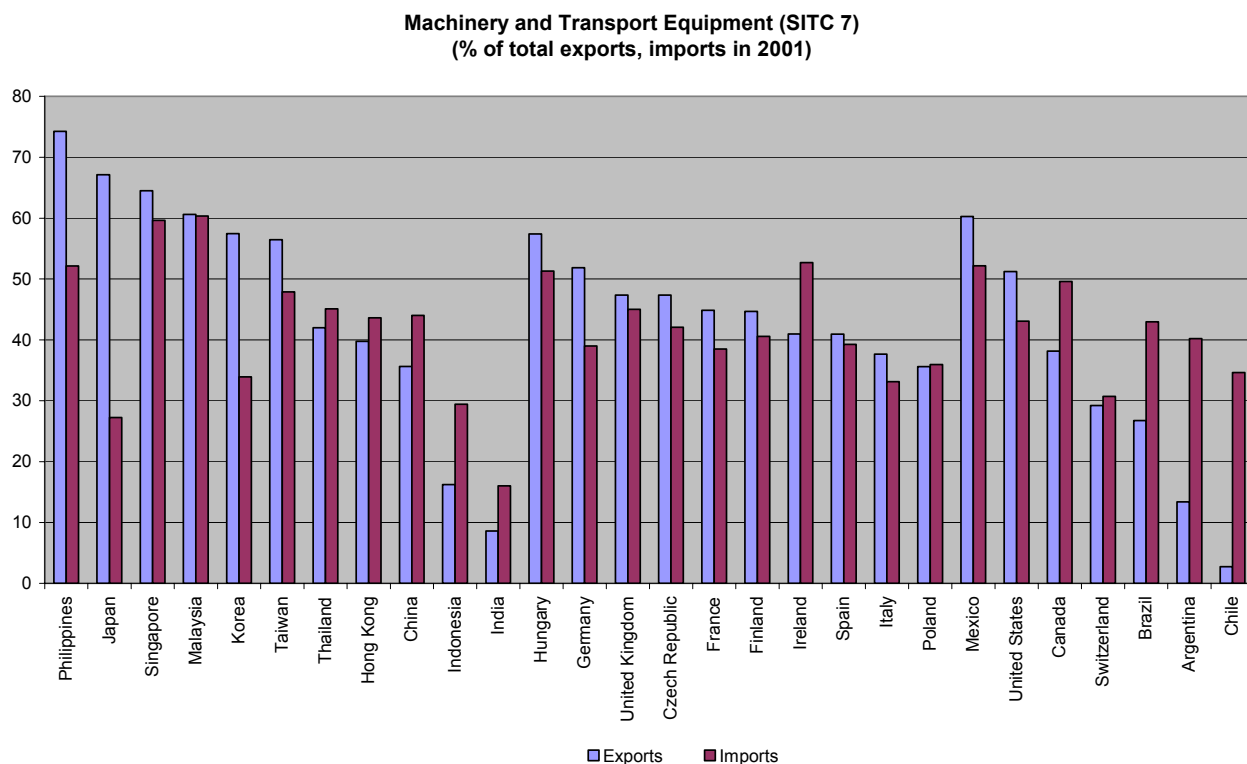


Figure 6: Development of Asian Trade with Industrialised Countries (IC) and within the Region

	Share of Exports to IL		Share of Exports to East Asia		Share of Imports from IL		Share of Imports from East Asia	
	1985	2003	1985	2003	1985	2003	1985	2003
Japan	58.4	45.6	26.3	46.2	39.9	36.7	28.6	44.5
NIEs	66.8	43.0	23.1	49.2	60.1	42.3	25.0	47.9
ASEAN 4	53.7	45.8	36.7	48.3	54.4	44.0	33.0	45.9
China	44.3	56.2	40.0	33.2	72.4	43.5	17.2	38.0



Figure 7: China's Trade by Stage of Production and its Contribution to Total Trade Balance in 2002

	World		Contribution in % to Total Trade Balance					
	Exports in %	Imports in %	World	Japan	Europe	North America	NIE	ASEAN 4
Primary goods	3.0	10.9	-59.1	4.3	-3.6	-7.6	7.3	-3.3
Intermediate goods	34.8	60.9	-169.8	-59.1	-10.2	7.2	-51.5	-26.8
Semi-finished goods	20.2	34.1	-88.5	-27.7	-1.1	4.7	-37.3	-11.3
Parts & components	14.5	26.8	-81.3	-31.5	-9.1	2.6	-14.2	-15.4
Final goods	62.2	28.2	328.9	44.2	48.5	124.5	58.8	6.0
Consumption goods	41.6	6.3	318.0	59.2	50.5	100.3	59.6	5.5
Capital goods	20.6	21.9	10.9	-15.0	-2.0	24.2	-0.7	0.4
Total	100.0	100.0	100.0	-10.6	34.7	124.1	14.6	-24.1

Figure 8: Contributions of Intermediate Goods (IG) and Final Goods (FG) to Various Trade Balances

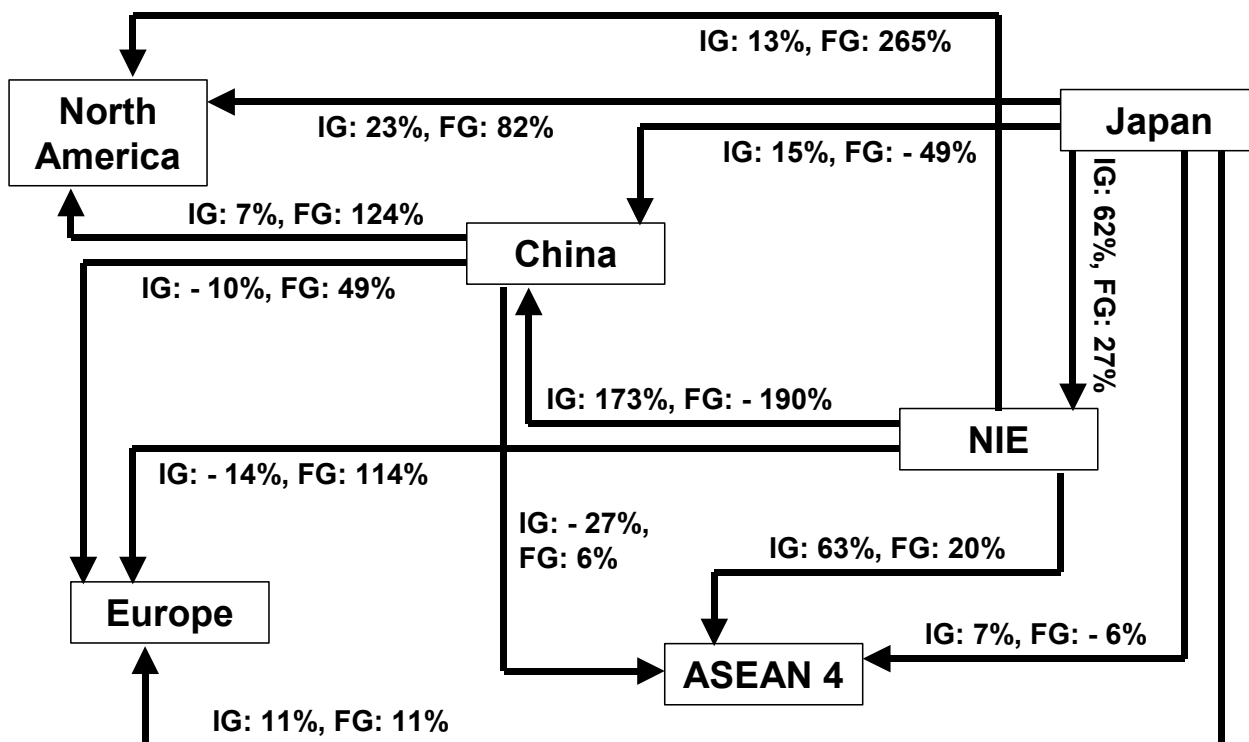


Figure 9: Trade Shares and Values with East Asia

	Exports to East Asia			Imports from East Asia		
	1980 in %	2003 in %	Value 2003 in Mill. US\$	1980 in %	2003 in %	Value 2003 in Mill. US\$
EU 25	-	5.4	164902	-	9.5	288789
EU 15	3.2	5.6	160809	3.6	9.6	266504
EU 10	-	2.2	4093	-	8.7	22286
USA	12.5	18.7	135202	12.9	27.0	352001
Japan	28.1	46.2	219070	25.9	44.5	170422

Figure 10

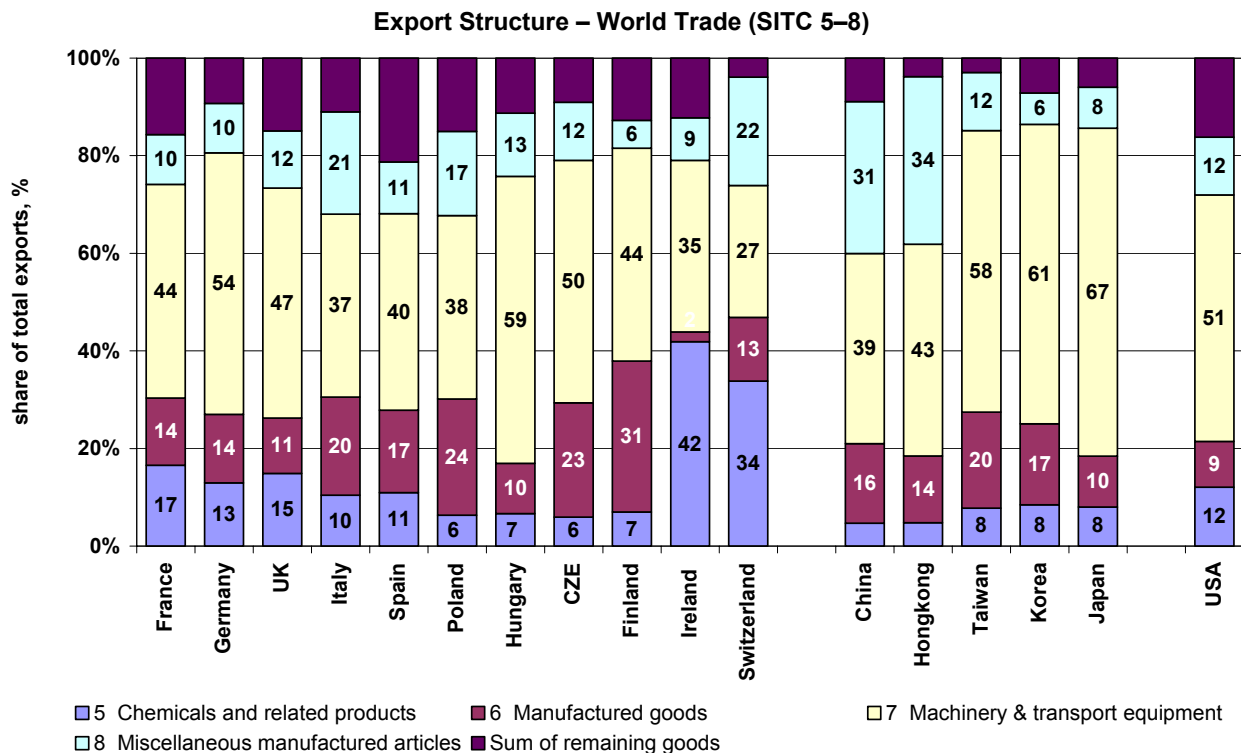


Figure 11

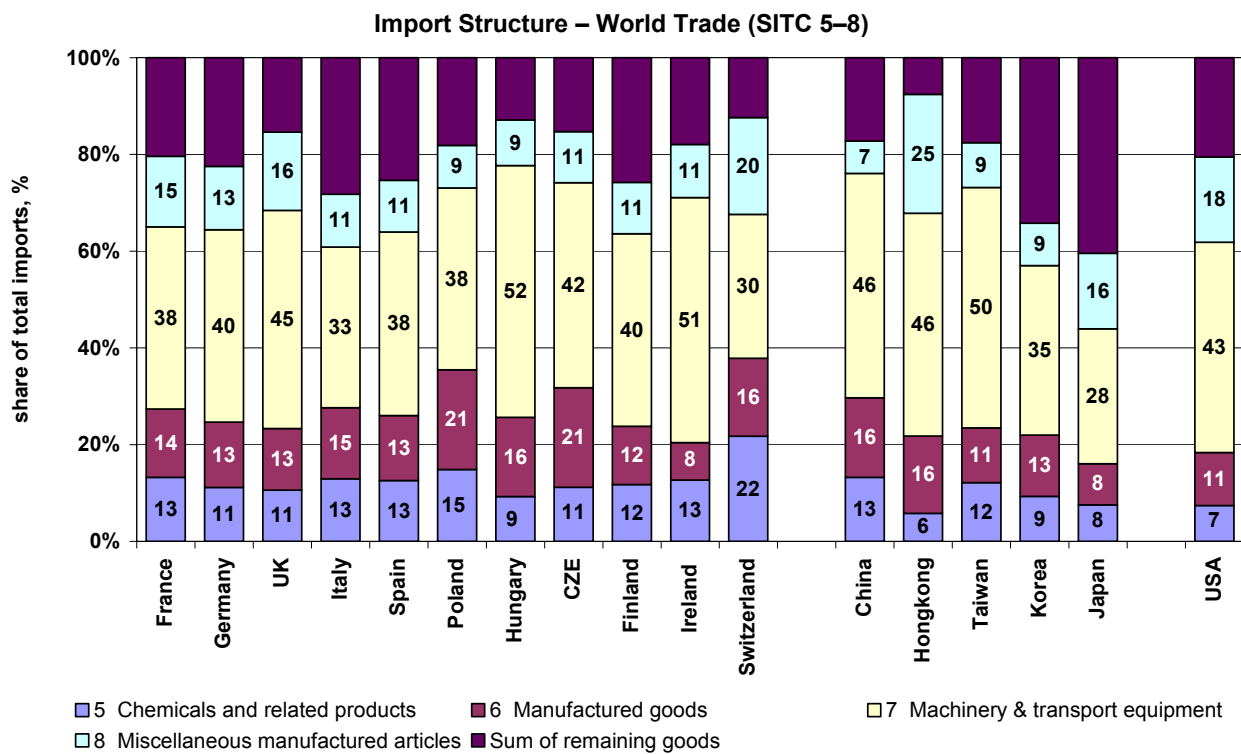


Figure 12

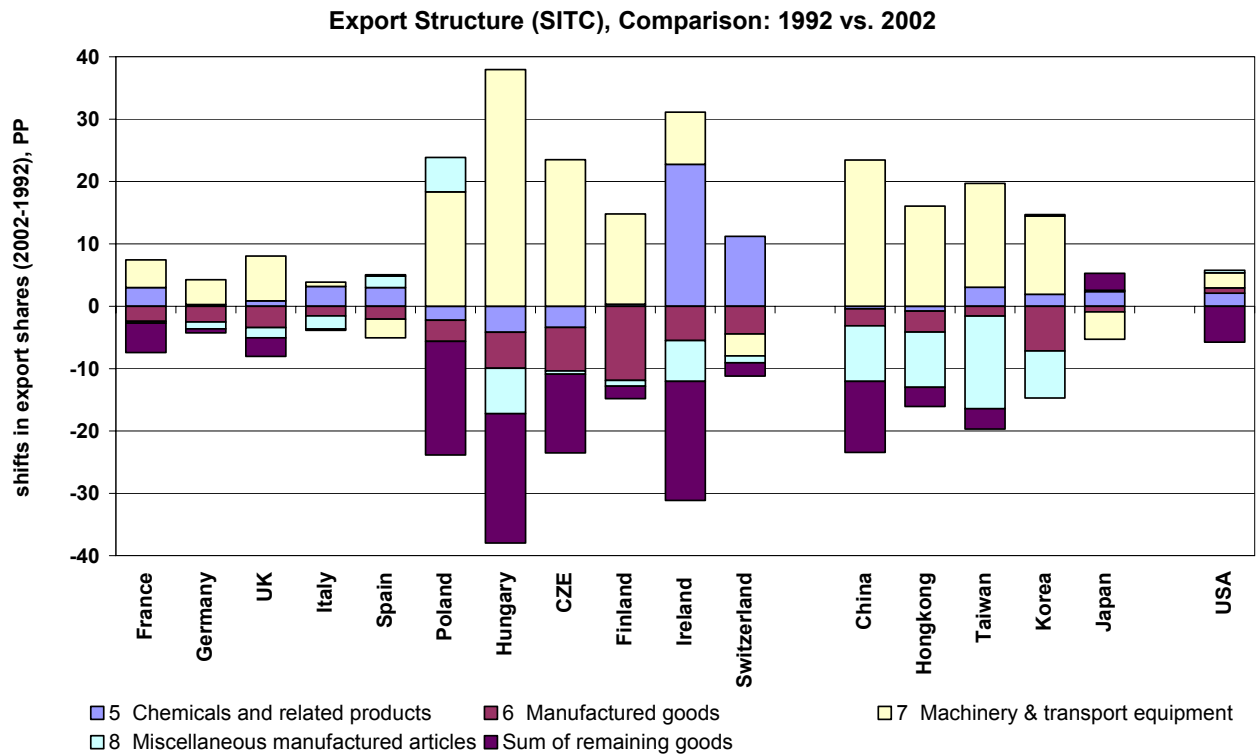


Figure 13

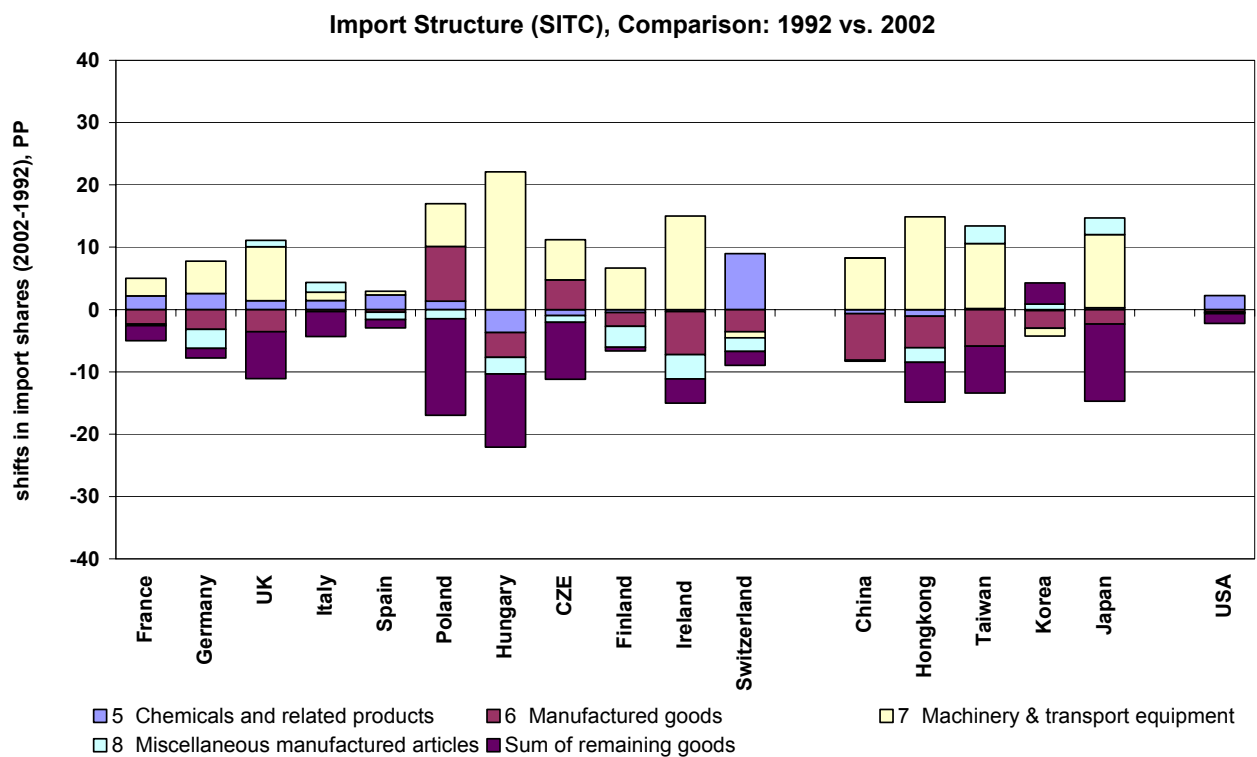


Figure 14

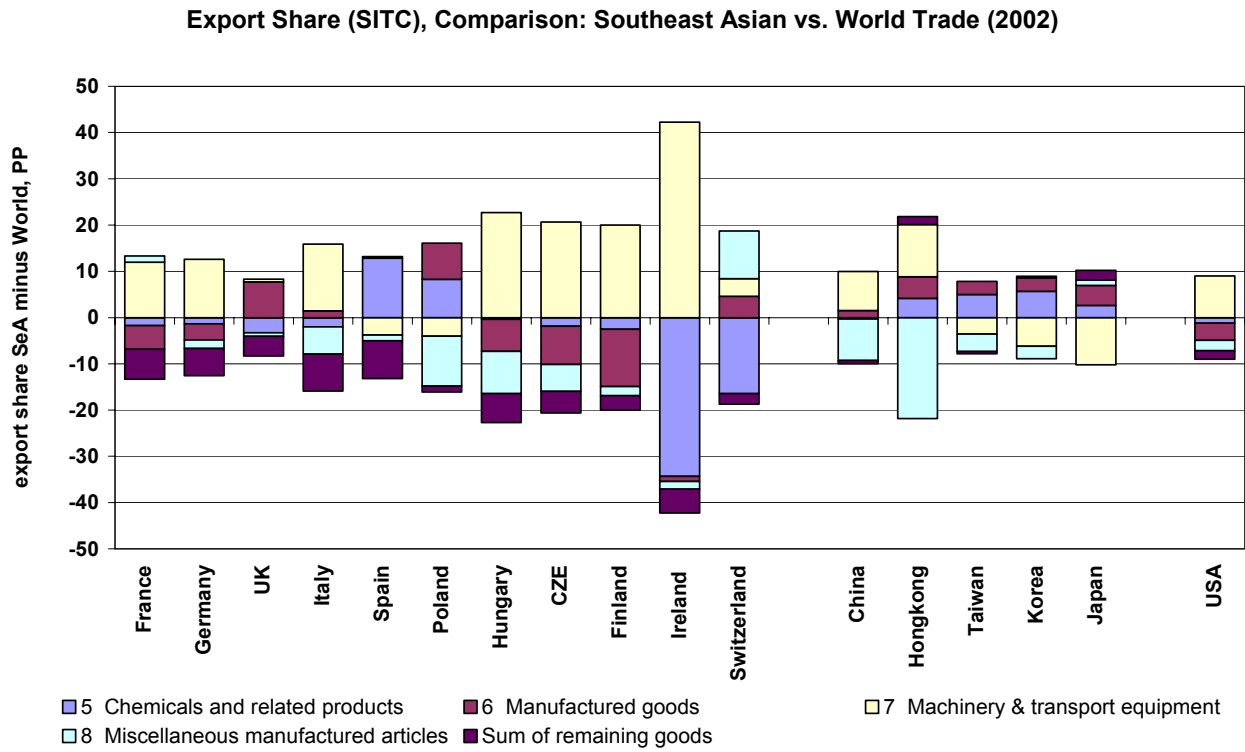


Figure 15

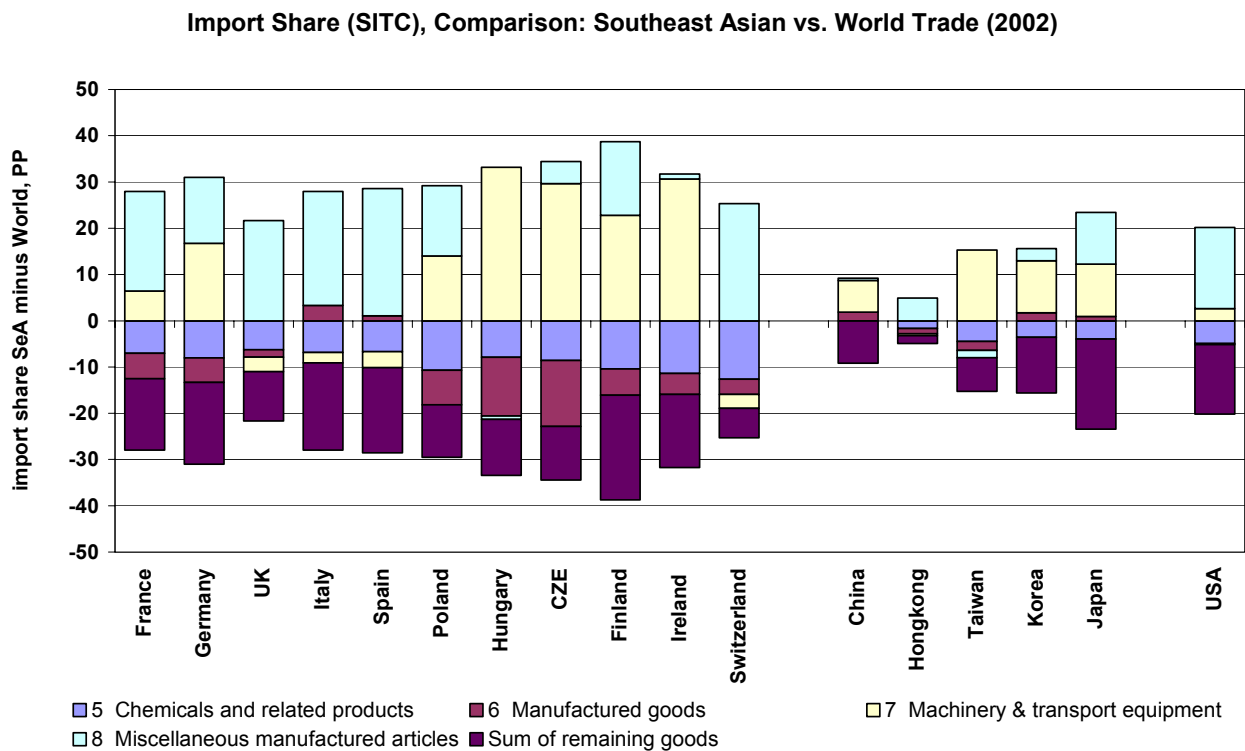


Figure 16

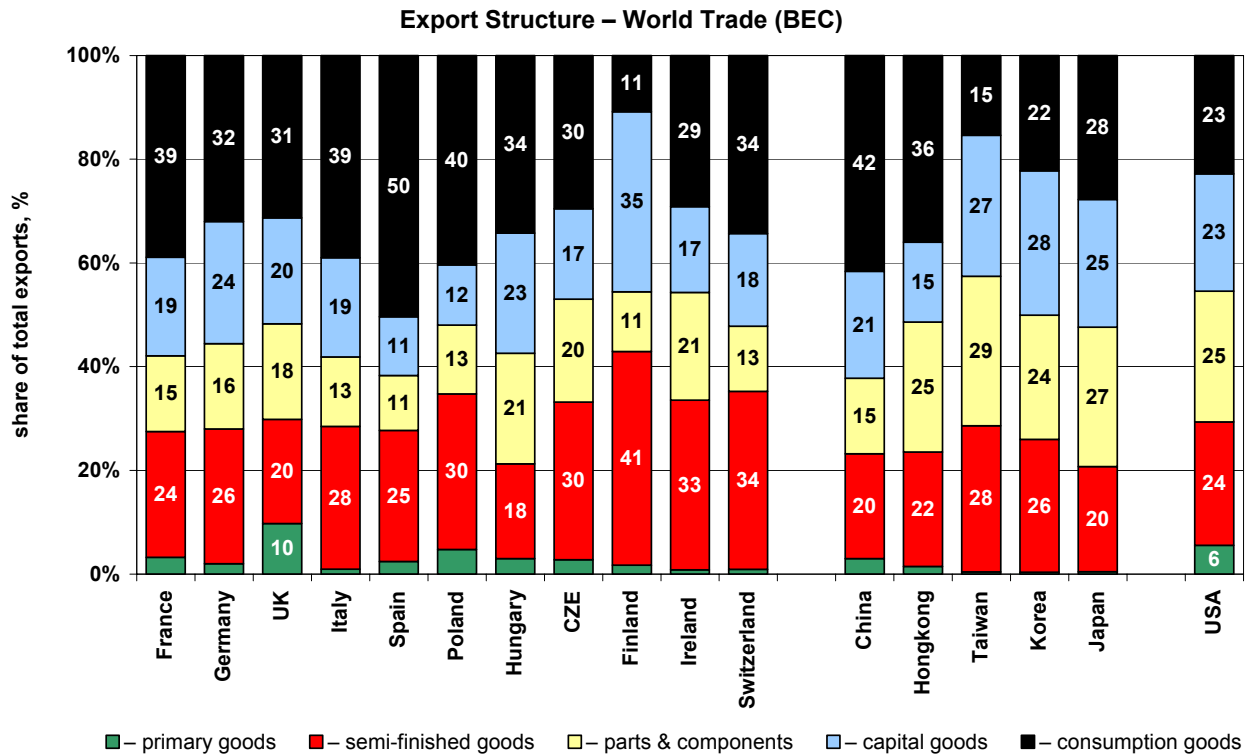


Figure 17

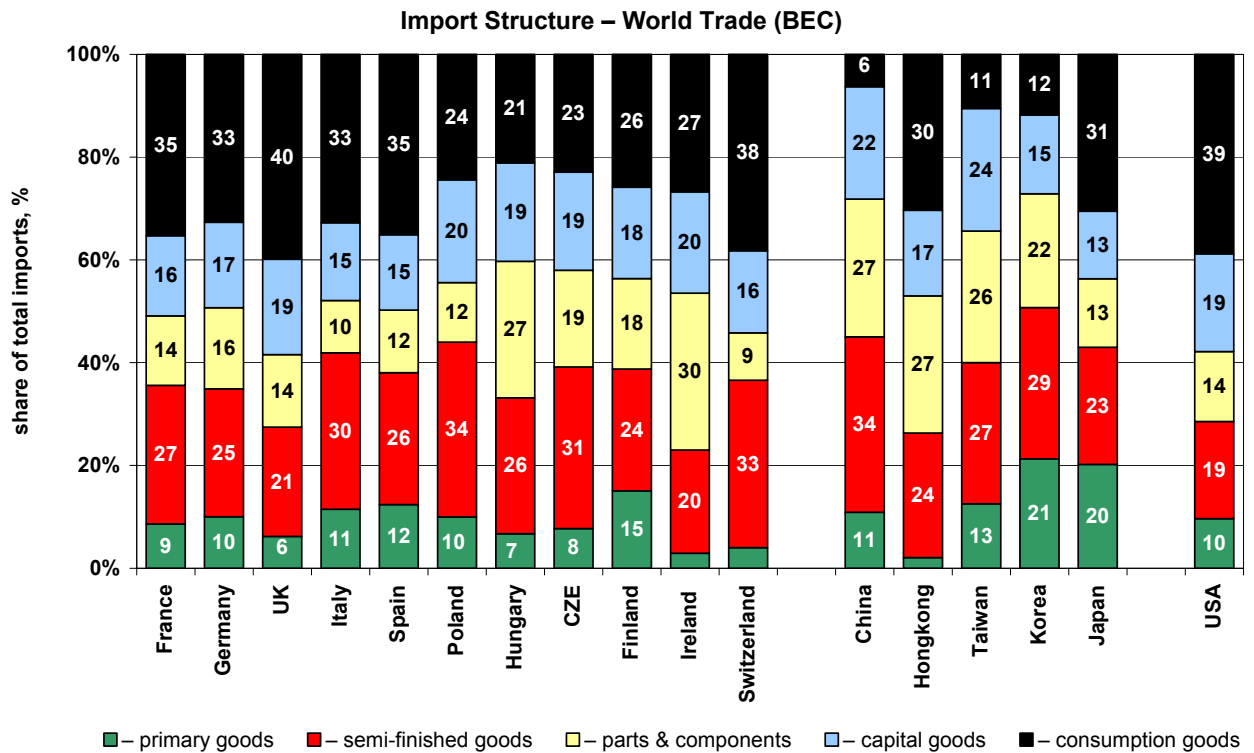


Figure 18

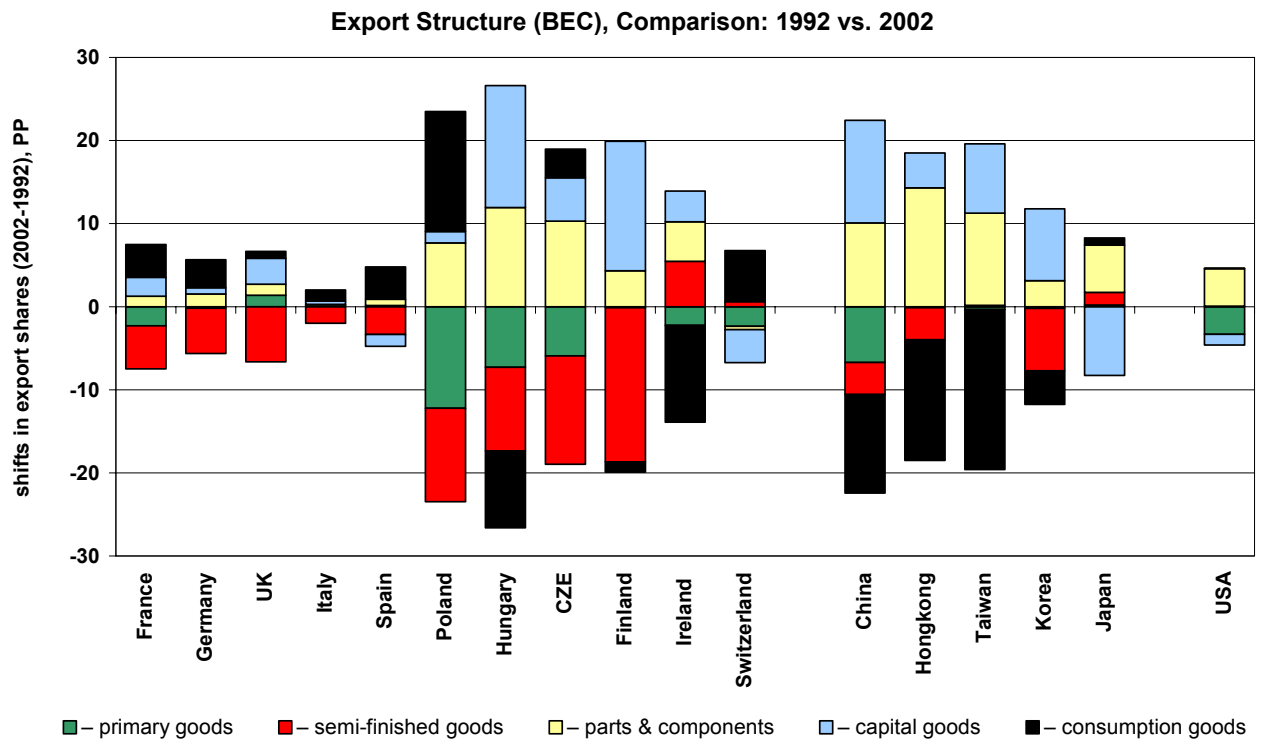


Figure 19

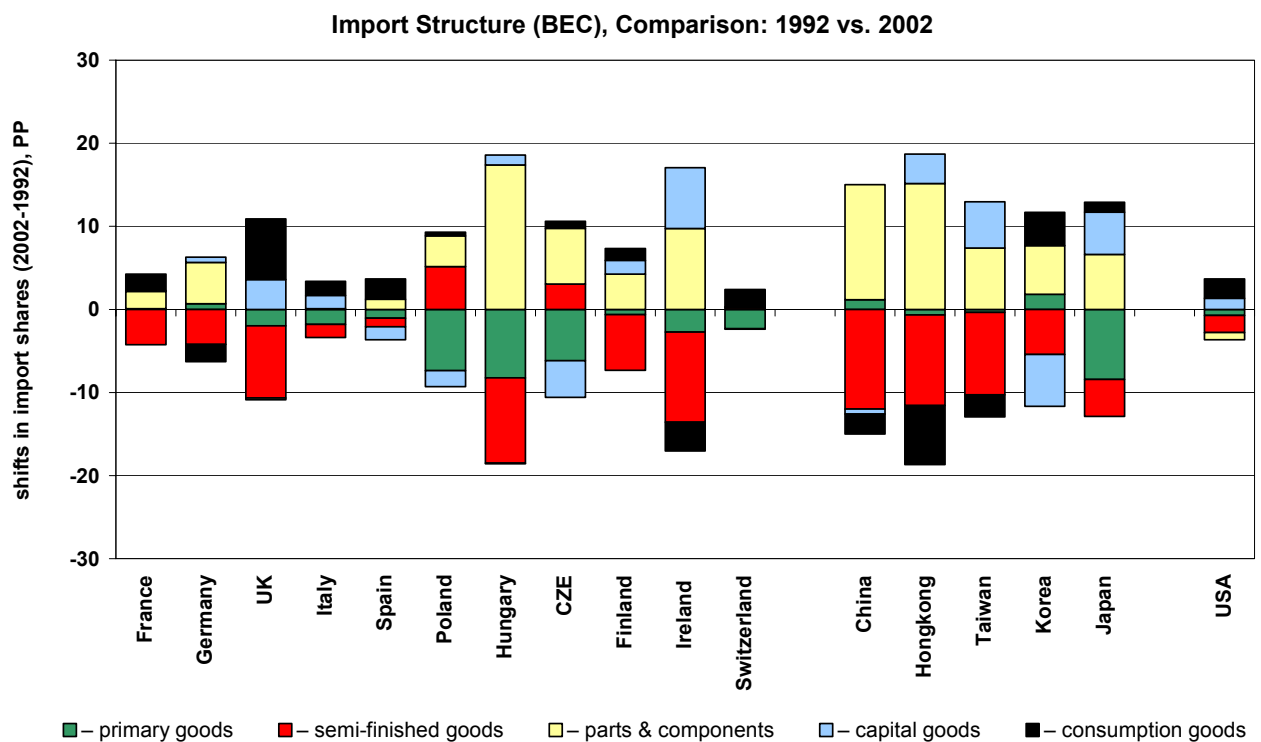


Figure 20

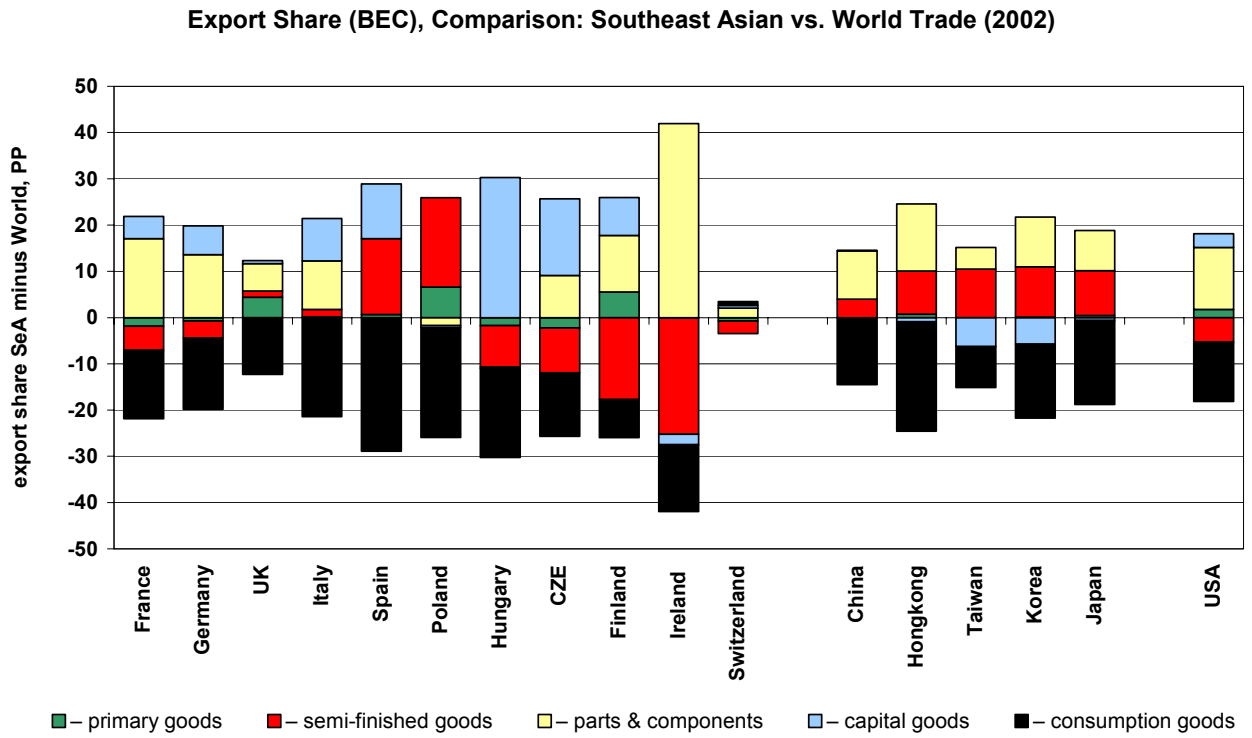


Figure 21

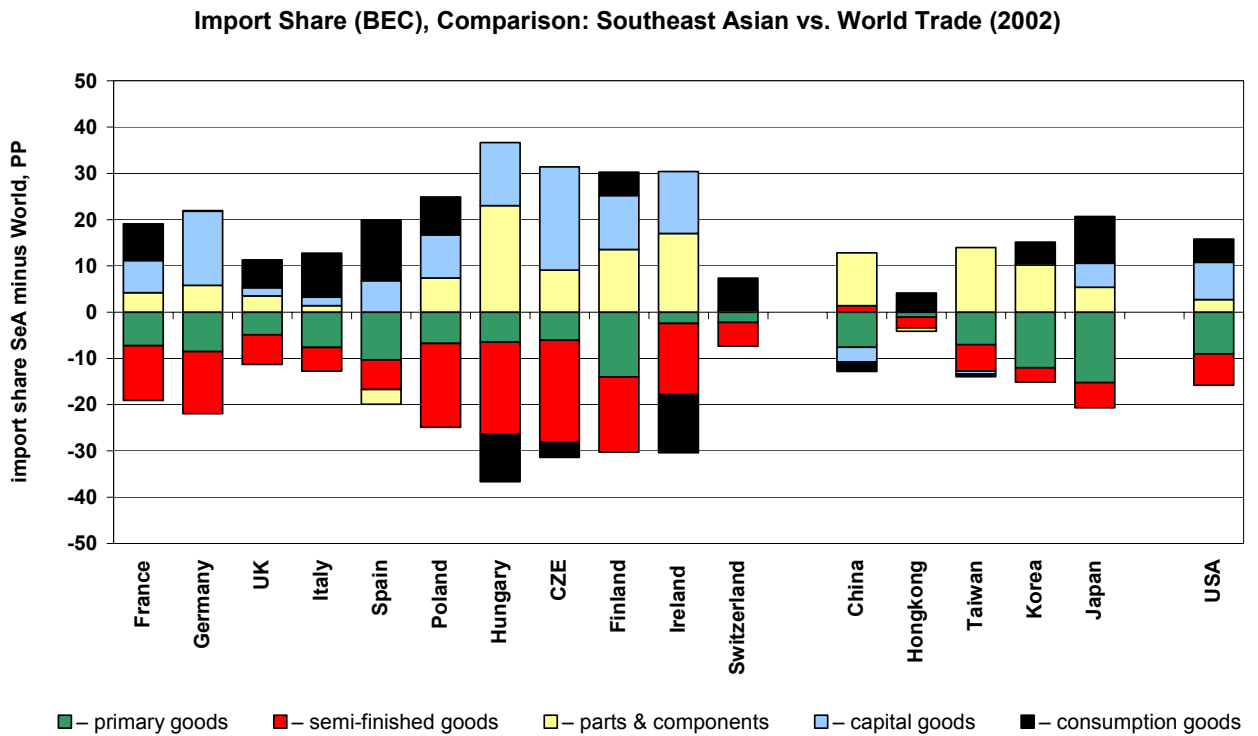




Figure 22

Average growth dynamics of high-tech products and their share of total exports (1997-2002)

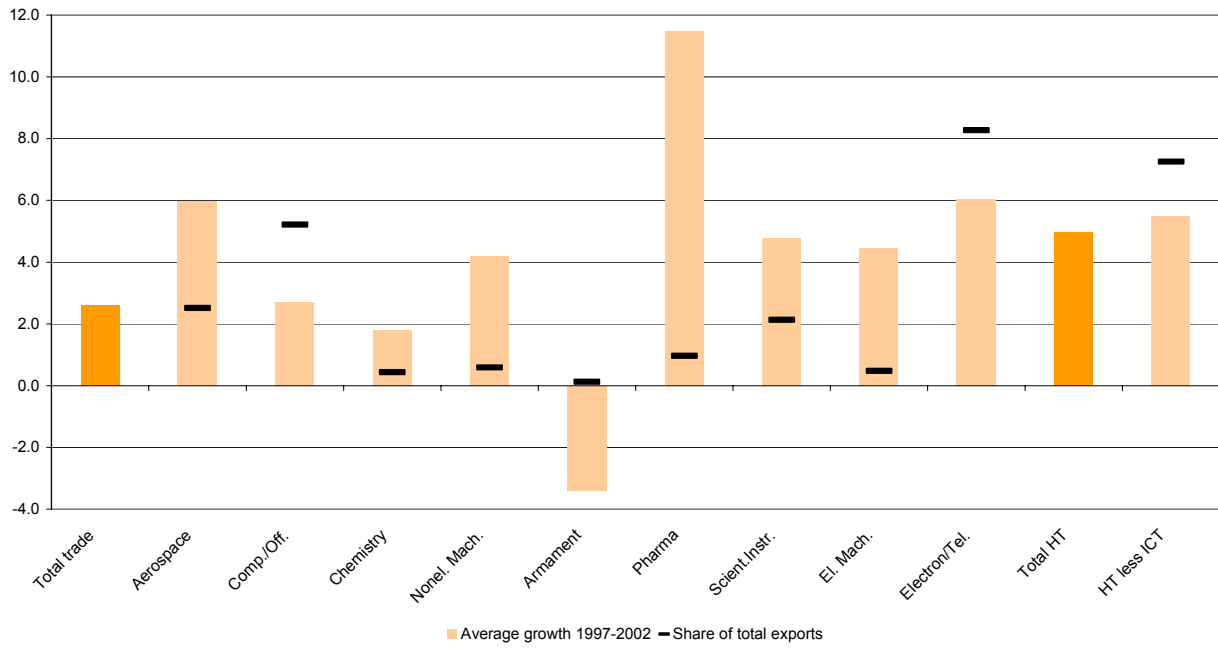


Figure 23

Growth dynamics of high-tech products and their share of total exports, by country

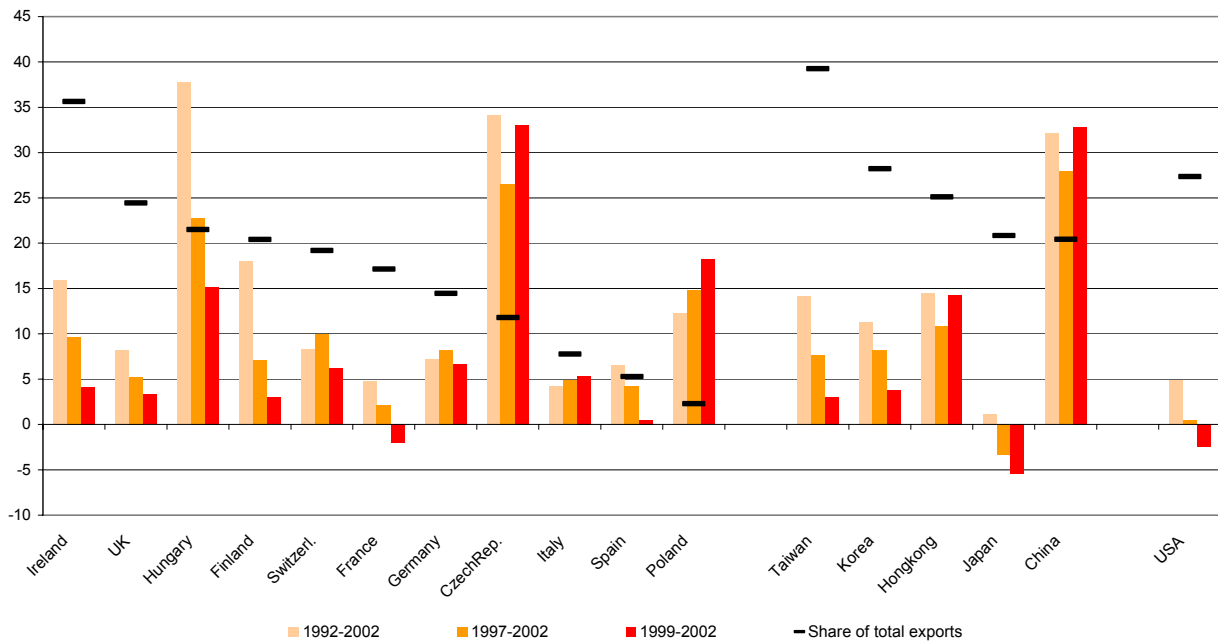


Figure 24

Country shares in the world wide trade in high-tech goods  
(within the country sample)

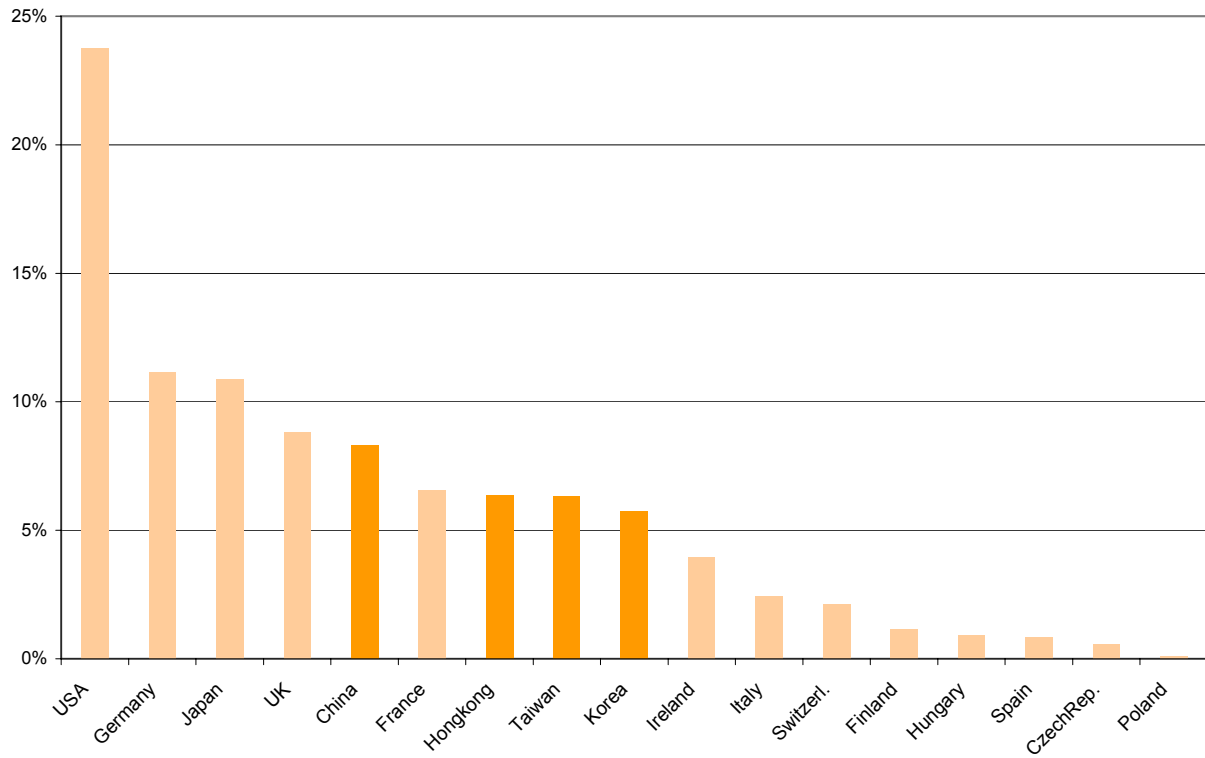


Figure 25

Share in high-tech products relative to total exports

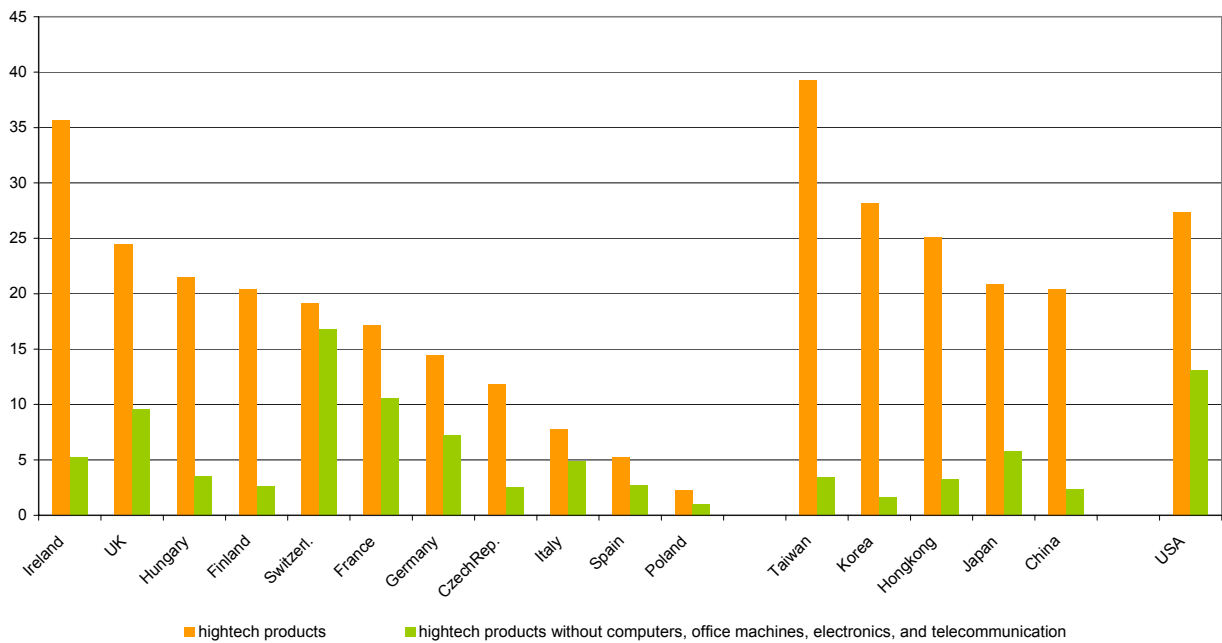


Figure 26

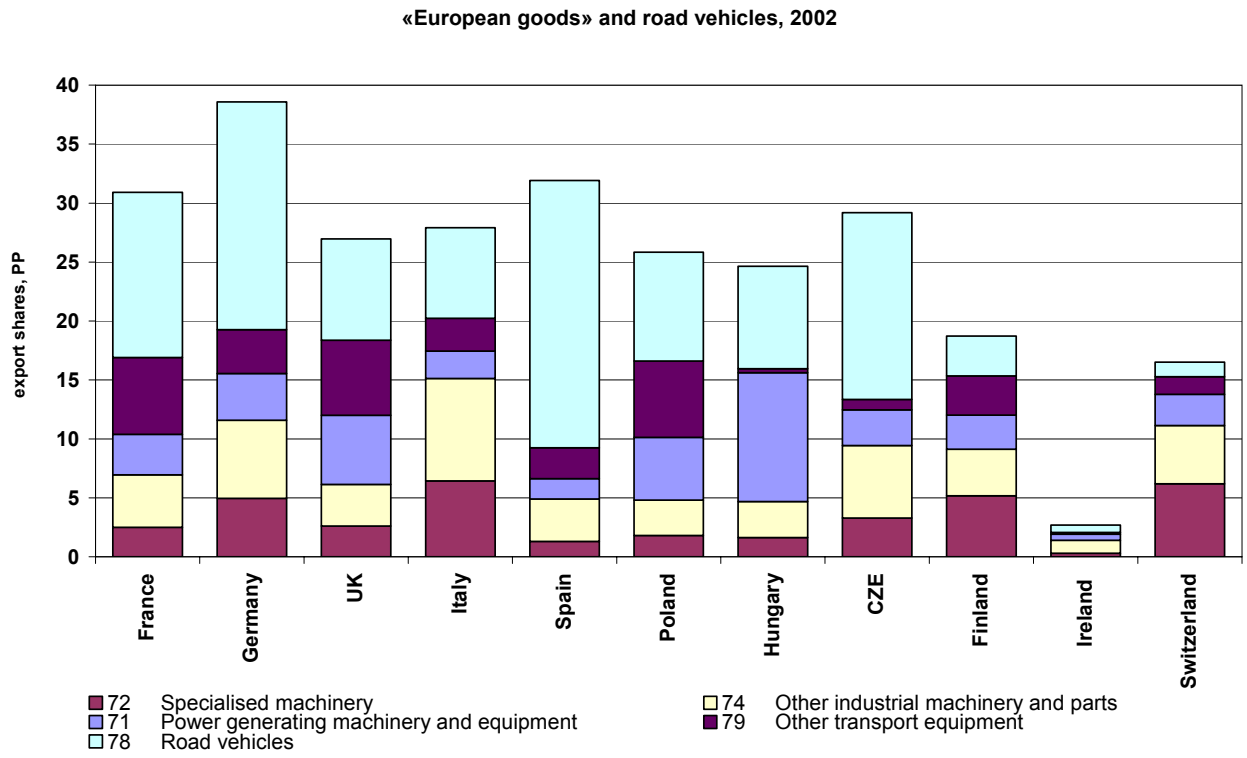


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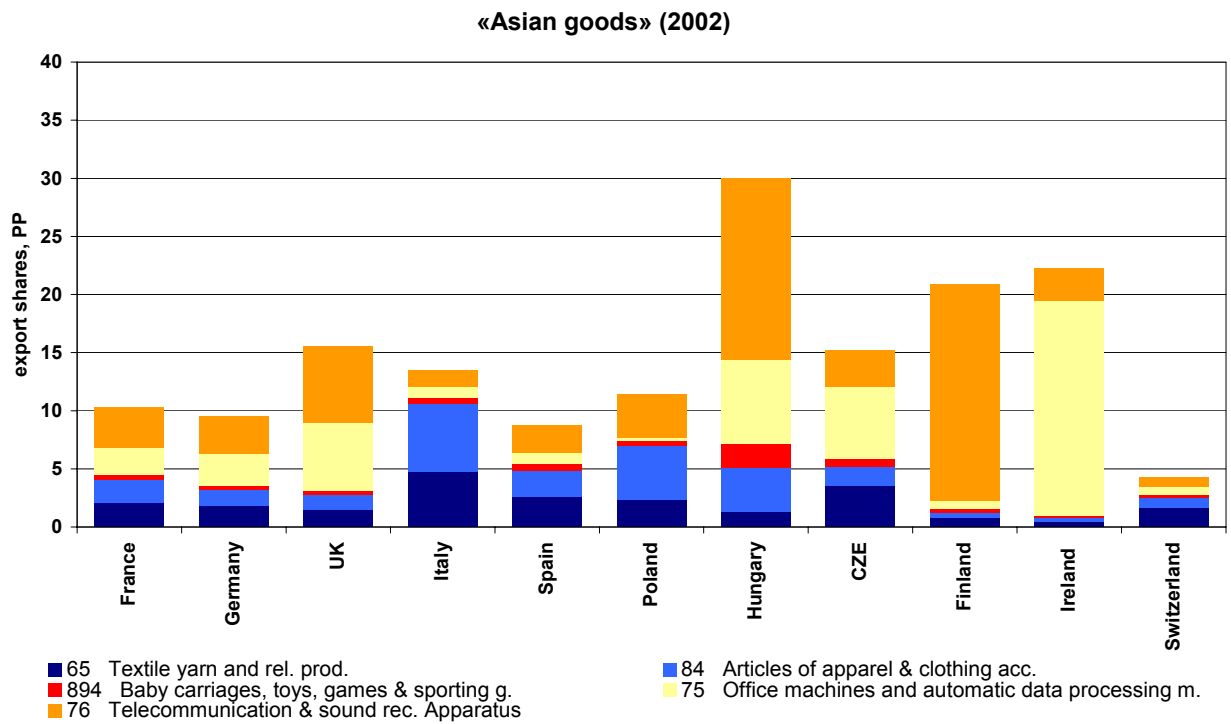


Figure 28

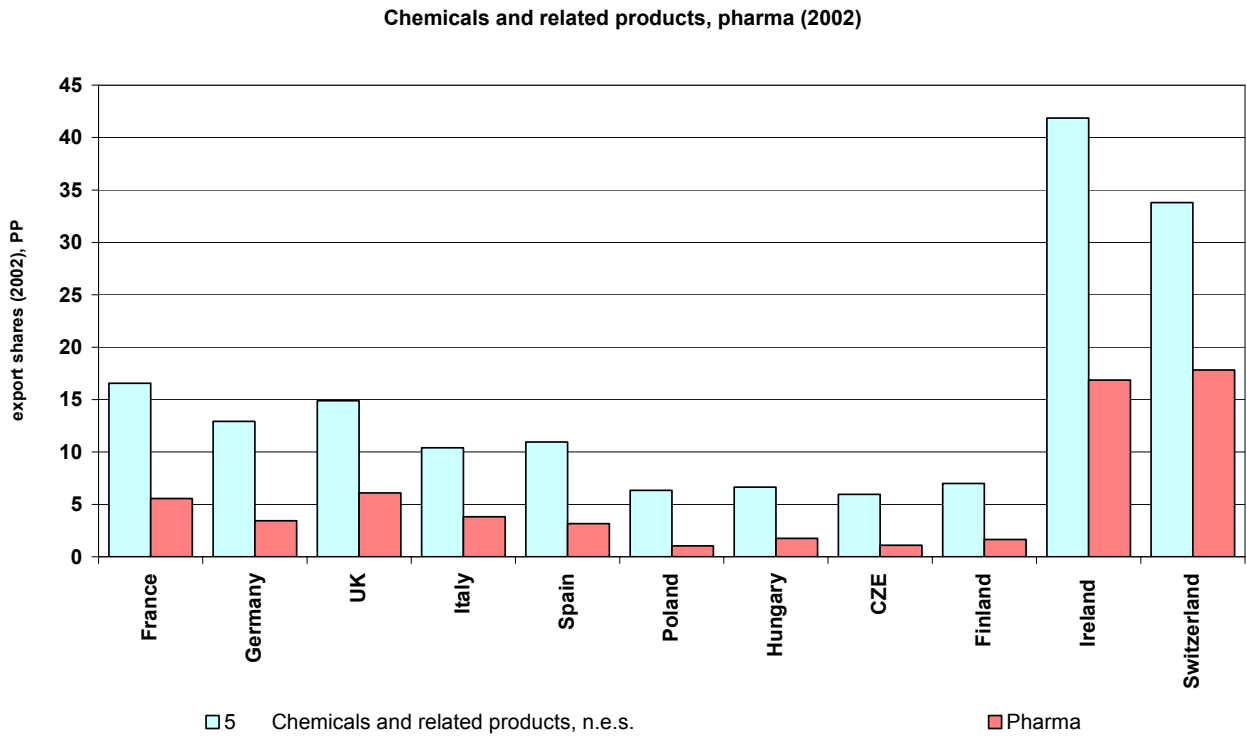


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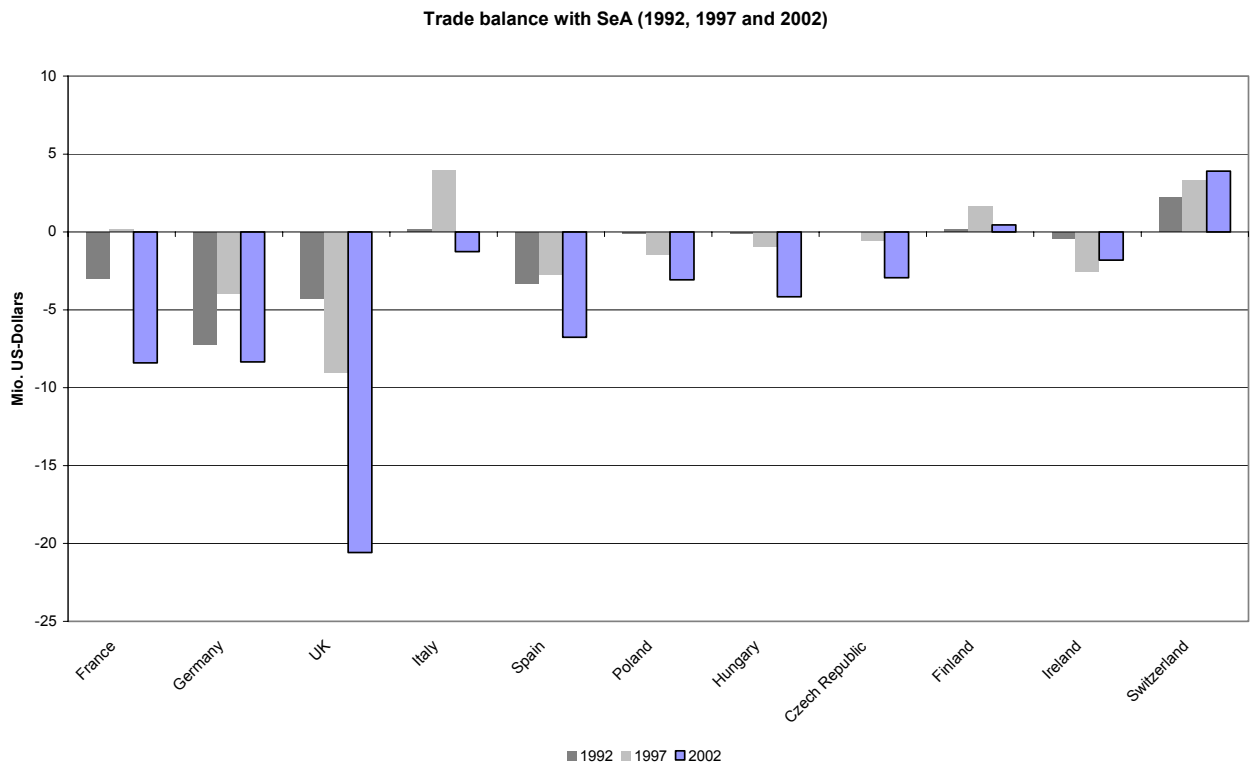


Figure 30

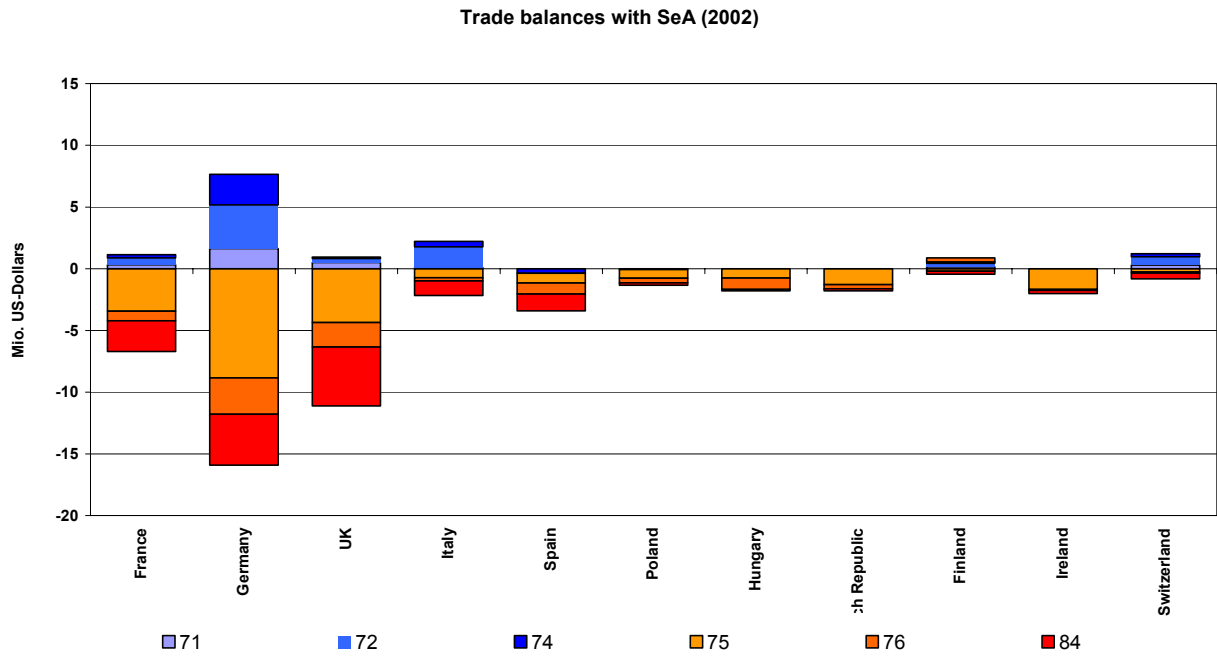


Figure 31

