Made in Sweden?
A New Perspective on the Relationship between Sweden’s Exports and Imports
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As the expert authority in trade and trade policy, the Board provides the Government with analyses and background material, related to ongoing international trade negotiation as well as more structural or long-term analyses of trade related issues. We also publish material intended to increase awareness of the role of international trade in a functioning economy and for economic development.

The National Board of Trade also provides service to companies, for instance through our SOLVIT Centre which assists companies as well as people encountering trade barriers on the internal market. The Board also administers the Swedish Council for Trade Facilitation, SWEPRO.

In addition, as an expert authority in trade policy issues, the National Board of Trade provides assistance to developing countries, through trade-related development cooperation. We also host Open Trade Gate Sweden, a one-stop information centre assisting exporters from developing countries with information on rules and requirements in Sweden and the EU.

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It is well known that Sweden is dependent on exports. A less discussed that Sweden is also dependent on imports and how important imports are to our exports. One-third of Swedish exports consists of imported raw materials, input goods and intermediate services from subcontractors around the world.

In this report, the National Board of Trade will review the effects on trade due to the increased specialisation of production in the world economy – and thereby the fragmentation of manufacturing operations to various countries. The market has become increasingly global which has affected international trade and international dependence. We will especially study how Sweden’s dependence on trade has been altered.

We will discuss the phenomenon of fragmentation and show the limitations of the present way of measuring international trade flow patterns. We will conduct an analysis of the dependency of exports on imports as well as discuss certain trade policy consequences due to fragmentation, primarily with regard to tariffs.

This report was written by Henrik Isakson and Emma Wajnblom at the National Board of Trade. We wish to give our special thanks to macroanalyst Bengt Roström, without whose help, we would not have been able to manage the advanced calculations.

Stockholm, December 2010

Lena Johansson,
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In recent decades the world’s production structure has become increasingly fragmented, i.e., it has been split into different tasks and spread out geographically. Subcontractors process and refine products turning them into finished consumer products in long supply chains, which has led to trade with input goods (components, raw materials, semi-finished goods, etc.) and input services (business services) becoming increasingly important.

In this report the National Board of Trade studies this fragmentation. We show the limitations of the current way of measuring international trade flow patterns, conduct an analysis of the dependency of exports on imports and discuss the consequences for trade policies due to statistics providing limited understanding of companies’ international trade. The discussion is based on Swedish production, but is applicable to all countries where production is dependent on imports. The calculations are based on Statistics Sweden’s input-output tables for 1995 and 2005 and on the UN’s BEC-classification (Broad Economic Categories) for 1995-2009.

Imports accounted for 30 per cent of Sweden’s exports value in 1995. Ten years later the imports proportion of exports had increased to 33.5 per cent. From an international perspective this amount is somewhat higher than average with regard to the OECD countries and emerging markets investigated. Almost all Swedish sectors have become more dependent on imports during this period. Exceptions to this trend are the textile industry and the IT sector where structural changes as well as increased profitability have decreased the import share.

Many Swedish companies find it difficult to develop their competitiveness without the opportunity of importing input goods and services. They are often dependent on the import of raw materials as well as input goods and services which are not produced in Sweden in a cost effective manner.

There is a great difference in imports dependency between various industries, from eight per cent in the financial sector to 90 per cent in the petroleum industry. Having a large or small proportion of imports within production or exports is not an end in itself, what is important is that companies become competitive. The reason for such a large proportion of imports in the petroleum industry is due to the fact that their exports mainly consist of imported crude oil. Also the rubber and plastics sector, which uses a large amount of imported crude oil, has a large proportion of imports. The motor vehicle industry is another sector with very high dependency on imports, however, this is primarily due to large imports of motor vehicle components.

Manufacturing companies have, in general, a higher import content in their exports than service companies. Seven out of eight service sectors compared with just one of 16 goods sectors had an imports proportion of less than 20 per cent in 1995. The service sector does not need as many inputs, the major part of the costs of service companies consists of wages. The largest percentage increase in import dependency between 1995 and 2005 has, however, occurred within the service sectors.
Swedish companies are overwhelmingly dependent on input goods from subcontractors who are located in high-cost countries within Europe. More than 80 per cent of all Sweden's imports of input goods stem from other high-cost countries, primarily from the western EU countries and Norway. Imports from low-cost countries both from inside the EU as well as the rest of the world have, however, increased markedly over the last fifteen years. Nonetheless, this accounts for less than a fifth of all imports of processed input goods, which among other things can be explained by the fact that low-cost countries have low costs, and imports therefore only amount to a small part of company costs.

The importance of exports on the economy is often reported as the exports' share of the GDP. In Sweden that share increased from 39 per cent in 1995 to 49 per cent in 2005. A different way to measure the importance of exports on the economy is to report the national value added (value added) of exports as a proportion of the GDP. Unlike the usual value of exports which also consists of imports, the national value added of exports is only the value added to the Swedish economy in the form of wages, capital investment returns, and taxes, i.e., exports less the imports content of the exports.

Between 1995 and 2005 the national value added of exports as a share of the GDP increased from 27 to 31 per cent. This occurred at the same time as the imports proportion of exports increased. Thus there are no contradictions between an increased import share in exports and an increased significance of exports for the national economy, even if Sweden's exports have become "less Swedish". In value terms, the Swedish value added of exports increased in all sectors apart from the agricultural sector. The importance of the service sectors increase when their share of exports is measured in value added. Using traditional trade statistics service exports account for 29 per cent of Sweden's total exports. Measured in value added the service exports account for 36 per cent of Sweden's total value added of exports. Sweden is therefore more dependent on service exports than what is shown by trade statistics.

We conduct an analysis on whether EU tariffs have been adapted towards current fragmentation. Almost half the duties on Swedish imports are levied on goods used in production, i.e., the imports that in many cases are necessary for companies to be able to meet growing international competition. In addition, calculations show that almost 60 per cent of tariff costs for input goods are levied on goods that are exported.

Export duties, anti-dumping duties, bureaucratic trade procedures and complicated rules of origin can also create problems for companies wishing to spread their production to several countries. Barriers against trading with input services can also complicate fragmentation. Knowledge of the world's fragmented production and the need for input goods and services is necessary in order to formulate a modern trade policy. The policy should allow for companies to find, according to their own prerequisites, the production structure that best suits them.
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1. Introduction

1.1 World Trade Becoming More and More Complex

Decades of trade policy liberalisation and technical advances have made possible today's global trading patterns where more goods and services than ever are traded on an international basis. To trade across borders is probably easier today than ever before. While trading, itself, is easier it is, however, more difficult to get the overall picture of trading patterns, to identify and see the connections between countries and trade sectors. The increasing element of, inter alia, trading with services, internal trading within companies and trading with input goods is not an especially new phenomenon but knowledge and understanding of these phenomena are often poor. The general view on trade and the actual trading patterns of today increasingly differ.

Production structures have become comprehensively fragmented, i.e. split up and spread out all over the world. This has occurred to such a great extent that the term “made in” is largely questionable. Most goods are not produced in one country, but in several. Service production is also often fragmented.

1.2 Purpose

As a result of fragmentation current trade statistics show a limited view of reality. The purpose of this report is to increase knowledge by taking an in-depth look at trade. We will do so by discussing the increased fragmentation as a phenomenon, show the limitations of today’s way of measuring international trade flows, conduct an in-depth analysis of Swedish exports’ dependency on imports (i.e. “vertical specialisation” in literature on economics) as well as discuss possible trade policy consequences, primarily with regard to tariffs.

The results contribute in part to a new view of the relationship between exports and imports. In light of the current global economy and the positive impact imports have on Sweden we can come to a conclusion on how trade policies can create better conditions for fragmentation.

1.3 Disposition

Chapter 2 gives a broad overview of the fragmented world trade. This chapter, which partly consists of a literature study, discusses how fragmentation is constructed, what drives the international supply strategies of companies and how fragmentation affects the economy. Case studies are also presented.

Chapter 3, as well as Chapters 4 and 5, are based on our own calculations. This chapter analyses Sweden’s integration in the international manufacturing networks by using the goods classification system Broad Economic Categories (BEC) which divides goods into input goods, consumer goods and capital goods. We present some interesting data but also point out the weaknesses of this measurement.

Chapter 4 is the central part of the study. Here the results of the calculations of Sweden’s vertical specialisation, both with regard to the country and with regard to different sectors, are shown and discussed. The calculations are made using input-output tables and encompass both goods and services.

Chapter 5 analyses how EU tariffs affect production in various sectors.

Lastly, Chapter 6 discusses which trade policy conclusions can be drawn by the fact that the importance of trade statistics has been altered.
2. Fragmented Production Chains

2.1 From trade with finished products to trade with tasks

The gradual transition from world trade based on trading with consumer goods to trade based on input goods and intermediate services (inputs) makes the global economy more complex. Goods used to be produced in one location only and the marking “Made in Sweden” could rightly be placed on the product. This applied especially to raw materials and unprocessed agricultural products that were only produced in one country. Most of today’s trade, however, consists of industrial goods more complex and containing multiple components which may be produced at various locations. Therefore, it is not as easy to unequivocally state the origin of the product. Additionally, a large part of the agricultural trade consists of processed products, with multiple ingredients of varying origin, whose production procedures cannot easily be described. The service trade also operates using, to a large extent, intermediate services in intricate production chains.

An educational approach is made by Baldwin in trying to explain the split, or fragmented, production structure (2006). He talks about “the second unbundling”, the second separation. The first separation occurred when trade over distance no longer made it necessary for production and consumption to take place at the same location. A product could be produced at a factory and be shipped to a consumer on the other side of the world. Prior to effective sea transport and other modes of transportation this was not possible. The second separation is much newer and implies the production process itself no longer needs to take place at the same location. Baldwin describes this as “the factories are unpacked and the tasks spread out across the world”. The term “trade in tasks” instead of “trade in goods” refers to the various tasks involved in the production process and which can be performed at various locations and as such become traded “products” in themselves. These different tasks, that previously were concentrated at one geographical location are today much more spread out. Competition in the world is thus not only between companies which offer various finished products but also between companies and production facilities within those companies which provide various tasks in the production chain. However, companies must still provide competitive products, and countries must have comparative advantages, the new part is that competitiveness not only lies in the production of a certain finished product but rather in the implementation of a certain task (producing certain input goods or services).

Which countries implement which type of tasks? Baldwin describes a division of economies in “Headquarter economies and factory economies”, where Sweden clearly is a typical headquarter economy. The term should not be interpreted too literally, but it implies that certain countries have their principle production within the manufacturing sector, while others focus on the non-physical portion of production (which may be associated with companies’ headquarters, but does not necessarily mean that a country actually holds the organisational headquarters of a company). This part of the production process consists of both high-skilled and low-skilled jobs, everything from design and marketing to simpler jobs in economic management not linked to the actual manufacturing process in the factory. An almost too clear example of this division is the relationship between the U.S.A. and Mexico. The production process is clearly divided into its factory part, in Mexico’s maquiladoras (assembly factories close to the U.S. border) and American headquarter tasks. Some examples of this are shown in section 2.4.

2.2 Offshoring of goods and services production

Trading with tasks means, in practice, trading with input goods and services. Input goods completely dominate the goods trade, with approx. two-thirds of EU imports consisting of input goods according to the European Commission. Input goods may be raw materials as well as semi-finished goods, or other finished products, which in turn become components of new finished products. Trade – international or domestic – arises when companies need to purchase these. An example of input goods could either be a component or part of a product in an end product, for example a bicycle’s handlebars or a microprocessor, or be expended in the production process such as detergents used to wash clothes.

As for services, the term “business services” is often used instead of “intermediate services”. In comparison with input goods which can be actual
components, intermediate services, due to their non-physical nature, are more abstract. Examples of intermediate services are out-sourcing of call centres, invoice management, consultative services, telecommunications, cleaning of company premises, etc. In other words service sectors are both high-skilled as well as low-skilled, and also include both low and high-tech services. Particularly important in trade contexts are the various intermediaries in the form of insurance companies, banks and shipping companies that are necessary for trade. Facts Summary 1 discusses the difference in how goods and services are traded.

Which tasks are transferred out, where they are transferred to and if they are transferred within a corporation or to an entirely different company varies. Some confusion on terms exists in the discussion on sourcing strategies which is explained in Facts Summary 2. In this study we use the term offshoring for those situations when parts of a production chain is located abroad, no matter whether they are goods or services or whether it is within the framework of the same company or if separate subcontractors are retained. In order for production to be fragmented so that the inputs are produced in different countries offshoring is thus required.

Offshoring does not always lead to inputs being imported to Sweden for further processing. It is not unusual for companies to invest in both production and in sales offices/shops in the same country in order to manufacture for the host country on-site. A “Swedish” Volvo can therefore be assembled in a factory in Belgium in order to thereafter be sold on the Belgian market. Another reason to invest in both production as well as sales offices abroad is to avoid formal trade barriers by establishing oneself in the country to which one is exporting.

Facts Summary 1. Deliveries of input goods and services

In order for the production of goods, spread over multiple locations worldwide, to run smoothly reliable logistics are required. Modern solutions with effective IT-based procedures and transport ensure that goods flowing to and from different locations in the production chain rarely need storage for any longer period of time, if indeed they need to be stored at all. They can often immediately be inserted into the production process according to the so called Just in Time method (JIT) where, for example, components of a computer arrive more or less the at the moment they are to be assembled. JIT is also used in sales where imported goods are often sent directly to shops, or even directly to the consumer, without first needing storage. The fact the need for storage decreases makes the production chain cheaper but at the same time more vulnerable.

Intermediate services can be purchased on the internet or by phone or in other ways from other countries. They can also be purchased by the customer travelling abroad in order to use the service or when the service provider travels to the customer’s country in order to perform the service on-site. However, most services sold internationally are sold when a service company establishes a subsidiary company abroad in order to sell their services, i.e. by foreign direct investments instead of trade.
2.3 Motives for and the effects of fragmentation

To separate the motives for a company to fragment production from the effects of fragmentation is sometimes ambiguous as the motives and the effects are often the same. A very important driving force to transfer the entire or parts of the production process across borders is lower cost, and which can in turn also become an effect of fragmentation. Competition is fierce in most sectors and opportunities for significantly lowering costs in Sweden and similar countries are limited. Low wages can affect the cost of labour-intensive manufacturing in a decisive manner. Despite the work force in these countries not being as productive as in Sweden there are savings to be made by locating labour-intensive production to such countries. It is important not to forget, however, that costs do not only refer to wages, as the terms low-cost country and low-wage country are often equated as being the same. Taxes, capital costs, logistics costs, etc. must also be accounted for. Despite these costs countries with low wages often also have low costs.

However, companies are not only looking for cost reductions. If they were, all inputs would be imported from low-cost countries and as we can see in chapter 3 this is not the case at all. Access to high-skilled workers, important raw materials, technical competence, efficient subcontractors, etc., also plays a part. It is an overall assessment that determines company strategies. Fragmentation involving the relocation of production is also associated with many challenges, for example, if the cultural divide implies difficulties in maintaining production and distribution in a foreign country. Corruption, political instability, weak infrastructure and low levels of education are just a few of all the problems many developing countries suffer from, to a varying degree. Therefore, companies occasionally transfer production from foreign countries to the home country when they have assessed that cost savings and other advantages with offshoring do not outweigh the problems and the risks.
More and more companies, specialised within their field in all the more countries, are competing for position in the production chains and for opportunities to produce and deliver their inputs to the production process. That all this creates enormous competitive pressure involving rapid and major structural changes to all participating economies is obvious. Western and other advanced economies are becoming ever more de-industrialised and service producing while a number of developing countries, with China in the lead, are becoming industrialised. The very low price level that exists today with regard to many products would not have been possible without the opportunity of importing cheap inputs from low-cost countries. Today’s consumers of both simple consumer goods as well as more advanced capital goods would not have had the same purchasing power if factory production had stayed in the high-cost countries. These products cannot be produced at the same low costs in high-cost countries such as Sweden. Without fragmentation consumer patterns would have been completely different with significantly fewer and more expensive products in the shops. The range of services offered would also have been smaller and more expensive. The large supply of cheap consumer goods has contributed to keeping inflation low and thereby increasing real wages on a global scale. The world economy, in other words, is currently dependent on global production chains and the fragmented production process.

The division of the production process leads to technology diffusion and knowledge and management spill overs between companies in the various stages of the production chain. If the production of a product, for example, craves five tasks and these tasks are separated; instead of being implemented at one factory they are carried out at five different factories, then the knowledge of the production process is spread to all the various production units. When companies incorporate technological advances from other countries into their own production process, by the use of a more effective input goods or services, this promotes productivity. This, in turn, leads to production costs being reduced and to companies utilising the new opportunities that arise. If what is produced by a company is later used as input goods in a different industry in the same country this gives a greater positive impact on other sectors of the economy in the country. Increased trade using input goods and services thus contributes to increased economic growth.

At the same time it should not be overlooked that fragmentation could also have negative effects, not least in traditional industrial countries. If a Swedish factory closed down and replaced by, for instance, a Polish one, jobs will naturally be lost in Sweden. This is often discussed in the media, which at times may become quite heated as it is unilaterally described as jobs disappearing to low-cost countries (the giant sucking sound as the American Presidential candidate Ross Perot described the effects of the NAFTA-Agreement in 1992 – multiple American jobs were going to be sucked to low-cost Mexico). The possibility of transferring individual work tasks instead of entire production units from the country creates a situation where companies can increase productivity where it actually is the lowest by only transferring those work tasks that are expensive in comparison to their output. This could affect people within both goods production and service producing companies and not just with regard to the low-skilled work force. Studies from the U.S.A. show that between 11 and 38 per cent of all employment, depending on definition and method, can be transferred abroad.

This fragmentation also implies major transitions for many of those who keep their jobs. New production patterns will have far reaching consequences when jobs receive new content and new demands are placed on staff.

2.4 Examples of fragmentation

A few case studies have been done which study how fragmentation could be implemented in practice. Perhaps the most renowned is a study from Linden, Kramer and Dedrick where an Ipod is literally dissected and the origins of its most important components are studied. The most important components and where the value added is created are displayed in Table 2. As shown, the most important part, the hard drive, originates from a Japanese-owned factory in China. With regard to the other most important components, there are factories in six countries, owned by companies with seats in four countries. At the same time this is still most likely a simplification. The hard drive itself consists of various components and inputs such as services and “expendable activities” such as water and electricity are also not included.

This iPod, imported to the U.S.A. is marked “Assembled in China” but we do not know how much of the value added will benefit China. The most important component is made by a Japanese factory in China but it is unclear how much of the value added will go towards wages (to Chinese workers) and how much will go towards capital returns (to the owners of the company). However, the authors calculate, while the reasons remain obscure only a few per cent of the total import price will go to China.

A different example that more clearly separates the input of goods and services in the production
chain is shown in a study by Chinese and Vietnamese manufactured shoes. In this example the separation of headquarters economics and factory economics is clear:

“The concepts of “production” and “manufacturing” are perceived as the same thing, but manufacturing is often only a relatively limited part of the entire production process, which also contains research, development, design, logistics and marketing, etc. These mostly creative parts of the production process usually add more value than manufacturing and they are mostly carried out in Europe. We found that, even for a low price shoe, EU value added is above 50%. For the medium price range EU value added can reach almost 70% and for up-market shoes, with high design and marketing costs, the EU value added can surpass 80%. This means that a shoe manufactured in China still can be regarded as a “European shoe”.

Further case studies are shown in Facts Summary 3.

2.5 Fragmentation makes trade statistics difficult to decipher

Due to an ever-increasing part of the production process being fragmented trade statistics have become much more difficult to decipher. As goods and services cross borders several times before evolving into an end product, the appropriateness of the use of the exports and imports portion of the GDP as a standard for the economic dependency of a country on the outside world is questionable. Though the standard is still significant, fragmentation makes many believe that the statistics are inflated, however, it is unclear by how much. According to Daudin et al (2009) the proportion of trade in the world economy is approximately one-fourth less than officially stated. This implies that trade comprises 19 instead of 26 per cent of global GDP. The difference is considerable and due to the attempt to estimate the net value of trade instead of gross, i.e. avoiding double calculations which arise when products cross borders several times. At the same time Daudin considers that the results of the study still overestimate the net trade value considerably and that the actual figure is much lower. It is quite obvious that traditional trade statistics need to be supplemented in order to give a more nuanced picture of world trade.

Is it inevitable that trading with inputs goods or services increases as a result of the companies’ new way of organising themselves across borders? Not necessarily, as two countervailing forces then stand against each other. On the one hand, fragmentation increases the need for imports of inputs for production. On the other hand, not all production and sales of “Swedish products” occur in and from Sweden. Swedish-owned chain stores abroad sell, for instance, clothes that have never physically been to Sweden. Swedish-owned subsidiaries abroad, involved in factory manufacturing also need inputs but as the companies’ operations are located outside of Sweden these inputs will never cross the Swedish border. For example, a Swedish-owned factory abroad may import input goods from another country and then sell the finished product to a third country. In such cases the economic activities of Swedish companies may increase and fragmentation can be refined all

<table>
<thead>
<tr>
<th>Component</th>
<th>Supplier</th>
<th>Company HQ Location</th>
<th>Manufacturing Location</th>
<th>Estimated Factory Price</th>
<th>Cost as % of all iPod Parts</th>
<th>Gross Profit Rate</th>
<th>Est’d Value Capture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Drive</td>
<td>Toshiba</td>
<td>Japan</td>
<td>China</td>
<td>$73.39</td>
<td>51%</td>
<td>26.5%</td>
<td>$19.45</td>
</tr>
<tr>
<td>Display Module</td>
<td>Toshiba</td>
<td>Japan</td>
<td>Japan</td>
<td>$20.39</td>
<td>14%</td>
<td>28.7%</td>
<td>$5.85</td>
</tr>
<tr>
<td>Video/Multimedia Processor</td>
<td>Matsushita Broadcom</td>
<td>Japan</td>
<td>Taiwan or Singapore</td>
<td>$8.36</td>
<td>6%</td>
<td>52.5%</td>
<td>$4.39</td>
</tr>
<tr>
<td>Portal Player CPU</td>
<td>PortalPlayer</td>
<td>US</td>
<td>US or Taiwan</td>
<td>$4.94</td>
<td>3%</td>
<td>44.8%</td>
<td>$2.21</td>
</tr>
<tr>
<td>Insertion, test, and assembly</td>
<td>Inventec</td>
<td>Taiwan</td>
<td>China</td>
<td>$3.70</td>
<td>3%</td>
<td>3.0%</td>
<td>$0.11</td>
</tr>
<tr>
<td>Battery Pack</td>
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<td>$0.00</td>
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<td>Display Driver</td>
<td>Renesas</td>
<td>Japan</td>
<td>Japan</td>
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<td>24.0%</td>
<td>$0.69</td>
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<td>Mobile SDRAM Memory - 32 MB</td>
<td>Samsung</td>
<td>Korea</td>
<td>Korea</td>
<td>$2.37</td>
<td>2%</td>
<td>28.2%</td>
<td>$0.67</td>
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<tr>
<td>Back Enclosure</td>
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<td></td>
<td></td>
<td>$2.30</td>
<td>2%</td>
<td>26.5%</td>
<td></td>
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<tr>
<td>Mainboard PCB</td>
<td>Unknown</td>
<td></td>
<td></td>
<td>$1.90</td>
<td>1%</td>
<td>28.7%</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal for 10 most expensive inputs</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$123.12</strong></td>
<td><strong>85%</strong></td>
<td></td>
<td><strong>$33.37</strong></td>
</tr>
<tr>
<td>All other inputs</td>
<td></td>
<td></td>
<td></td>
<td><strong>$21.28</strong></td>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total all iPod inputs</td>
<td></td>
<td></td>
<td></td>
<td><strong>$144.40</strong></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Linden et al (2007)
The car example shows that fragmentation is not an entirely new phenomenon. A study from 1996 on something much less advanced, a Barbie doll, shows that even such seemingly simple products have been manufactured in a fragmented production chain. The doll was designed at Mattel’s headquarters in California. Oil, originating from an oil-exporting country, was refined into ethylene plastics of which the doll is made, at a factory in Taiwan. The nylon hair was manufactured in Japan. The cotton clothing was manufactured in China. The mould for the doll was made in the U.S.A. as well as the paint she was coloured with and the box that she was packaged in. Assembly of all these parts took place in factories in Indonesia and Malaysia. Quality testing took place in California. Manufacturing locations have most certainly been transferred several times and presumably a much larger proportion of the process is presently located in China.
3. The Development of Sweden’s Trade with Input Goods

3.1 Changes in trade with Swedish input goods

The following section focuses on the economic operations in Sweden and on the face of Swedish-based business industry’s dependence on inputs. One way to measure fragmentation is to use a division based on the UN’s SITC-statistics called “Broad Economic Categories” (BEC). BEC classification divides all international trade flows into 19 different products groups. Each group is in turn defined as capital goods, input goods or consumer goods, including eight product groups categorised as input goods. These statistics can be cut in different ways to give various comparisons between product groups, over time and supplier countries. As described later it is, however, risky to interpret these figures too literally and for that reason we will be satisfied with two shorter analyses of the statistics; partly how imports of input goods to Sweden have developed and partly which countries supply these to Sweden.

Firstly, it is clear that Sweden imports more and more goods that according to the BEC are classified as input goods. The value of the imports of inputs increased by 68 per cent in the period 1995-2009, from 35 billion USD to 59 billion USD. A clear effect of the crisis can be noticed in the statistics. If we instead of 2009 end the time period in 2008 then the increase of the imports of inputs against 1995 is shown to be a whole 159 per cent instead. The crisis reduced economic activity in Sweden and the need for input goods fell sharply. Over the long-term, however, the trend is that imports of input goods are increasing. As a proportion of total imports, input goods have, however, decreased, from a 57 per cent average during the second half of the 90s to 54 per cent during 2000-2009. The lowest value of just 51 per cent was noted in 2009. This development is illustrated in Figure 1.

Why is the proportion of input goods of the total imports decreasing? One explanation could be that Sweden’s large increase of direct investments abroad has lessened the need of input goods for production in the home country as well as increased the need for importing finished consumer goods, including from the foreign subsidiaries. The statistics clearly show that primarily imports of consumer goods but also of capital goods have increased more than imports of input goods. This does not mean that Sweden’s need of input goods has decreased though, and that the Swedish economy is less dependent today on the international production chains than it was 15 years ago. The Swedish economy’s need for input goods is according to BEC statistics large but not increasing. As we shall see later on this seems to somewhat underestimate the changes that have occurred.

![Figure 1. The development of Sweden's total imports and imports of input goods 1995-2009](source: UNCTAD and Statistics Sweden)
3.2 Where do input goods come from?

The greatest proportion of the imported input goods consists of processed goods for the industry, but the proportion consisting of raw materials has increased since 1995. The phenomenon of importing raw materials, however, is not new, and is not propelled by companies spreading their manufacturing around the world. When, as discussed above, work tasks have been spread over the globe we are talking about the fragmented production process and not about mining or oil drilling, which out of necessity was always widespread. It is of greater interest, therefore, to instead take a look at the trading of intermediate input goods, i.e. goods that have been processed and are partly refined products: components, semi-finished goods etc.

Where do Sweden’s imports of processed input goods come from? When we answer the question on where Sweden’s imports come from it is therefore important to interpret these figures carefully. This is because of the so-called Rotterdam effect that likely overestimates Sweden’s goods imports from the EU and underestimates goods imports from the rest of the world. Goods that are imported to Sweden from other EU countries are only registered in the dispatching country in the EU. This is true even when the goods at an earlier stage have been imported from countries outside the EU.

The most important countries for imports of processed input goods are illustrated in table 3 below. As illustrated imports from the other EU countries dominate entirely, even though they have decreased slightly, and moreover, as mentioned above, they are somewhat overestimated. According to these figures, three-fourths of Sweden’s imports of input goods come from other EU countries, of which the greatest supplier is Germany. In addition, 10 per cent come from Norway. The production networks that Swedish companies are dependent on are thus overwhelmingly located in Europe, even though these companies in turn assuredly have non-European suppliers. Though imports from China have increased sharply they only account for a few per cent of the imports of processed input goods to Sweden. “The World’s Factory” seems therefore to primarily produce consumer goods instead of input goods for Sweden.

Table 3 The most important countries for imports of input goods for Swedish production

<table>
<thead>
<tr>
<th>Year</th>
<th>EU</th>
<th>Norway</th>
<th>USA</th>
<th>China</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>77%</td>
<td>7%</td>
<td>6%</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>2009</td>
<td>73%</td>
<td>10%</td>
<td>4%</td>
<td>3%</td>
<td>2%</td>
</tr>
</tbody>
</table>

Source: Comtrade and own calculations
A different way to study statistics is to divide the countries into high and low-cost countries. This shows to which extent the Swedish companies’ sourcing strategies are dependent on cheap production in low-cost countries. This is illustrated in Figure 2.

As shown, most imports of processed input goods come from high-cost countries i.e. Western Europe, U.S.A., Japan and a handful of other wealthy countries such as Australia and Canada. However, this proportion has noticeably decreased in the past 14 years, from 95 per cent to 85 per cent, which means that the low-cost countries’ share of the production process has increased. Half of the input goods that are imported from low-cost countries come from EU countries in Central Europe and half come from countries outside the EU. The largest supplier to Sweden from the EU is Poland, followed by the Czech Republic and Estonia. Outside the EU, the largest supplier is China, followed by Russia and Brazil. It could appear that imports were almost the same from low-cost countries within the EU as from outside. However, then we have forgotten the Rotterdam effect which may imply that the proportion of input goods from low-cost countries outside the EU is somewhat higher and the proportion of imports from the high income countries is somewhat smaller.

Most of the world trade with processed input goods takes place between traditional industrial countries. It may seem, therefore, that costs do not matter too much as most sourcing do not take place from countries with low costs. This, however, is just one picture of reality, based on the value of the imports. If we instead studied statistics based on volume measurements, such as litres, kilogrammes or items, the picture would probably look different. That this is such a small part of the value is due to the fact that the low-cost countries, in fact, have low costs. A major and important part of Swedish companies’ production of inputs takes place in countries where costs are so low that the value does not amount to any significant part of the companies’ costs. In a hypothetical case, had the low-cost countries’ exports of input goods to Sweden occurred at the same price level as the high-cost countries then their market share of Sweden’s imports would have increased considerably. To a great extent, we additionally import labour intensive products from low-cost countries while imports from high-cost countries consist of capital and human capital intensive goods. Therefore, we can draw the conclusion that imports from high-cost countries dominate but are decreasing, and that imports from low-cost countries are increasing and are far more significant than the statistics show.

### 3.3 Weaknesses of the BEC classification

The above discussion is as far as one gets by using the BEC classification system for the classification of goods. Statistics provide an interesting picture of Sweden’s international dependence on input goods but several problems exist making it difficult to get...
a deeper grasp of fragmentation. One problem is that three of the 19 product groups in the BEC are not categorised at all, neither as input goods, capital goods or consumer goods, as they are used extensively by both companies and individual consumers. This includes the not so insignificant product group, cars.

The problem reaches further than just cars. The above method used to study the trade with input goods is based on international trade flows being able to be broken down into one of the three categories input goods, capital goods or consumer goods. Problems arise when products can be used within two or three of these categories. In those cases products are categorised by their primary use. There are many such products, perhaps the majority of all products are like that. One example is oranges, which are used both directly by consumers and by the food industry in order to make orange juice.

The greatest problem regarding the BEC is, however, that services are left out altogether. There is no categorisation of services into intermediate services and other types of services. Thus the BEC only shows a rough estimate of something that is only a part of the trade with inputs. It is clear that these statistics do not give an overall view of the growing global integration that is created by the fragmented production processes between different countries.

The use of input-output tables provides a more nuanced picture than the BEC which is why we move on to a deeper analysis of Sweden’s dependency on imported inputs in the following chapter. Services are also included in the analysis.
4. The Significance of Imports to Sweden’s Exports

4.1 Input-output tables and international trade

The classifications according to the BEC into capital goods, intermediate goods and consumer goods indicate that the proportion of input goods of total trade has decreased since the 1970s. It was shown in chapter 3 that imported input goods to Sweden have decreased as a proportion of total imports since 1995. These results contradict the viewpoint of many researchers that the fragmentation of companies and their specialisation have led to increased trade with input goods and intermediate services. The problem with the BEC method is that trade with input goods as a proportion of total trade does not capture the entire picture including global value chains and offshoring.

An alternative method to analyse the importance of trading with inputs of both goods and services is to study input-output tables. Input-output (IO) analyses contribute with a deeper dimension and show how countries’ production processes become more and more dependent on imports. The tables can be described as a report in matrix form of a country’s national accounts. The matrix describes the country’s production and consumer structures and illustrates the flow of goods and services between its different sectors. In Sweden it is Statistics Sweden that is responsible for input-output tables. These tables are updated every five years and the most recent ones, published in 2008 contain data from 2005. Facts Summary 4 shows an aggregated version of Sweden’s IO table for 2005 and also describes how the table is constructed.

There are several reasons why input-output tables are so useful to analyse fragmented trade. One important reason is that it is possible to deduce which goods and services that are used as inputs in order to manufacture new goods and services and which are used for consumption, investments or exports. Thereby the problems of classifying goods as either capital goods, input goods or consumer goods are avoided. With these input-output tables a product can be shown both as input goods in a different sector’s production process and as consumer goods. Another great advantage these input-output tables provide is that the service sectors are also included.

In these input-output tables the imports statistics are shown in an imports matrix which makes it possible to deduce how much is imported and from which sectors each sector in the country imports. The connection of import flows between sectors in different countries creates opportunities to see new economic relationships and leads to exciting areas of use for input-output tables. Statistics can be more useful for a certain type of analysis, for example you can see how large a part of the Swedish automotive industry’s production value consists of imports from the foreign rubber or plastics industry or the foreign metal industry.

However, input-output tables also have weaknesses in relation to traditional trade statistics as it is not possible to see which country these imports come from. Also, it is not possible to see to which country or to which sector the exports go. Traditional trade statistics are therefore better when looking at trade between countries, while input-output tables are preferable when studying trade flows of input goods and intermediate services between sectors in different countries.

4.2 Calculating dependence on imports

Analyses with the aid of input–output tables can be used within several different fields in order to study the relationship between various sectors and see how changes in one sector have implications for other sectors. One possibility is to use input-output tables to analyse a country’s dependency on imports. This is performed by calculating the value of the proportion of imports of exports, i.e. the extent of imported products and services used to manufacture a product which is later exported. This standard is called vertical specialisation and was created by Hummels, Ishii and Yi in 2001. Today the standard is a generally established and accepted definition within the realm of research, however, not as well known in the realm of policies.

Vertical specialisation is actually a calculation of how large a part of each sector’s production consists of imports. Each sector’s proportion of imports is then applied to the sector’s exports which are assumed to have as large a proportion of imports as the production. For example, a piece of Swedish furniture, sold in Sweden, is assumed to have an equal proportion of imported inputs as a Swedish piece of furniture that is exported to a different country.

Koopman, Wang and Wei write that China’s vertical specialisation is grossly underestimated as
**Facts Summary 4: Input-output tables**

The matrix below is an aggregated version of Sweden’s input-output table and shows the domestic economy in 2005. The total value of Sweden’s total production, consumption, investments, exports and imports is showed in the matrix.

**Sweden’s economy 2005 (billion SEK)**

<table>
<thead>
<tr>
<th>Products</th>
<th>Sector</th>
<th>Primary</th>
<th>Production</th>
<th>Services</th>
<th>End consumption</th>
<th>Gross investments</th>
<th>Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>Primary</td>
<td>7</td>
<td>50</td>
<td>10</td>
<td>6</td>
<td>-2</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Production</td>
<td>11</td>
<td>286</td>
<td>211</td>
<td>158</td>
<td>61</td>
<td>859</td>
</tr>
<tr>
<td>Services</td>
<td>14</td>
<td>304</td>
<td>948</td>
<td></td>
<td>1 540</td>
<td>253</td>
<td>353</td>
</tr>
<tr>
<td>Imports</td>
<td>11</td>
<td>438</td>
<td>295</td>
<td></td>
<td>214</td>
<td>112</td>
<td>50</td>
</tr>
<tr>
<td>Purchases made by foreign citizens</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-57</td>
<td>0</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Taxes on goods less subsidies</td>
<td>3</td>
<td>6</td>
<td>101</td>
<td>190</td>
<td>47</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Total use</strong></td>
<td></td>
<td>47</td>
<td>1 086</td>
<td>1 566</td>
<td>2 051</td>
<td>472</td>
<td>1 333</td>
</tr>
<tr>
<td>Wages</td>
<td></td>
<td>20</td>
<td>291</td>
<td>1 189</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxes on manufacturing less subsidies</td>
<td>-7</td>
<td>8</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital</td>
<td></td>
<td>26</td>
<td>202</td>
<td>594</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>The sector's output</strong></td>
<td></td>
<td>86</td>
<td>1 587</td>
<td>3 413</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Statistics Sweden

The first column under the heading Products shows product groups that are used in various parts of the economy, either as inputs in sectors or as end use. The product groups are divided into primary, production and services, where the group primary consists of agricultural, hunting, forestry and fishing products as well as products from mining. Other inputs consist of imports and the net tax on goods less goods subsidies. Taxes on goods and goods subsidies are paid or received in relation to how much is produced and part of the total use. Examples of taxes on goods are VAT, energy taxes and tariffs.

Wages, the net taxes on goods less subsidies and capital represent the value added that is created within the sector, i.e. the sector’s value added. Taxes on production and subsidies, for example, property tax or vehicle tax, are in contrast to taxes on goods and goods subsidies not connected to how much produced. The value added is shown in the input-output table at the base price. This means that taxes on production and subsidies are included in the value added and thereby also the GDP at base price, while if one adds taxes on goods and subsidies one gets GDP at market price.

The sector’s total use, i.e. all the inputs, together with the value added, constitute the sector’s total output. As the matrix shows the primary sector used inputs of primary products to a value of 7 billion SEK in its production process, inputs of production products at a value of 11 billion SEK and inputs of services at a value of 14 billion SEK. Imports accounted for a total value of 11 billion SEK, the net tax on goods and subsidies totalled 3 billion SEK. The total value added at base price consisting of wages, tax on production less subsidies and capital amounted to just under 39 billion SEK.

The right hand side of the matrix shows the final use divided into consumption and investments (both private and public) and exports. The consumption of primary goods amounted to 6 billion SEK, investments in primary goods amounted to a negative result of minus two billion and exports of primary goods amounted to just under 14 billion SEK.

Purchases made by foreign citizens inside the country are shown as domestic consumption in the statistics. As the products and services are consumed by people who are not Swedish citizens they are then discounted from those statistics instead of being placed in the statistics on exports.
domestic policies encourage manufacturing for exports by preferential tariffs on imports and other types of tax relief but these are only applicable if the produced products are then exported. This leads to exports having a much higher proportion of imports than production for domestic consumption, which is something that the calculations do not show. As for Sweden, which does not use such a system the assumption is not likely to cause a problem. The calculations are also based on the assumption that goods and services within the same sector have an equal proportion of imports and exports. The vertical specialisation, for example, can become higher than it really is if a product that uses many imported inputs is then not exported. Therefore this calculation must be interpreted using caution with regard to each individual sector. The standard is often used in connection with attempting to describe the effects on trade by fragmented production processes. According to Hummels et al three requirements must be fulfilled in order for vertical specialisation to be able to occur:

- A product is produced in one, two or several stages
- Two or more countries contribute to the value added during the production process
- At least one of the countries must use imported inputs in their production process, and some of the products must be exported

The last criterion implies that goods that are not exported do not have vertical specialisation even though imports are used in the production process. The calculations for vertical specialisation are therefore based on the imports proportion of domestic production and this share is then multiplied by the exports. If there are no exports, then there is no vertical specialisation according to this definition.

What makes vertical specialisation so interesting is that it measures both direct and indirect imports. Direct imports refer to goods or services that are imported to the sectors where they are to be used. The paper industry imports, for example, chemicals that are needed for the production process. With the aid of input-output tables one can also calculate the indirect imports, in other words, the sum of all imports that indirectly end up in a sector’s production process by being imported from other sectors. In the example of the paper industry an important part of the input goods come from the domestic forestry industry. The forestry industry has, in turn, imported such items as R&D services and equipment. When the paper industry uses forestry products in their production process then the imported equipment (items such as engine parts) and research is also used and consumed indirectly. When calculating indirect imports, all imports in the past are therefore included in the supply chain, from all the various sectors used in the production process. This provides a deeper picture of a sector’s total dependency on imports.

Is vertical specialisation a way to calculate the entire fragmented production chain? Inomata (2008) means that vertical specialisation only includes a limited part of the production chain i.e. what takes place upstream, not downstream. The fragmented production process can continue on downstream if a country exports products that are used in the receiver country’s production processes, which the calculation does not allow for. Vertical specialisation does not, therefore, give a picture of the total global fragmentation but the calculation only shows to what extent each country’s own national exports are dependent on imports.

Vertical specialisation also has other useful applications such as the possibility of analysing structural differences between sectors with regard to, for example, how much of the production process consists of imported inputs and how this share has changed over time. A review of the calculation of vertical specialisation is shown in Facts Summary 5.

**Facts Summary 5: Calculation of vertical specialisation**


\[
VS_{ki} = \left( \frac{\text{imported input goods}}{\text{exports gross production}} \right) \times \text{export}
\]

where \( k \) is the country and \( i \) is the product or the sector.

The first part of the equation calculates the proportion of imported inputs in relation to gross production. When the quotient is multiplied with the export value the value regarding the amount of imports within exports is approximated. The mathematical calculation of vertical specialisation is shown in the footnote 41.
Further assumptions in the calculation of vertical specialisation are that the imports content of the purchases made by tourists is assumed to equal the average imports value of exports as it is not possible to deduce what they buy in the input-output tables. Furthermore, the calculations are based on vertical specialisation of data from input-output tables which are reported in current prices. Large price changes between the time periods that are studied can affect the performances of the sectors if, for example, the share of imports decrease in value due to lower prices while at the same time the actual imports content increases in volume. The calculations are also based on all imports deriving from other countries and not that part of these imports could also be comprised of goods which originally are domestic. If Sweden imports an electronic product and a component of that product has previously been produced in Sweden then part of the imports also consists of domestic goods. When these products are included it would appear that our imports of foreign goods are greater than they actually are and then the vertical specialisation becomes overestimated. The calculations shown shall therefore be seen as how estimates on what the dependency on imports looks, both with regard to Sweden as a whole and within the various sectors.

For more information on the methodology please see Hummels et al (2001).

4.3 Sweden’s vertical specialisation

The calculations shown for Sweden are made using Statistics Sweden’s input-output tables for 1995 and 2005. In 1995 Sweden’s vertical specialisation amounted to 30 per cent. Ten years later the imports proportion of exports had increased to 33.5 per cent. The difference in vertical specialisation is not dramatic but the change does show that an already large dependence on imports has been further strengthened. Because of the fact that companies utilise increased imports in their production process the production that remains in this country becomes more specialised.

What are the reasons for the increase of Sweden’s vertical specialisation? The change in vertical specialisation over time is due to two factors. The calculation is partly affected by how the imports proportion has changed within each sector and partly by the fact that the country’s vertical specialisation is an export-weighted average of the sectors’ vertical specialisation. If, for example, the imports share within a sector remains unchanged while the sector simultaneously increases its share of Sweden’s total exports then that sector will make a greater impact on the calculations of Sweden’s total vertical specialisation. Therefore Sweden’s increased proportion of imports in exports could be due either to increased import shares within the sectors or due to those sectors where there is a large vertical specialisation accounting for a greater share of the exports in 2005 than in 1995.

An analysis on how the sectors’ relative export shares have changed during this time period shows that sectors with a lower than average share of vertical specialisation have increased their share of exports. The implication is that the increase in Sweden’s vertical specialisation is due to Sweden’s sectors, in general, having become more dependent on imports.

Small countries, with a smaller supply of inputs produced in the domestic market, naturally often have higher vertical specialization than larger countries. This is because small countries lack access to a large domestic market that can meet all the needs for inputs in the production process and they are therefore more dependent on trade with the outside world. According to Miroudot et al the unweighted average of the share of vertical specialisation in 29 OECD-countries as well as 11 growth economies that were studied in the most recently available year (2005 for most countries) was 31 per cent. However, there was a large variation between the countries, from 10 per cent in Russia to 60 per cent in Luxembourg. The Russian results can be explained by the country’s exports largely consisting of oil and gas, products which naturally are without a large foreign imports content. The high percentage of Luxembourg can be explained by the country having a small economy and a small domestic production with high labour costs and then the possibility of diversified production is of course limited.

Figure 3. Sweden’s vertical specialisation

Source: Statistics Sweden and own calculations
4.3.1 The vertical specialisation of sectors

It is also of interest to know the difference of vertical specialisation between the sectors and how these changes appear over time, which is illustrated in Figure 4.

Sweden's sectors show a wide diversity in their shares of vertical specialisation. In 2005 (1995) vertical specialisation was at its lowest with 8 per cent (7 per cent) within the financial and insurance sector and at its highest with 90 per cent (78 per cent) within the sectors of coal products, refined petroleum products and nuclear fuel.

There is a marked difference between the goods sectors and service sectors (red text in the figure) in the size of the vertical specialisation. Most goods sectors have a higher proportion of vertical specialisation than the much less imports dependent service sectors. The imports that take place within the service sectors are often comprised of service imports in comparison with the goods sectors. Seven out of the eight service sectors in the figure had a vertical specialisation of less than 20 per cent in 2005. Sectors that provide services are not as dependent on imports of input goods and intermediate services as the manufacturing sectors.

Figure 4. Average vertical specialisation in 24 sectors

Source: Own calculations based on Statistics Sweden’s input-output tables
The sector with the highest vertical specialisation is coke, refined petroleum products and nuclear fuel. The fact that vertical specialisation is so great within the petroleum sector (also applies to the rubber and plastics sector where a major part of the raw materials consist of petroleum products) is primarily due to inputs mainly consisting of imported crude oil. The high share of vertical specialisation within the motor vehicle sector is due to large imports of primarily motor vehicle components.

Even though the share of vertical specialisation is lower in the service sectors many service sectors have seen a large percentage increase in the vertical specialisation between 1995 and 2005. More than half the service sectors have had a percentage increase between 14 and 60 per cent. Within post and telecommunications services, for example, vertical specialisation has increased by 59 per cent which is due to a large increase in imports of research and development, post and telecommunications services and electronic equipment. Within the transport, storage and auxiliary activities sector vertical specialisation has increased by 36 per cent which is due to a large increase in imports of land transport services.

Only three out of 24 sectors have a lower share of vertical specialisation in 2005 compared to 1995: the computer sector, the textile and clothing sector and the transport sector (marginally). As to the computer sector the value of imports has increased but the sector’s total production value has increased even further which has led to the proportion of imports decreasing. The share of imports in the textile and clothing sector has also decreased, which according to the industry is likely due to an altered industry structure where the need for imports is not as great. Additionally the lower prices for textile and clothing input goods may have contributed to the decrease in the share of imports. It is therefore not sure that the volume of imports to the textile sector has decreased but the value of the imports has gone down.

4.4 The importance of sectors for the economy

Vertical specialisation reports the imports of the sectors as a share of the exports. Knowledge of both the size of the sectors’ exports and value added are important complements in being able to understand what the dependency on imports is in the sectors that contribute the most towards our exports. Without studying this there is a risk of drawing the conclusion that sectors that have a low imports content, for example the service sectors, always contribute more to the national economy.

4.4.1 How value added is created

The size of the value added affects the scope of the sectors’ contributions to the GDP. The value added is the value added created in companies during the production process. The model below illustrates a company’s production chain for a product or a service and shows how the value added is created.

In order to manufacture a product or provide a service companies use inputs of goods and services from domestic sectors. In addition foreign inputs are also used, i.e. imports. The inputs are processed into outputs meaning they are processed or used and gain a greater value. For example, the input of iron ore is processed into iron or the input of washing up liquid is used by a cleaning company. The difference between the market value of the production process (output) and what the company puts in (inputs) is the value added to the product, i.e. the value added. This includes wages, capital investment returns and taxes. In order to process an input labour and capital are needed and these are rewarded with either a salary or a capital investment return. The public sector takes part of the value added through taxes which are paid by both wage earners and capital owners. In simple terms, the GDP amounts to the sum of the total value added created in a country during a

Figure 5. Production chain of a product or a service

![Production chain diagram](image-url)
period of one year. All types of activities in the economy that increase the value added create economic growth and increases the GDP.

The finished output then partly goes towards exports, partly towards end use for consumption and investments, and partly to other domestic sectors to be used as input in a new production process. The boxes marked imports and exports show how goods and services flow in and out of the domestic economy.

4.4.2 The importance of the level of vertical specialisation

The table below shows the exports of Sweden’s sectors, vertical specialisation and national value added divided into 24 sectors. The table is split into six columns that show the total exports in each sector in billion SEK, each sector’s share of the total exports, the vertical specialisation, the national value added of exports, the national value added as a share of each sector’s exports and finally how that share has changed between 1995 and 2005.

Table 4 can be explained using examples from the metal industry. In 2005 the sector’s exports amounted to just under 105 billion SEK (column 1), equalling nine per cent of Sweden’s sectors’ total exports (column 2). The sector’s vertical specialisation was 38 per cent (column 3) which means that 38 of the exports value consisted of imported inputs. The remainder of the exports value, 65 billion SEK (column 4), or 62 per cent (column 5), con-

<table>
<thead>
<tr>
<th>Sector</th>
<th>Total exports (million SEK)</th>
<th>Exports as a share of the total</th>
<th>Vertical specialisation</th>
<th>value added of exports</th>
<th>Change of the value added 1995-2005 as a share of exports (percentage units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, hunting, forestry and fishing</td>
<td>4 143</td>
<td>0%</td>
<td>22%</td>
<td>3 214</td>
<td>78%</td>
</tr>
<tr>
<td>Mining and quarrying</td>
<td>9 766</td>
<td>1%</td>
<td>23%</td>
<td>7 500</td>
<td>77%</td>
</tr>
<tr>
<td>Food products, beverages and tobacco</td>
<td>22 111</td>
<td>2%</td>
<td>30%</td>
<td>15 436</td>
<td>70%</td>
</tr>
<tr>
<td>Textiles, textile products, leather and footwear</td>
<td>9 788</td>
<td>1%</td>
<td>37%</td>
<td>6 133</td>
<td>63%</td>
</tr>
<tr>
<td>Wood, publishing and printing</td>
<td>113 945</td>
<td>9%</td>
<td>29%</td>
<td>81 245</td>
<td>71%</td>
</tr>
<tr>
<td>Coke, refined petroleum products and nuclear fuel</td>
<td>43 202</td>
<td>4%</td>
<td>90%</td>
<td>4 252</td>
<td>10%</td>
</tr>
<tr>
<td>Chemical products</td>
<td>95 175</td>
<td>8%</td>
<td>35%</td>
<td>61 738</td>
<td>65%</td>
</tr>
<tr>
<td>Rubber and plastics products</td>
<td>21 746</td>
<td>2%</td>
<td>43%</td>
<td>12 438</td>
<td>57%</td>
</tr>
<tr>
<td>Metal products</td>
<td>104 752</td>
<td>9%</td>
<td>38%</td>
<td>64 791</td>
<td>62%</td>
</tr>
<tr>
<td>Machinery and equipment, nec</td>
<td>120 365</td>
<td>10%</td>
<td>39%</td>
<td>73 831</td>
<td>61%</td>
</tr>
<tr>
<td>Office, accounting and computer machinery</td>
<td>5 351</td>
<td>0%</td>
<td>38%</td>
<td>3 344</td>
<td>62%</td>
</tr>
<tr>
<td>Medical, precision and optical instruments</td>
<td>26 381</td>
<td>2%</td>
<td>35%</td>
<td>17 016</td>
<td>65%</td>
</tr>
<tr>
<td>Motor vehicles, trailers and semi-trailers</td>
<td>134 349</td>
<td>11%</td>
<td>50%</td>
<td>67 051</td>
<td>50%</td>
</tr>
<tr>
<td>Other transport equipments</td>
<td>17 876</td>
<td>1%</td>
<td>36%</td>
<td>11 426</td>
<td>64%</td>
</tr>
<tr>
<td>Other manufacturing</td>
<td>138 954</td>
<td>11%</td>
<td>42%</td>
<td>80 956</td>
<td>58%</td>
</tr>
<tr>
<td>Electricity, gas and water</td>
<td>5 479</td>
<td>0%</td>
<td>15%</td>
<td>4 653</td>
<td>85%</td>
</tr>
<tr>
<td>Wholesale, retail trade and repairs</td>
<td>105 629</td>
<td>9%</td>
<td>17%</td>
<td>87 727</td>
<td>83%</td>
</tr>
<tr>
<td>Transport, storage and auxiliary activities</td>
<td>76 690</td>
<td>6%</td>
<td>30%</td>
<td>53 842</td>
<td>70%</td>
</tr>
<tr>
<td>Post and telecommunications</td>
<td>10 821</td>
<td>1%</td>
<td>20%</td>
<td>8 669</td>
<td>80%</td>
</tr>
<tr>
<td>Finance and insurance</td>
<td>26 971</td>
<td>2%</td>
<td>8%</td>
<td>24 874</td>
<td>92%</td>
</tr>
<tr>
<td>Renting of machinery and equipment</td>
<td>4 643</td>
<td>0%</td>
<td>18%</td>
<td>3 810</td>
<td>82%</td>
</tr>
<tr>
<td>Computer and related activities</td>
<td>23 025</td>
<td>2%</td>
<td>16%</td>
<td>19 283</td>
<td>84%</td>
</tr>
<tr>
<td>Research and development</td>
<td>99 120</td>
<td>8%</td>
<td>19%</td>
<td>80 551</td>
<td>81%</td>
</tr>
<tr>
<td>Other services</td>
<td>5 700</td>
<td>0%</td>
<td>9%</td>
<td>5 181</td>
<td>91%</td>
</tr>
<tr>
<td><strong>In total</strong></td>
<td><strong>1 225 982</strong></td>
<td><strong>100%</strong></td>
<td><strong>33.5%</strong></td>
<td><strong>798 940</strong></td>
<td><strong>63%</strong></td>
</tr>
</tbody>
</table>

Source: Comtrade and own calculations
sisted of national value added and generated Swedish income in the form of wages, capital investment returns and taxes. The last column shows the proportion of Swedish value added decreased by five percentage units between 1995 and 2005 from 67 per cent to 62 per cent.

The table clearly illustrates that most Swedish sectors, to a greater or lesser extent, are highly dependent on imports. In total, nine of the 24 sectors have exports which comprise more than five per cent of Sweden's total exports and together they comprise over 80 per cent of Sweden's total exports. Five of these sectors, whose exports together comprise 60 per cent of Sweden's total exports are extremely import dependent sectors with a vertical specialisation of 35 per cent or more. The other four sectors are not as dependent on imports yet between 17 and 30 per cent of their exports consisting of imported inputs. Of all the sectors in Sweden only two, financial and insurance and other services have a vertical specialisation below 10 per cent.

In Sweden the value added of exports decreased from 69 per cent in 1995 to 63 per cent in 2005. The fact that the value added has decreased is primarily due to capital investment returns having decreased and the share of imports having increased. As the table illustrates, the national value added as a share of exports is at its highest in those sectors that have the lowest proportion of imports, chiefly in the service sectors.

When the proportion of imports is small a larger part of the production value is given to the own country, therefore it is natural for the service sectors to have a higher national value added.

That the Swedish value added of exports has decreased and the share of imports in exports has increased are due to a number of circumstances and can neither be interpreted as positive or negative. Various factors such as a high level of education and/or technology create a higher value added. When products are not easily interchangeable companies can take out greater margins and thereby reach a higher national value added both by higher wages and higher returns to capital owners. Also access to raw materials within the country's borders can create a high national value added within the sector. This is the case in Sweden with regard to the forestry sector for instance. In other sectors fierce competition may lead to a high imports content and lower value added. Imported inputs can then be a necessity in order for companies to survive and to be able to keep any of the value added of the production process in Sweden. Many variables affect the proportion of imports and it is impossible to define which level is a good one. The possibility of making the production process more effective differs between various companies, sectors and countries. Possible gains from vertical specialisation are furthermore changed over time keeping up with economic, technological and political changes.

Another important aspect to keep in mind is that the national value added as a proportion of exports only shows how great a part of the sector's production contributes to the economy. What is important to national economy is the actual value added in SEK. A country aiming for economic growth strives to reach the highest national value added as possible. In Sweden the value added of exports was higher in SEK in 2005 than in 1995 despite the proportion of value added in exports decreasing and this is explained by the fact that exports were much greater in 2005 compared to ten years ago. The value added in SEK has increased in all sectors except in the sector for agricultural, hunting, forestry and fishing products. Almost half the Swedish value added from exports come from five sectors which all had an imports share of over 35 per cent.

No self-serving reason exists then for a high or low share of vertical specialisation or a high or low national value added. The important thing is that the sectors have a vertical specialisation that leads to companies becoming as competitive as they can. This is achieved by companies gaining access to imported inputs at as good a price as possible.

### 4.5 Different ways to measure exports

The contributions to Sweden's exports from the sectors can be calculated in various ways. Figure 6 illustrates the difference between the traditional way of calculating the value of exports compared to calculating the national value added of exports. The figure is sorted by the value of the blue bar, which shows

<table>
<thead>
<tr>
<th>Sector</th>
<th>Value Added of Exports</th>
<th>Imports Share</th>
<th>National Value Added</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural, Hunting, Forestry</td>
<td>60%</td>
<td>35%</td>
<td>25%</td>
</tr>
<tr>
<td>Fishing</td>
<td>60%</td>
<td>35%</td>
<td>25%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>60%</td>
<td>35%</td>
<td>25%</td>
</tr>
<tr>
<td>Energy</td>
<td>60%</td>
<td>35%</td>
<td>25%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>60%</td>
<td>35%</td>
<td>25%</td>
</tr>
</tbody>
</table>
each sector’s share of the value of Sweden’s sectors’ total exports in 2005. The grey bar shows each sector’s Swedish value added of exports as a share of Sweden's total value added from exports. The comparison is interesting when seeing if the value added can provide a different view of which sectors are most important to Sweden's exports.

The sectors with the greatest share of the value of Swedish exports are manufacturing industries and the largest is other manufacturing which primarily comprises electrical appliances and communications equipment.

Calculated in value added a partly differing view is revealed. Of the 24 sectors 13 sectors have a greater share of exports calculated in value added. The largest percentage difference comes from two sectors, marked in red in the figure, financial and insurance (+42 per cent) and other services (+39 per cent). The two sectors in the figure marked in yellow show the largest negative percentage change in relation to their traditional share of exports. This means that the traditional method of calculating exports gives the sectors a greater importance towards the economy than the value added method does. These are the petroleum (-85 per cent) and the motor vehicle sectors (-23 per cent). Calculated as a share of Swedish value added in exports wholesale and retailing is the most important sector closely followed by wood and paper, other manufacturing and research and development.

Figure 6. Contributions of the sectors towards Sweden’s exports
The most important thing with regard to exports is not the value itself, the important thing is how much of the exports value actually ends up in Sweden, benefiting Swedish wage earners, Swedish capital owners and the public sector. The sector with the highest Swedish value added in exports is therefore the most important exports sector for Sweden’s GDP. The exports of the motor vehicle industry for example does not contribute more towards GDP than exports from the research and development sector. Using traditional statistics these sectors’ shares of exports are 11 and 8 per cent, however, using value added based statistics the shares are instead 8.5 and 10 per cent. Research and development thus generate more national value added than exports of motor vehicles.

By comparing the importance of, with regard to exports, the total products and service sectors the results show that the service sectors are not of as great importance in the usual exports statistics. 29 per cent of Sweden’s exports consist of the exporting of services, though when using value added terms the same sectors reaches 36 per cent. Traditional exports statistics show a greater Swedish dependence on the exporting of goods and a lesser dependence on the exporting of services. Moreover, there is a large service content in the operations of goods production companies. If this is applied to exports we may assume an even greater share of services, “disguised as goods” exist in exports statistics. In addition, a large part of Sweden’s economic relationships with the outside world are comprised of Swedish subsidiaries’ sales of services abroad. Therefore, we are a much more de-industrialized “headquarters economy” than what is apparent from current trade statistics.

That sectors are often highly dependent on each other makes it difficult to draw clear conclusions about what a share of the national value added in a sector means without simultaneously analysing in depth how the sectors interact with each other. The motor vehicle industry for instance has very strong connections with other sectors. In a report published by Almega and Unionen changes to the motor vehicle industry are shown to have major indirect impact on other sectors. According to the authors’ calculations a reduction in employment of 10 000 persons within the motor vehicle industry leads to reduced demand for labour by its suppliers in other sectors by an additional 14 600 persons. This indirect decrease in employment is greater than 10 years ago sending out the signal that the dependency between the motor vehicle industry and other sectors has become stronger. In 2005 each direct employment increase within the motor vehicle industry generated 0.4 more service sector jobs than in 1995. This example shows that one sector can have a great diversifying effect on other sectors so the sector’s importance to the economy could be greater or lesser than the figures show. This line of reasoning can be applied to all sectors and it is therefore difficult to determine how much a sector contributes to the economy.

As mentioned earlier, tourists’ purchases in Sweden are not divided into sectors in the statistics. According to Nutek about half of their purchases are spent on goods (retailing) and one-third is spent within the hotel and restaurant sector. If these had been included in the calculations based on the estimates made by Nutek then the exports share of both sectors would have increased. With regard to retailing, the exports share has increased by two percentage units to 10.5 per cent and the share of the total Swedish value added in exports had also risen by two percentage points to just over 13 per cent. The hotel and restaurant sector has no reported exports. Using the new estimate the sector’s share of exports would have reached 1.3 per cent and the value added share in exports 1.7 per cent.

The importance of exports for our economy is often shown as the exports’ share of the GDP. In Sweden this share amounted to 49 per cent in 2005 compared with 39 per cent in 1995. Instead, if one shows the national value added of exports as a share of the GDP then this increased from 27 to 31 per cent between 1995 and 2005. The national value added as a share of exports at the same time decreased from 69 per cent to 63 per cent. The significance of exports on Sweden’s economy has thus increased even though Sweden’s exports are less Swedish than they used to be.

4.6 More difficult to understand changes in production patterns

The all the more complex production structure has made it increasingly difficult to calculate what trading with inputs is like by using trade statistics. This section has illustrated an alternative way of calculating how fragmentation affects companies’ dependency on imports. Empirical data show increased dependency on imports with regard to Swedish production and exports which benefit the competitiveness of companies and Sweden’s economic growth.

The imports used by companies in their production process contribute, together with increased international competition, to productivity improvements and thereby economic gains for society. In order for companies to hold on to their competitiveness in an ever more globalised world it is important they have access to imports at as good a price as possible. The next chapter will look to see if EU tariff policies permit this, i.e. that companies have access to input goods at low prices.
5. How EU Tariffs Affect Sweden’s Fragmented Production

5.1 Important to have input goods at good prices

Input goods are more price sensitive than consumer products which means that both trade barriers and transport costs are of higher significance. As input goods are less differentiated than consumer goods company purchasers are more sensitive to price changes. Companies seeking to lower prices at all stages create strong pressure with regard to price and professional company purchasers often have a better overview of the market than private consumers. Furthermore, input goods are not visible in the finished product making the price an even more important factor when choosing inputs. With regard to finished consumer goods it is easier to create an added value for the product through other factors. There are, for instance, more opportunities to differentiate and market a sweater than the cotton it is made of.

The European Commission has noted that access to input goods is of great significance to European production and note:

“Trade openness facilitates the integration of local companies in global production chains. It makes them more productive and competitive, and creates more employment. More than two thirds of EU imports are imports of intermediate goods, many of them much needed to ensure the competitiveness of EU companies both in Europe and abroad.”

As shown in the previous chapter the manufacturing and exports of Swedish companies, as well as companies in most other economically integrated countries, are highly dependent on imported input goods and services. The EU’s ambition to facilitate access to input goods is important for furthering the competitiveness of European companies. However, it can be difficult to ascertain what constitutes input goods. Identifying a raw material can appear to be rather easy but a raw material such as potatoes can be purchased by both households as well as by the industry and may thus be counted as both consumer goods and input goods. Also with regard to processed products such as light bulbs, it can be difficult to determine if they are consumer goods or input goods.

5.2 The design of EU tariffs

Access to input goods is important with regard to the competitiveness of European companies. The EU applies a tariff policy that implies that tariffs on input goods are often lower than tariffs on finished products. This makes it possible, among other things, to facilitate imports of input goods companies need for their production. The way tariffs are applied to an industry can be exemplified by the textile goods industry. Imports of raw cotton to the EU from a third country are exempt from tariffs while imports of cotton shirts are levied with a tariff of 12 per cent.

Table 5 demonstrates the level of tariffs within a few different industries, divided into raw materials, semi-finished goods and finished products. The tariffs shown are the EU’s average unweighted applied MFN tariffs. The table shows that tariffs on raw materials are often lower than tariffs on semi-finished goods and finished products. In the table there are exemptions in the sector for wood, pulp, paper and furniture but tariffs are still comparatively low within that sector.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Raw materials</th>
<th>Semi-finished goods</th>
<th>Finished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish and fish products</td>
<td>9,1</td>
<td>12,5</td>
<td>14,0</td>
</tr>
<tr>
<td>Fruit and vegetables</td>
<td>6,7</td>
<td>9,7</td>
<td>15,4</td>
</tr>
<tr>
<td>Coffee, tea and cocoa</td>
<td>3,1</td>
<td>8,7</td>
<td>9,5</td>
</tr>
<tr>
<td>Leather and leather goods</td>
<td>0,1</td>
<td>2,4</td>
<td>6,2</td>
</tr>
<tr>
<td>Metal ores</td>
<td>0,0</td>
<td>1,6</td>
<td>2,8</td>
</tr>
<tr>
<td>Minerals and precious metals</td>
<td>0,1</td>
<td>2,2</td>
<td>3,4</td>
</tr>
<tr>
<td>Textile goods</td>
<td>2,5</td>
<td>6,6</td>
<td>9,8</td>
</tr>
<tr>
<td>Wood, pulp, paper and furniture</td>
<td>0,0</td>
<td>1,8</td>
<td>0,7</td>
</tr>
</tbody>
</table>

Source: WITS
Higher tariffs do not only affect the end user of a finished product but also affect manufacturers in the EU that use more processed input goods in their production process. In order to avoid this there are various procedures companies can follow so imported goods are, in some circumstances, subject to lower tariffs or none at all. Under certain circumstances companies may also get back the tariffs they have paid. More detailed information on these procedures is found in Facts Summary 6.

The fact these instruments exist shows the intention of the EU in promoting production within Europe but they do not cover all imports of input goods used in the production process. Applications come with a certain administrative burden to companies which is why some companies fail to apply when administrative costs become too great in relation to expected tariff relief. Additionally, these instruments can only be used under specific conditions. Active processing covers, for instance, only products that are to be exported outside the EU.

5.3 The significance of tariffs for Swedish production

Despite tariff rates often being quite low today tariff costs are not insignificant. Also a high tariff rate can be prohibitive, i.e. the tariff is so high that it stops imports and then there will be no tariff costs. In 2005 Sweden’s total imports of goods amounted to 813 billion SEK. More than 70 per cent of these

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**Facts Summary 6: Procedures towards lower tariffs on input goods**

The EU has different systems so companies may apply for tariff relief for certain input goods. A **tariff suspension** means that the tariff rate on input goods used in industrial manufacturing is reduced or suspended for a limited period, provided that there is insufficient production within the EU that can meet the need. A **tariff quota** is similar to a tariff suspension in its design, but only applies to a limited quantity of imports as there is some production within the EU. In addition to these opportunities of paying a lower tariff rate there is a special regulation which implies “favourable tariff treatment” due to the nature of the goods. Products which are to be used for special purposes with regard to, for instance, certain types of ships, airplanes or in various preparations may be imported exempt from tariffs or with reduced tariffs. **Processing under customs control** is used by companies who import a product in order to process it. One precondition is that the new processed product is subject to lower import duties than the product that was imported. In that case the company will pay the lower tariff rate for the finished goods which have been processed. The purpose of these procedures is for companies to have access to the input goods they need in their production process at lower costs.

In order to make the EU’s exports competitive in other markets companies can also apply for **inward processing**. This implies that companies that import goods, process them and thereafter export the new products outside the EU do not pay any tariffs on the imported goods. Another system of strengthening domestic competitiveness is **outward processing**. Companies within the EU export, on a temporary basis, goods to a country outside the EU where the goods are then processed. After the processing in a third country the product can be reimported to the EU either exempt from tariffs or with a lower tariff rate.
imports were exempt from tariffs as they arrived from or came via other EU countries. Apart from the EU, Sweden imports mostly from Norway, U.S.A., Russia, China and Japan. Two factors determine whether tariffs shall be paid on imports: the type of product and which country the product comes from. Many products are exempt from tariffs but in Sweden companies and consumers paid tariffs amounting to 4.7 million SEK in 2005. This equals two per cent of the value of the imports of goods that came from countries outside the EU. In 1995 tariff costs accounted for just under four per cent of Sweden's imports of goods from countries outside the EU. That tariffs as a share of imports in 2005 were half of what they were in 1995 is most likely largely due to tariff reductions but could also partly be due to an altered pattern of imports.

In Sweden's input-output tables we can see that two-thirds of Sweden's total imports in 2005 were used in production while one-third went directly towards consumption. Almost half of the total tariff costs were placed on products that were used in production and roughly the same amount was placed on products that went to consumption and were used by households. The remainder of the tariffs were levied on products that were used for investments (primarily machinery and motor vehicles) as well as imported products that were immediately exported (fish, foodstuffs and agriculture).

The low tariff costs in relation to the imports value could be interpreted as tariffs not being a major problem for companies. Trade from or via EU countries comprise a major share of Sweden's imports. Also, a large share of the imports within the EU is exempt from tariffs and various types of preferential agreements often mean that the tariff rate is reduced. Simultaneously we know that production in Sweden has become more dependent on imports and there are numerous situations when even a low tariff rate could mean major costs for companies.

- Input goods are, as previously mentioned, more price sensitive than consumer goods.
- Companies' production costs increase due to administrative costs for handling customs procedures.
- Companies are specialising in, to a much greater extent, a limited part of the production process, which means a product can cross the border of numerous countries before it becomes a finished product. A tariff that is paid in various stages in the production process of the same product could cause high tariff costs for the end product. In that case a low tariff will have greater impact on the final production cost.
- Tariff costs are important when companies determine where to geographically locate their production plants and from which countries they will import their goods.
- Tariffs could also indirectly affect the cost of trade within the EU. If a company in Sweden purchases goods from a company in another EU country that, in turn, has imported and paid tariffs for input goods from a country outside the EU then the tariffs has probably affected the price. To what extent the tariff costs are pushed down the line depends on many variables such as the price sensitivity of the product and the competitiveness of the sector in question.
- Tariffs could also lead to costs for companies with fragmented production even though no tariff costs arise at the time the import takes place. For example, if a product from South Korea is exported and processed in Japan before being exported to a company in Sweden, the Swedish company is affected indirectly by which tariffs Japan sets on South Korea.
- According to the National Board of Trade's company survey more than every tenth Swedish company believes that the high tariffs of the EU pose a problem with regard to imports. The problem is perceived as greater with regard to small-sized companies and is primarily true for the foodstuffs industry and the retail sector. Tariffs are often a greater problem for those companies that have lower margins such as small-sized businesses or companies in developing countries. The higher costs that tariffs can cause could stop them from entering into new markets.
- The existence of export duties on certain raw materials from certain countries make the overall cost of tariffs sometimes much higher than indicated in the EU customs tariff Taric.

5.3.1 Tariffs by product

The sectors which are most hard hit by tariffs are those with a large proportion of imports of dutiable goods and those who use many input goods from other sectors in the economy who in turn have paid tariffs. How does this affect imports in Sweden? Which products are subject to tariffs and which sectors are most affected by tariffs?

Figure 7 shows the product groups of all tariffs that were levied in 2005. The figures come from a summary made by Statistics Sweden where they illustrate, in a tariff matrix, which products are subject to tariffs and who, at the first stage, uses the dutiable goods. The users are divided into various sectors, households, investments, storage and
exports and in this way it is possible to deduce how large a part of the tariffs is levied on the production process. The figure does not include the indirect tariffs which arise when a product is imported to another EU country and is thereby cleared for customs, and later sent on to Sweden. The blue part of the bar shows how large a share of tariffs was placed on the sectors by the goods being used as input goods. Other tariffs were levied on goods which, to a large extent, were used by households.

Of the total tariffs paid in 2005 almost half was comprised of tariffs levied on products in the three first product groups shown in the figure: clothes, motor vehicles and foodstuffs.

For certain product groups in Sweden no tariffs were levied in 2005. These were products within coal, lignite, peat, crude petroleum and natural gas, uranium and thorium ores, metal ores, other mining products, pulp, paper and paper products, and electricity, gas and water.

Just over two billion SEK or 44 per cent of the total tariff costs, were levied on goods used in production. There is a wide divergence between the product groups in the share of the tariffs that were levied on input goods. Tariffs on agricultural products and hunting products did not, for instance, affect production to any great extent (just over 10 per cent), they did, however, affect households. In the metals, chemicals and rubber and plastics sectors more than 90 per cent of the tariffs affected input goods. The products which had the highest tariff costs in SEK, for input goods, were products within foodstuffs, beverages and tobacco products as well as telecom products and other electrical machinery and items.
5.3.2 Tariffs by user

Figure 8 illustrates who used the dutiable products and thus most likely paying a large part of the tariff costs. The difference between the two figures is that the first figure shows how tariffs affected the product groups, i.e. which products tariffs were levied on while the other figure shows how tariffs affected the sectors.

It is not possible to deduce from the statistics who imported these goods and paid the tariffs, the figure only shows who used the dutiable goods in the first stage. More sectors are included than in the previous figure as service sectors are also included. Tariffs are not levied on services yet service companies which import goods towards their production process can pay tariffs for these imports.

Companies in the top five sectors in the figure used input goods where tariffs amounted to more than half of the total tariffs on input goods. Tariffs in the motor vehicle sector amounted to 344 million SEK where the largest part of these costs derived from imported input goods from the foreign motor vehicle industry. It is of interest to note that approximately one-third of the tariff costs were levied on goods used by companies in the service sectors when importing goods such as foodstuffs, textile goods, clothes and rubber and plastic products.

Analysing the tariff costs of the sectors without taking into account the size of the sectors does not give a full view of the significance of tariffs. By placing tariffs in relation to the value of the sector’s imports an indication is given on the significance of tariffs for the sector. There are, however, several methodological problems in doing so.

- The sectors are extremely aggregated which means that within a sector with seemingly low/high tariff costs companies could exist which are heavily/hardly affected by goods with high tariffs placed upon them.
- A high tariff rate can be prohibitive.
- Even low tariff rates generate, as mentioned previously, administrative costs for companies.
- Different sectors are dependent on imports to a varying degree. Companies in a sector that is more dependent on imports are more sensitive to tariffs.
- Indirect imports also affect tariff costs as input goods often move between different sectors for further processing before becoming part of a finished product or service. Companies that pay tariffs on their input goods probably try to pass the cost onto the next stage in the production chain and it is not unlikely that companies who purchase dutiable goods from other sectors pay tariffs as part of the purchase price.

Bearing these weaknesses in mind, the comparison shows that in relation to all imports, i.e. including imports from the EU, tariff costs for most sectors lie between zero and one per cent of the value of imports with a few exceptions; leather and leather goods (5.5 per cent), clothes; fur and fur products (1.7 per cent) and hotel and restaurant services (1.2 per cent).

5.4 The significance of tariffs for Swedish exports

Tariffs affect imports costs but the connection between tariffs and exports costs are not often as self-evident. If dutiable input goods are processed and thereafter exported, tariff costs may accompany the goods all the way to export. In these cases the tariff becomes an indirect tax on exports. As early as the 1960s the concept of “effective protection” was discussed, which implies that not only are trade restrictive measures analysed but also their implications on companies and sectors. Researchers look at how import duties for instance protect domestic producers and how import duties on input goods affect companies that manufacture export goods negatively.

It is possible to calculate how much of Sweden’s tariff costs on input goods affect the exports industry based on the size of the tariff costs affecting each sector and thereafter how much of the sector’s manufacture is exported. Based on how much of the dutiable input goods the sectors initially use, as shown in figure 6, just under 60 per cent of the tariff costs for the input goods are used on exports, equaling just under 1.2 billion SEK. This is a negligible amount in relation to the size of the exports, however, the fact remains that this could be of significance to individual companies. It is also possible to alter the above calculation slightly by redistributing the tariff costs based on the sectors’ direct and indirect imports shares instead of just looking at how much the sectors use initially. Thereby consideration is also taken to the demand for dutiable goods between different sectors. The results show that tariff costs that are levied on exports become slightly lower at 55 per cent, but it is still more than half of the tariffs on input goods that could make Sweden’s exports more expensive. Import duties do not, therefore, only affect what is produced and consumed within the country but a large part also becomes an indirect tax on exports.
Figure 8. Sectors that used dutiable products in 2005

Motor vehicles, trailers & semi-trailers
Electrical machinery & apparatus, nec
Food products and beverages
Machinery & equipment, nec
Trade, maintenance and repair services of motor vehicles and motorcycles; retail sale of automotive fuel
Hotel and restaurant services
Health and social work services
Construction work
Chemicals and chemical products
Rubber & plastics products
Research and development services
Medical, precision & optical instruments
Fabricated metal products, except machinery & equipment
Pulp, paper and paper products
Basic metals
Products of agriculture, hunting and related services
Computer and related services
Public administration and defence services; compulsory social security services
Water transport services
Leather and leather products
Land transport; transport via pipeline services
Other transport equipment
Recreational, cultural and sporting services
Wood and products of wood and cork
Real estate services
Furniture; other manufactured goods n.e.c.
Wearing apparel; furs
Printed matter and recorded media
Education services
Post and telecommunication services
Coke products, refined petroleum products and nuclear fuel
Textiles
Electrical energy, gas, steam and hot water
Other services
Supporting and auxiliary transport services; travel agency services
Products of forestry, logging and related services
Other non-metallic mineral products
Fish and other fishing products
Membership organisation services n.e.c.
Sewage and refuse disposal services, sanitation and similar services
Air transport services
Renting services of machinery and equipment without operator and of personal and household goods
Financial intermediation services, except insurance and pension funding services
Metal ores

Source: Statistics Sweden’s tariff matrix
6. Conclusions

6.1 Fragmentation has changed the meaning of trade statistics

Production is being spread all over the world and international competition is setting new requirements for increased productivity in companies. Fragmented production and increased imports of inputs are in many cases a necessity in order for companies to meet ever toughening international competition. This is also clearly stated in the EU’s new trade policy strategy, which is part of the overall Europe 2020-strategy for growth in Europe.

Global production chains have made trade statistics more difficult to interpret. International trade has become more complex which has led to trade statistics showing a limited picture of reality. Therefore it is important that these figures are interpreted for what they are. According to the BEC classification Sweden’s imports of input goods have increased while simultaneously decreasing as a share of the total imports. This is due to imports of primarily consumer goods having increased more. However, input-output tables, which are used to calculate both direct and indirect use of imported input goods and intermediate services in various sectors, show that the dependency on imports in Sweden has increased in almost all sectors. Calculations on vertical specialisation also show a large dependency on imports in many of Sweden’s most important export sectors and that the service sectors increase their importance when calculating which of Sweden’s sectors’ exports create the highest national value added. The different ways of calculating a country’s dependence on imported inputs complement each other and contribute towards conveying a more in-depth picture of reality.

Almost half of Sweden’s tariff costs in 2005 were levied on goods used in production and within certain product groups roughly 90 per cent of the dutiable goods used in production were affected. It is estimated that more than half of the tariffs levied on input goods which affected products and services were then exported.

6.2 The significance of open markets

Trade barriers hit companies that import and also present a risk of making finished products more expensive and less competitive in international markets. Regulations which may disfavour fragmentation by driving prices higher on inputs, make supply chains unnecessarily administratively complicated to manage or create uncertain conditions hindering companies from utilising the international distribution of tasks. As this review shows trade has become all the more complex and it has become harder for the EU to use trade restraining measures to protect its own production. Tariffs, for instance, leads to higher prices for companies who through imports or indirect imports use dutiable input goods, however, it is not only import duties on goods used in domestic production that affect production costs.

Tariffs on consumer goods makes domestic consumption more expensive. Also, tariffs on consumer goods may partially hurt domestic production in situations where the physical production process has been transferred abroad while research and development, design, marketing and other services have been performed within the country. This will be a common situation in an ever more de-industrialised Sweden.

An illustrative example is the case study on shoe production described in chapter 2 where more than half of the imports' value added on a pair of shoes, manufactured in a factory outside the EU, can be passed on to companies within the EU.

Another interesting calculation experiment on the unwanted effects of tariffs on input goods has been conducted in the U.S.A. where a committee analysed the foreign content of American exports. The committee asked itself how US GDP and employment had been affected if the US had introduced high tariffs to hinder the import of input goods. The answer they provided was that in those cases where companies had chosen to switch to a domestic supplier of input goods competitiveness had deteriorated due to higher production costs. The higher costs would, in turn, have reduced American exports and increased demand for imports of cheap finished goods, contrary to what the tariff increase intended to do.

6.3 How trade policies can create better conditions for fragmentation

Trade policies are a significant tool in ensuring that imports are not made more expensive by trade restrictive measures and that companies can utilise fragmentation. European production can be promoted by the EU’s trade policies taking into account the fragmented production of companies and meeting the import demands. Improvements can be implemented in widely diverse areas of interest such as tariff policies, trade defence measures, restrictions on exports and trade procedures.

With the aim of increasing U.S. exports the American President signed a new law in 2010 which
temporarily eliminates or reduces tariffs on numerous imported goods which are used in manufacturing. In Canada they have gone even further and recently approved a plan for permanent unilateral phasing out of tariffs on basically all input goods for the industry until the year 2015. Many tariffs on input goods were removed as early as 2010. Similar initiatives could be taken in the EU.

Tariffs on exports also increases the cost of input goods. Between 70-80 per cent of all raw materials used within the EU are imported from a third country, not least when it comes to strategic metals. Access to these input goods is affected by the growing number of restrictions on exports such as export taxes and at times even a total ban on exports. Such policies are entirely legal within the WTO and in both the short term and mid-term these policies often benefit the countries applying the export restrictions. It is positive the EU is working towards a multilateral agreement in the Doha Round in order to limit trade restrictions.

Trade defence measures often come in the form of anti-dumping tariff. The differences compared to usual tariffs duties are that these measures can be implemented relatively suddenly and may involve very high tariff rates. Most anti-dumping measures affect typical input goods such as metals and chemicals and contribute in creating a general uncertainty in the sectors dependent on such goods for their manufacturing. The problems with anti-dumping do not only apply to input goods but have also spread to consumer products. The European “headquarter economies” are influenced by, for instance, physical manufacturing of shoes taking place outside the EU whose value added is largely passed on to companies in the EU, being affected by anti-dumping measures. The EU should review its anti-dumping regulations in order to decrease the risks for companies dependent on importing input goods for their manufacturing. Factors that indirectly increase import costs also exist. One such factor is slow and bureaucratic trade procedures. Extensive handling of documents, insurance and payment procedures, slow handling of customs declarations, corruption and filling in various permits take time and cause costs for the companies. For companies that are dependent on imports from many different sources worldwide and who apply Just-in-Time delivery this could be very serious. Simple and transparent trade procedures are therefore a competitive advantage in a world with global production chains. Sweden already has some of the best trade procedures in the world, but there are still great opportunities for many EU countries to make improvements and with the use of technical assistance to increase the capacity in many developing countries.

Complex rules of origin making trade even more administratively complicated and may also create costs for companies. Costs can occur when, for instance, five countries are involved in a production chain and all the countries set up different bilateral agreements with each other based on different rules of origin with varying degrees of opportunity to import from subcontractors in third countries. In the light of complex production and trade patterns multilateral, or as second choice plurilateral, solutions have become all the more important.

Fragmentation also require measures to increase access to intermediate services. In practice, many goods production companies do not sell pure goods, far from it, the product usually also includes a number of services. A tariff reduction in GATT or a new liberalisation in GATS may be eroded if profits are not realised because the necessary complementary goods or services are impossible to get hold of, or are prohibitively expensive. Various ideas on linking products and services issues exist, primarily in the IT field. As many services are sold internationally through foreign subsidiaries it is also important to encourage foreign direct investments as a way of receiving access to required intermediate services.

6.4 Are we heading towards more or less fragmentation?

Will Sweden’s vertical specialisation increase further? Besides from the trade policy variables mentioned above, this depends on a number of other factors. Not in the least, the companies’ balance between trade and investments will be of significant value. If an ever larger part of Swedish companies’ operations, both production as well as sales, take place outside Sweden’s borders then Sweden’s need for importing input goods will decrease. A possibility is a more de-industrialised Sweden in the future will need to import more intermediate services but less input goods. A Swedish “headquarters economy” would, in that case, be dependent on imports from abroad of many more routine business services while the relatively limited physical industrial manufacture would make input goods less important. Even though a relatively greater part of Swedish companies’ industrial production takes place abroad Sweden’s industrial production in Sweden can, however, increase in absolute figures. This might entail increased demand for imports of input goods.
Notes

1 Several terms have been used in order to describe the spread out international production structure. Fragmentation of production (to various companies and/or countries), production sharing between different locations, slicing up the value added chain, etc. In this study we use the term fragmentation of the production chain.

2 In order to be able to import sought after products from abroad we must export Swedish products. Exports thereby contribute economically towards financing sought after imports. It is much more noticeable today, however, that we need to import input goods and intermediate services to actually be able to produce products and services that are then exported.

3 This is relatively simplified, as even the most lowly agricultural product can have a certain value added from a different location i.e. where the vegetable was grown. An example could be that foreign fertiliser has been used to fertilise the vegetable.

4 Baldwin (2006)

5 A theory on task trade has been formulated by Grossman and Rossi-Hansberg (2008)

6 European Commission (2010)

7 One has to differentiate input goods from capital investments. The latter are long-term investments used in production but which are not consumed in the production process. For example an industrial robot used for a number of years is not input goods while the oil that is used to power the robot is.

8 However, not all business services are intermediate services, some are more long-term in nature and are thus - according to the discussion in the above footnote on investments in capital - to be looked at as investments in human capital. For instance, the training of personnel in a new invoicing system is not an intermediate service while the invoicing in itself is an intermediate service.

9 These four so-called modes of delivery are listed in the WTO’s General Agreement on Trade in Services (GATS).

10 Own calculations, based on data from the company database at The Research Institute of Industrial Economics.

11 As an illustrative example, the hourly wage cost for an industrial worker in Poland in 2005 (the year we are using in our calculations in chapter 4), can be mentioned. This was just one-fourth of the Swedish hourly wage, while costs in Brazil and China were 15 and 5 per cent of the Swedish costs. Both these examples stem from The World Bank Doing Business, www.doingbusiness.org.

12 Another example is that the cost of shipping a container from Brazil is more than double the cost in Sweden. The lack of a functioning administration and judicial system and the prevalence of corruption can also contribute to large and difficult to manage costs. Another example is that 37 different permits are required in order to get a building permit in China compared to eight in Sweden. Acquiring all these permits not only takes time but requires expensive legal aid and creates insecurity. Both these examples stem from The World Bank Doing Business, www.doingbusiness.org.

13 See Pehnelt (2007), for example, or Bakens et al (2006)

14 If you perform a search for Giant Sucking Sound on www.youtube.com several clips appear.

15 Blinder (2009)

16 Linden et al (2007)

17 This type of statistic, unfortunately, does not exist. We do not know, either, how much of the Japanese company’s profits are reinvested in China or who are the shareholders of the Japanese company. Therefore, we cannot distribute the value added between China and Japan (or for that matter, other countries where shareholders might exist).

18 Recently an updated version of this study was made, on this occasion focusing on an iPad. That report reaches the same conclusions and assesses the Chinese share of value added at five per cent.

19 National Board of Trade (2007)


22 Tempest (1996)

23 Daudin et al (2009)

24 Standard International Trade Classification


26 The fact that we use 1995 as our base year has to do with the analyses made in Chapter 4 that start in the said year.

27 Source: COMTRADE.

28 BEC-categories 111, 21 and 31

29 In 1995 raw materials accounted for 13 per cent of the imported input goods while in 2009 this had increased to 20 per cent. Within the field of raw materials the largest increase was in the group fuels and lubricants, including oil as the major post. As the oil price has been rising all throughout the period this is not surprising.

30 BEC-categories 121, 22, 322, 42 and 53.

31 The reason is it called the Rotterdam effect is because Rotterdam is the largest port in Europe and many goods reaching the EU arrive there first. Problems due to the Rotterdam effect only arise when goods arrive and are unloaded in another EU country and tariffs are levied there. The Rotterdam effect most likely leads to the share of input goods originating from countries such as China and other low-cost countries outside the EU being underestimated.

32 Rising imports from Norway are due to a large increase in imported fish. Sweden’s membership in the EU in 1995 has led to a great deal of Norwegian fish exports being transported through Sweden, thereby being registered as Swedish imports in trade statistics.

33 The World Bank’s definition of high income countries as high-cost countries and middle and low income countries as low-cost countries. All ten Central European EU members count as low-cost countries even though most of them have recently been upgraded by the World Bank. Their costs are nonetheless significantly lower than in Western Europe.

34 It would have been interesting to study what type of input goods come from what type of country. Then it would have given a clearer picture of Sweden’s large dependence on low-cost countries for a number of important goods, a dependence that is much greater than just stating that they account for 15-20 per cent of the imports of input goods. Unfortunately we have not been able to find a study that has investigated this issue closely.
35 Hummels et al (2001)

36 That the investments have a negative value is due to the value of company storage investments decreasing. In the forestry industry, for example, storage investments consisting of the change in felled timber assets have been negative.

37 In Asia, however, an Asian input-output table has been created for a group of countries, in order to follow the trading of goods and services, based on company data, both between countries and between sectors. On a global level a project exists, financed by the EU, with the purpose of creating an input-output data base that covers the majority of world trade. This is based on various assumptions and aims to estimate a global input-output table. More information regarding this project can be found at www.wiod.org

38 Hummels et al (2001)

39 The input-output tables for 1995 and 2005 show more than 50 sectors. In the following calculations the sectors have been aggregated into 24 sectors, partly to show that some sectors, due to confidentiality, are not shown individually in the input-output tables but are aggregated together with other sectors, partly because aggregation makes the sectors comparable between the two time periods. The aggregation has, as far as possible, been performed in accordance with the classifications by Miroudot et al (2001).


41 Vertical specialisation as a proportion of total exports $\Xi = uAM-\Xi^{-1}Xk$ where $u$ is a 1 X n vector of ones, AM is a n X n import coefficient matrix, I is an identity matrix, AD is an n X n domestic coefficient matrix, X is a n X 1 export vector and Xk is the sum of the country’s total exports. $I-AD^{-1}$ is a geometric infinity sum and is the mathematical term that incorporates imported input goods from all stages in the production process.

42 Nutek discusses in its report Facts on Swedish Tourism and the Tourism Industry (Fakta om svensk turism och turistnäring) (2008) how tourists spend their money and shows that approximately half is spent on the purchase of products and a third is spent in the hotel and restaurant sector. Both these sectors have a lower share of imports in production than the Swedish average. This impacts the vertical specialisation from tourists’ consumption, which is thus likely to be exaggerated. However, the purchases made by tourists do not encompass more than just over four per cent of Sweden’s total exports so the problem does not need to be exaggerated.

43 Daudin et al (2009)

44 Calculations have been performed due to the export value staying unchanged over a period of time. This means that each sector’s vertical specialisation in 2005 has been applied to the sector’s export figures from 1995 instead of the export figures from 2005.

45 Miroudout and Ragoussis (2009)

46 Argentina, Brasiliien, Estland, Kina, Indien, Indonesien, Israel, Rysland, Slovenien, Sydafrika and Taiwan

47 Textile goods, clothes, leather and leather goods

48 Conversation with Åke Weyler, ex-Managing Director of Textilimportörerna

49 Also included in Sweden’s total exports are imports that only cross our borders going directly as exports and foreign citizens’ purchases in the country. Those figures are not shown in the table. An example of direct exports is Norwegian salmon which passes through Sweden on its way to other EU countries. In total these types of imports accounted for just below four per cent of Sweden’s exports in 2005 and it is the reason why vertical specialisation together with the national value added does not amount to 100 per cent in the table.

50 Chemical products, metal products, machinery and equipment nec, motor vehicles, trailers and semi-trailers, and other manufacturing.

51 The retail sectors’ exports should, however, be interpreted with caution. The exports from the retail sector include, among other things, merchandising, which means that Swedish companies buy and sell products abroad, without the product crossing Swedish borders. The difference between the selling price and the purchasing price comprises Swedish service exports in the retail sector. Therefore, the trade sector exports not consist of a homogeneous product group but it is a combination of all products that can be bought and sold by Swedish companies. The value added passed on to the Swedish economy can be seen as remuneration for services that have been performed by the domestic company, for example, research, product development, marketing and administration.

52 National Board of Trade (2010) 1

53 Almea and Unionen (2008)

54 Miroudout et al (2009)

55 European Commission (2010) 2

56 HS5201 discarded or uncombed

57 Tariffs are shown in MTN-categories, i.e. Multilateral Trade Negotiation. The categories are industrial product categories that the countries within the WTO used in negotiations on market access during the Uruguay Round. Various preferential tariffs and preferential quotas etc. imply, however, that tariffs in certain cases can be considerably lower when importing to the EU.

58 Swedish Customs (2010)

59 Statistics Sweden

60 In an article written by Yi the author discusses how the standard trade theory models experience difficulties in explaining why tariffs reductions have contributed to such a large trade increase since the 80s. The author believes that the existence of vertical specialization increases the models’ explanatory level as fragmentation across several national borders has created greater tariff costs in manufacturing. If tariffs have been paid more than once, a slight decrease in tariff rates leads to production costs decreasing even more for goods produced in more than one country. Thus a small reduction in tariffs can cause a major impact on the volume of trade. However, as far as we know, no studies have been made in in an attempt to quantify this.

61 National Board of Trade (2010) 2

62 European Commission (2010) 3

63 Committee on Analyzing the U.S. Content of Imports and the Foreign Content of Exports (2006)


65 Canadian government (2010)

66 According to the World Bank’s Doing Business (www.doingbusiness.org) Sweden is the world’s seventh best country with regard to this.

67 This also applies to input goods where for instance a computer processor can include services such as support, training and installation. The opposite, of course, also applies, where a company sells an intermediate service where the products are included. One example is an anti-virus protection program which has been built into a computer with the aid of a physical component. This commercialization is probably not as common.
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