

Where is **Sweden** competitive?

– using global value chain specialization patterns to define the key competitors of Sweden

In this study, Growth Analysis takes the global value chain perspective one step further. We use the tools of global value chain analysis to first ask the question of where Sweden is competitive, and then ask which nations that are the main competitors of Sweden.

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Foreword

An increasing share of world economic activity takes place in what is called Global Value Chains – producer networks that stretch across countries and regions. A question of importance to Swedish policy makers as well as the general public is what this increased use of global production systems means for Sweden, and the Swedish economy.

Growth Analysis has since 2012 carried out a number of studies to address these questions. Summarized elsewhere (Growth Analysis Report 2014:12) these studies broadly show that the Swedish economy is heavily, and successfully, connected into global value chains. A significant part of the Swedish economy is dependent on participating in global value chains, and this participation has brought about major changes in employment patterns (according to skills as well as geographical region) and have improved the over-all competitiveness of the Swedish economy.

The studies have, this far, been primarily descriptive in nature – seeking to map out the “new economy” in which Sweden is a part. In this study we take the global value chain perspective one step further and address the question of what a global value chain perspective can tell us about the competitive environment of Sweden. We use the tools of global value chain analysis to first ask the question of where Sweden is competitive, and then ask which nations that are the main competitors of Sweden. We thus use a new analytical tool (GVC analysis) on an old question (where is Sweden competitive) in order to provide us with new answers.

The report has been written by Dr Gaaitzen de Vries of the University of Groningen, with inputs by Professor Stefan Arora-Jonsson at University of Uppsala and Enrico Deiaco, Director at the Swedish Agency for Growth Policy Analysis.

Stockholm, April 2016

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Förord

En allt större del av världens ekonomiska aktivitet äger rum inom det som kallas globala värdekedjor – producentnätverk som sträcker sig över länder och regioner. En fråga som är viktig för svenska politiker såväl som för allmänheten är vad den ökade användningen av globala produktionssystem innebär för Sverige och den svenska ekonomin.

Myndigheten för tillväxtpolitiska utvärderingar och analyser, Tillväxtanalys, har sedan 2012 genomfört ett antal studier för att undersöka dessa frågor. Dessa studier (se sammanfattning i Tillväxtanalys Rapport 2014:12) visar att den svenska ekonomin är nära knuten, och framgångsrikt, till de globala värdekedjorna. En stor del av den svenska ekonomin är beroende av de globala värdekedjorna, och det har medfört stora förändringar i sysselsättningsmönstren (både kompetensmässigt och geografiskt) och har förbättrat den svenska ekonomins konkurrenskraft.

Studierna har hittills varit deskriptiva till sin natur – försökt kartlägga den ”nya ekonomi” som Sverige är en del av. I den här studien går vi ett steg längre när det gäller globala värdekedjor och undersöker frågan om vad ett sådant perspektiv kan berätta om den konkurrensmiljö som Sverige befinner sig i. Med utgångspunkt från globala värdekedjor använder vi analysverktyg för att få svar på frågan om var Sverige är konkurrenskraftigt, och därefter vilka länder som är Sveriges huvudkonkurrenter. Vi använder alltså ett nytt analysverktyg (GVK-analys) för att besvara en gammal fråga (var ligger Sveriges konkurrenskraft) och få nya svar.

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Summary

Background

The Global Value Chain (GVC) perspective is a new way of unraveling the economic activities that make up a growing part of the world economy. The main purpose of this report has been to take this perspective and run its full course with respect to analyzing the competitiveness of a country. Specifically, the report provides a method and a measure of the competitive characteristics of Sweden – what is its skill profile and to what markets it delivers economic value. By performing the same mapping exercise on the most significant other economies, a competitor mapping is provided.

Results

While there are few major changes in the listing of the main competitors to Sweden as compared to those that often figure in policy discussions (Denmark, Finland), the close similarity to Austria and the Czech Republic is less often recognized in policy discussions. Also the relative *dissimilarity* of the Netherlands, which often is used as a benchmark for policy development, is interesting to note.

In addition the analysis shows:

- Sweden, Finland and Denmark receive about three quarters of their GVC income from the EU 15
- Both Finland and Sweden receive a high share of their GVC income from China
- Sweden is highly specialized in R&D, sales and marketing, logistics, technology and process development.
- Sweden does not have a comparative advantage in core production and assembly activities
- The Nordic countries are deeply integrated in each other's value chains

Conclusion and recommendations

While mapping out key competitors, the report actually also recognizes potentially important economies for collaboration. One could argue that Sweden could benefit from close cooperation with Denmark and Finland to increase its competitive position in global value chains. This is yet another argument in favor of consciously seeking to develop the economic and policy collaboration and coordination between the Nordic countries. Now, even more than before, we could benefit from each other.

When value chains fragment and innovation is becoming global, the intellectual resources needed to compete successfully increases. For small countries the advantage for co-operation and division of labor therefore increases, in particular when as in Finland, Sweden and Denmark value chains are integrated to a large extent. We think that there are interesting possibilities for co-operation in the areas of research funding, university collaboration and in standard-setting in new technology areas such as in new digital manufacturing technologies.

Our findings indicate that, from a GVC perspective, the competitiveness profile of Sweden is not radically different from what the use of more traditional analytical tools would

provide. This finding is informative in several ways. First, it confirms that even in a “new economy”, *some* of our old ideas hold true. However, it also shows that there are close competitors that we seldom notice or discuss - such as Austria or the Czech Republic. The GVC perspective also shows us a competitiveness image of Sweden in terms of the economic *activities* – instead of the traditional products and industries – where we are competitive in creating value. Both these findings open up for new ways of thinking about which policy instruments to use for enhancing competitiveness.

Sammanfattning

Bakgrund

Globala värdekedjor (GVK) är ett nytt sätt att ta reda på vilka ekonomiska aktiviteter som utgör en allt större del av världsekonomin. Huvudsyftet med denna rapport är att med globala värdekedjor som grund analysera ett lands konkurrenskraft. I rapporten redovisas en metod för att mäta Sveriges konkurrenssegenskaper – dess kompetensprofil och till vilka marknader landet levererar ekonomiskt värde. Genom att kartlägga andra stora ekonomier på samma sätt kommer man fram till en konkurrens-karta.

Resultat

Sveriges huvudkonkurrenter är fortfarande de länder som oftast förekommer i de politiska diskussionerna (Danmark, Finland), men den stora likheten med Österrike och Tjeckien hör man mer sällan talas om. Den relativt stora *olikheten* med Nederländerna, som ofta används som en jämförelse när det gäller politisk utveckling, är också värd att notera.

Analysen visar också följande:

- Sverige, Finland och Danmark får cirka tre fjärdedelar av sina inkomster från globala värdekedjor från EU-15-länderna
- Både Finland och Sverige får en hög andel av sina inkomster från globala värdekedjor från Kina
- Sveriges specialområden är forskning och utveckling, försäljning och marknadsföring, logistik, teknik och processutveckling.
- Sverige har inga konkurrensfördelar inom kärnproduktions- och monteringsaktiviteter
- De nordiska länderna är i hög utsträckning integrerade i varandras värdekedjor

Slutsats och rekommendationer

Rapporten visar vilka ekonomier som skulle kunna vara aktuella för ett samarbete. Sverige skulle faktiskt kunna dra nytta av ett nära samarbete med Danmark och Finland för att öka sin konkurrensposition inom globala värdekedjor, även om (eller eftersom) vi identifierat dem som de viktigaste konkurrenterna, beroende på att deras specialisering och geografiska inriktning överlappar i hög grad. Det är ännu ett argument för att Sverige bör försöka utveckla det ekonomiska och politiska samarbetet och samordningen mellan de nordiska länderna. Nu kan vi i högre grad än förut dra ömsesidig nytta av varandra.

I och med globaliseringen av värdekedjor och innovation ökar behovet av immateriella resurser för kunna konkurrera. Samarbete och delad arbetskraft är viktigt för små länder för att de ska förbli konkurrenskraftiga, särskilt om deras värdekedjor redan är starkt integrerade, som i Finland, Sverige och Danmark. Vi anser att det finns intressanta möjligheter till samarbete inom forskningsfinansiering, universitet och nya standarder inom tekniska områden, som t.ex. nya digitala tillverknings-tekniker.

Resultaten av Sveriges konkurrensprofil sett ur ett GVK-perspektiv avviker inte i någon större utsträckning från mer traditionella analysverktyg. Det är intressant på flera sätt. För det första bekräftar det att även i en ”ny ekonomi” gäller fortfarande en del gamla idéer. Det visar dock också att det finns vissa konkurrenter i vår närhet som vi sällan lägger

märke till eller diskuterar – bland andra Österrike eller Tjeckien. GVK-perspektivet ger oss även en bild av Sveriges konkurrenssituation inom ekonomiska aktiviteter – i stället för traditionella produkter och industrier – där vi kan skapa värde på ett konkurrenskraftigt sätt. Båda dessa iakttagelser kan leda till en ny syn på de politiska instrument som kan användas för att öka konkurrenskraften.

1 Introduction: understanding competitiveness in a new global economic landscape

A popular measure of competitiveness is the success of a nation in taking part in the world economy, often measured by calculating its shares of world export. If a country holds a large share of export of a particular product, it is thought to be competitive with respect to this product. From a growth policy perspective, the purpose of such measures is not to arrive at a relative standing of the nation in terms of export success, but to gain insight into what parts of the national economy that is working well and where policies need to be directed to develop economic activity to become more competitive. The competitiveness of countries is understood in terms of their competitiveness *profiles*- i.e. a mapping of the main competitive characteristics of an economy and these have most often been expressed in terms of industries (Porter 1990). Sweden, for instance, is commonly thought of as a heavy machine-tool or paper and pulp nation whereas a country like Denmark is characterized as an agriculturally based economy.

With the latest wave of globalization of economic activities from the early 1980's and onwards, the way the world economy works has however changed significantly. One result of this globalization wave is that much of the economic activity takes place in Global Value Chains (GVCs); the products that we consume are the result of large set of producers that are spread over the world and are linked together in a long chain for the manufacture of a particular product. This means that specific products and industries, which have traditionally been the basis of measuring national competitiveness, are becoming less and less descriptive of the economic activity of a single nation. About half of the economic value of a Volvo car that rolls off the production line in Gothenburg is Swedish, while the rest of the value of the car is imported from another country and assembled in Gothenburg. Out of the value that is Swedish, a substantial part derives from other industries than the automotive – for instance from the IT industries (National Board of Trade 2012:16; Growth Analysis PM 2014: 23).

This development makes it unreliable to measure the competitiveness of a country in terms of the success of export of particular products (Timmer et al 2014; Baldwin 2012). If, for instance, Volvo Cars in Gothenburg outsources a larger part of its production to another country and thereby reduces the price of the car so that it can sell (and therefore export) more – does that mean that the competitiveness of the Swedish economy has increased or decreased? While the number of cars that are exported has increased, the economic value of each car that is created in Sweden has reduced. Similarly, if the Swedish IT industry innovates and provides better services to Volvo so that it can export more cars, is this to the credit of the automotive industry?

The change in how and where economic value is created presents a challenge to national policies for growth (Baldwin and Everett 2012). How do we know if Sweden is doing well or not – in comparison to how we were doing earlier and in comparison to our competitors? In what dimensions should we gauge the competitiveness of the Swedish economy? New ideas of how to measure the competitiveness of countries have been developed over the past ten years along with new data that allows tracing of the *value added* by country, rather than gross value exported in terms of products of a country, (OECD, 2013; Baldwin and Everett 2012; Timmer et al 2014). This new literature suggests that national competitiveness is best understood and measured in terms of the *activities* of a global value chain

that a nation is competitive in. Where nations would earlier have been characterized as competitive in terms of “heavy machinery” or “automotive industry”, the new idea is to characterize nations as more or less competitive in the stages of a value chain – which roughly can be divided into preproduction activities (such as research and development, raw materials sourcing), production (operations, manufacturing) or post-production (services, sales, financing).

National policies for economic growth are primarily about improving the competitiveness of a nation. An important step in any policy work is therefore to establish the relative standing of a nation in relation to other nations – i.e. to gain an idea about the competitiveness of the nation. Growth analysis has begun to investigate Swedish competitiveness from a GVC perspective (see the working papers from Growth Analysis 2012:23; 2013:10; 2014:03; 2014:15; 2014:23 and Report 2014:12). One main conclusion is the importance of understanding how *Swedish* economic value is created in global value chains, rather than to track changes in traditional measures of economic outcomes such as gross exports (Growth Analysis PM 2014:03). With respect to competitiveness we show in Growth Analysis 2014:10 that a commonly used measure of competitiveness – Revealed Comparative Advantage (RCA) at the level of product categories differs substantially depending on whether Swedish RCA is measured in terms of gross exports or in terms of Swedish value added.

These developments beget the wider question of how, in a time where a sizable part of the Swedish economy is generated in global value chains, we should think about Swedish competitiveness, and *who* the Swedish competitors are. Would the competitiveness profile of Sweden look different than what we are used to see if we map it from a GVC activities perspective? And, if we map our possible competitor nations the same way – would we see the same or new competitors?

1.1 This report: mapping Swedish competitiveness from a new angle

In this report we draw on the most recent developments in data availability to investigate the Swedish economy from a global value chain perspective. We illustrate in this report what Swedish competitiveness looks like from the perspectives of the activities in which the most value is added. Instead of characterizing the Swedish economy in terms of some industry or product, we characterize it in terms of the most important economic activities that take place in Sweden. The output of this report is therefore *first* a mapping of Swedish competitiveness per activity, across all manufacturing industry sectors which answers the question of what stages in global value chains where the Swedish economy adds the most value. This mapping of Sweden is complemented by a mapping of the other major world economies and we derive at a shortlist of what other economies that are the most similar to Sweden from a GVC competitiveness perspective. These are the countries that, *from an activities perspective* are our closest competitors.

From a competitor mapping perspective, it is however not only important to know whether other countries are good at doing the same things as Sweden, but also where they deploy these skills. An added advantage of a global value chain perspective on competitiveness is that it allows us to think of the competitiveness of Sweden not only in terms of *what* we do, but also *where* what we do is demanded. The *second* output in this report is therefore a mapping of countries that are similar to Sweden in *where they deliver the value* that is created by the different activities.

Bringing these two mappings together, a *third* output of this report is a competitor matrix for Sweden. This matrix answers the question: in relation to the profile of the Swedish economy, what are the countries that are similar in what they do and where they sell (competitors); similar in what they do but sell in different markets (potential competitors); different in what they do, but sell to similar markets (complementors), and those that are just different from Sweden from a competitive profile perspective.

2 Global value chains

Vertical specialization of countries in trade is by now a major established theme in international economics, spawning a voluminous strand of research.¹ A key outcome of this work is that production is fragmenting internationally and countries specialize in tasks in global production networks (Grossman and Rossi-Hansberg, 2008). These tasks include production activities as well as various services activities, including both pre-production tasks, such as R&D and design, and post-production tasks, such as marketing and after-sales service.

In this report we provide evidence of the functional specialisation of countries in the production of manufacturing goods. We follow an approach known as the Global Value Chain (GVC) approach introduced by Timmer et al. (2014) which allows one to identify vertically integrated product chains and to trace the value added by all countries that are directly or indirectly involved in the production process. The contribution of this report is to add new information on the functional distribution of value added. Nine functions are distinguished: production, management, R&D, back-office, logistics, after-sales services, technology and process development, facilities maintenance, back-office, and sales and marketing. The value added of a particular function is identified by the labour income of workers that perform the function, using information on the occupation of workers. We analyse functional specialization of Sweden in global value chains and examine who are her main competitors. For those who are curious, we will show that the Swedish economy adds most of its value in the activities of R&D and product development, operations and assembly and administration. Using the same methodology, we then develop the same type of characterization of the specialization of value creation of the other European economies. On the basis of this, we then develop a classification of these economies as being more or less similar to Sweden in a capabilities perspective.

¹ See e.g. Amador and Cabral (2014) for an overview.

3 Measuring activities of Sweden in Global Value Chains: concept, data, and example

The global value chain approach measures the contribution of countries to global production. It is defined as the income generated in a country by participating in global manufacturing production of a particular set of products, abbreviated by the term “GVC income”, for global value chain income (Timmer et al., 2014). It answers the question how much value a country adds to the global production of a particular set of products.

Figure 1 An accounting framework for global value chains

			Final products of a global value chain, identified by country-industry of completion							Value added
			Country 1		...		Country M			
			Industry 1	...	Industry N	...	Industry 1	...	Industry N	
Value added from country-industries participating in global value chains	Country 1	Industry 1								
		...								
		Industry N								
	Country M	...								
		Industry 1								
		Industry N								
Total final output value										World GDP

Note: Cell values represent the value added generated in the country-industry given in the row, within the global value chain corresponding to the country-industry of completion given by the column.

Source: Timmer et al. (2014)

A particular row in Figure 1 provides information on the value added from a particular country-industry to all global value chains in the world. Obviously, this includes value added in the production of its own final products, but also value added to production in other GVCs, by means of delivering intermediate inputs. Note that this includes value added delivered directly to the industry-of-completion, but also indirectly through other industries. An element in the final column of Figure 1 provides the summation across the row and is equal to the value added in an industry.

In this report we focus on the contribution to the global production of final manufacturing goods, denoted by the term “manufactures”, similar to previous reports by Growth Analysis. Production systems of manufactures are highly prone to international fragmentation, as activities have a high degree of international contestability: they can be undertaken in any country with little variation in quality. GVC income of a country is then defined as the contribution of its industries to the global production manufactures. The GVC income of a country in global production of manufactures is equal to the sum of value added by all its industries to the production of all final manufacturing goods where the last stage of production takes place in any country in the world. Note that this includes not only activities in the manufacturing sector, but also production activities in all other sectors, such as agriculture, utilities, business and IT services, and so on, that provide inputs in any stage of the production process (see Box 1 in Growth Analysis 2014:12 reproduced below).

Box 1. Measuring services activities in global value chains

It is important to note that a country's share in manufactures GVC income indicates its competitive strength in a particular set of activities, namely those directly and indirectly related to the production of final manufactures. This includes activities in the manufacturing sector itself but also in supporting industries such as business, transport and communication and financial services through the delivery of intermediate inputs. These indirect contributions will be explicitly accounted for through the modelling of input-output linkages across sectors.

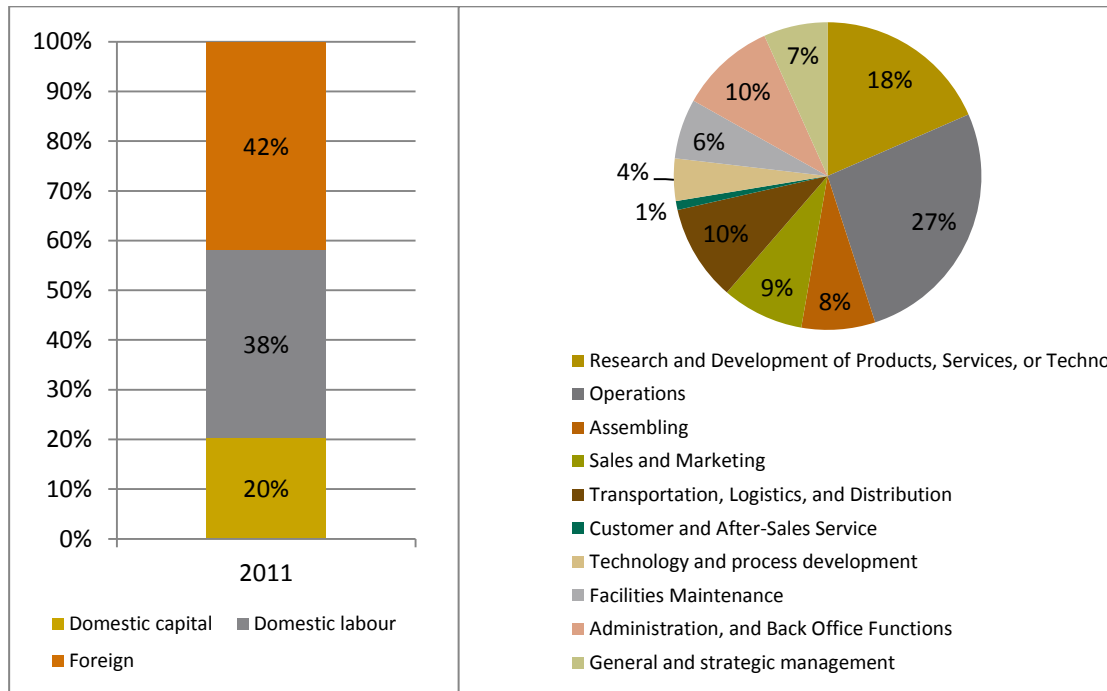
Consider the example of car production in Germany. Demand for German cars will in first instance raise the output of the German car industry. But production in this industry relies on parts and components that are produced elsewhere, such as engines, braking systems, car bodies, paint, seat upholstery or window screens, but also energy, and various business services such as logistics, transport, marketing and financial services. These intermediate goods and services need to be produced as well, thus raising output in the industries delivering these, say the Swedish business services industry, the Czech braking systems industry and the Indian textile industry.

Labor market data is aggregated from survey and census data. For European countries we use the European labor force surveys for occupational employment data and the structure and earnings surveys for their relative wages. For the United States we use the wage and employment data available in the Occupational Employment Statistics (OES). For European countries we have occupational data at the three-digit level following the International Standard Classification of Occupations (ISCO) 2008. For the US the OES distinguishes 800 occupations. In total, we collect occupational employment and wage bill shares within 31 industries (of which 13 manufacturing industries) across 30 countries for 2011 and 2013. This very detailed occupational dataset allows us to map workers into business activities. It should be emphasized that the mapping is done using a GVC perspective where the primary interest lies in those jobs that are involved in GVCs. Hence, the mapping of armed forces officers (ISCO category 11) to the business function 'general and strategic management' is not particularly relevant to our analysis, because these are unlikely to be heavily involved in manufactures GVCs. Other occupations, by contrast, are. For example, sales marketing and development managers (ISCO category 122), which are grouped under the business function 'sales and marketing'.

Figure 2 shows an example of the Global Value Chain of transport equipment in Sweden. The left panel of Figure 2 shows the value added distribution in Sweden and abroad in 2011. In Growth Analysis (2014:10) we documented that the foreign value added share increased from 35% in 1995 to 46% in 2008. In 2011, the foreign value added share is 42%, somewhat lower than 2008 possibly related to the collapse in trade following the financial crisis (Los et al. 2015). The remaining share in 2011, which is 58%, is GVC income accruing to Sweden. Of this 58%, 38% is labor income, whereas 20% is income from capital. In this report we identify GVC business activities by labor income. Ideally, we would also like to allocate capital income to business activities. However, currently available data only distinguishes capital by asset types, which does not allow for such a mapping. In addition, the national accounts data we use is based on the System of National Accounts 1993, which does not capitalize R&D investments. Future releases of national accounts data that follow the System of National Accounts 2008 will include R&D investment data. In addition, with new intangible investment data (Corrado et al., 2014), this may enable an extension of the analysis presented here to allocate investments across business functions.

The right hand panel of Figure 2 splits up the labor income by Sweden from the Swedish GVC of transport equipment in 2011 into the various business activities. Core production and assembly activities (Operations and Assembling) account for about one third of labor income (27% plus 8% = 35%), whereas the remaining two thirds of GVC income is derived from support functions. These support functions include pre-fabrication activities such as Research and Development of Products Services, or Technology (18%) and post-fabrication activities such as Sales and Marketing (9%) and Transportation, Logistics and Distribution (10%).

Figure 2 GVC activities in production of Swedish transport equipment



Notes: Decomposition of final output of the transport equipment manufacturing industry in Sweden (ISIC rev. 3 industries 34 and 35).

Source: Author's calculations based on World Input-Output Database (November 2013 release) and occupation database.

4 Specialization in manufactures GVCs

This section analyzes specialization in manufactures GVCs using the Global Value Chain approach. In section 4.1 we examine activity shares in 2011 for Sweden and compare that to other countries. In section 4.2 we use the activity shares to analyze revealed comparative advantage. Finally, in section 4.3 we combine the insights from sections 4.1 and 4.2 to provide a mapping of Sweden's key and potential competitors.

4.1 Activity Shares in 2011

Activity shares for a nation show the share of total global value chain income of that nation that comes from each stage in the value chain. It is, in a sense, a “profiling” of the activities in which a country is competitive in global value chains. The first column in Table 1 shows the activity shares from Sweden in all manufactures global value chains in 2011. Aggregating over all GVCs of Sweden suggest that about one third of all Swedish GVC income is derived from core production activities (35.9%) – fairly much like the example of transport equipment. The remainder is from support activities. Major support activities are Research and Development (14.5%), Transportation, Logistics and Distribution (10.3%), Administration and back-office (10.2%), Sales and Marketing (9%), and General and strategic management (7.2%).

In subsequent columns, activity shares are shown for the four countries that most resemble Sweden in terms of activity share profile. The bottom row provides a measure of structural similarity of the activity shares to put specialization patterns in a comparative perspective. The similarity index, I^{ij} is defined as the cosine of the angle of two vectors of activity shares and is given by

$$I^{ij} = \frac{\sum_{f=1}^F s_f^i s_f^j}{\sqrt{\sum_{f=1}^F (s_f^i)^2 \sum_{f=1}^F (s_f^j)^2}}$$

where s_f^i and s_f^j are the activity share in country i and j, and f is the number of activities. The index varies between 0 and 100 and is higher in case of greater similarity. If two countries have the same activity specialization, the vectors will coincide and the index will take a value of one hundred. In contrast, if both countries completely specialize in different activities, the vectors will be orthogonal and the index will take a value of zero. The results from using the activity structure of Sweden as a reference is given in the bottom rows of Table 1. The countries shown are ranked by similarity and the top 4 are shown (the activity shares and ranking of other countries is shown in Appendix table 1).

Table 1 Share of GVC-income from each stage in the value chain. Activity shares in manufactures Global Value Chains, 2011

Activity	Sweden	Austria	Denmark	Finland	Czech Republic
Research and Development of Products, Services, or Technology	14,5	14,2	14,4	18,6	11,9
Operations and assembly	35,9	39,4	37,1	33,5	41,3
Sales and Marketing	9,0	7,4	11,6	10,6	7,2
Transportation, Logistics, and Distribution	10,3	8,7	9,1	10,7	10,6
Customer and After-Sales Service	1,1	0,3	0,7	0,5	0,4
Technology and process development	5,0	4,1	4,7	5,4	2,8
Facilities Maintenance	6,7	6,3	4,0	6,1	6,1
Administration, and Back Office Functions	10,2	13,0	12,6	9,0	11,1
General and strategic management	7,2	6,6	5,7	5,6	8,6
Similarity to Sweden		99,5	99,4	99,2	99,2
Rank		1	2	3	4

Notes: Decomposition of final output of all manufactures GVCs.

Sources: Author's calculations based on World Input-Output Database (November 2013 release) and occupation database.

The findings suggest that Austria, Denmark, Finland, and the Czech Republic have very similar specialization patterns in Global Value Chains to Sweden. The share of core production activities is about one third in Austria, Denmark, and Finland, but higher for the Czech Republic (41.3%). Support activities, such as R&D are about 14% in both Austria and Denmark. However, it is higher in Finland (18.6%) and lower in the Czech Republic (11.9%). The combined GVC income from post-production support activities, such as Sales and Marketing and Transportation, Logistics, and Distribution is 19.3% (9%+10.3%). This is similar to that in Denmark (20.7%) and Finland (21.3%), but higher compared to Austria (16.1%) and the Czech Republic (17.8%).

Appendix table 1 shows activities shares for other countries. A lower rank indicates the country has more dissimilar activity shares compared to Sweden and are therefore potentially complementary countries. These include several Eastern European countries, such as Estonia (ranked 24 out of 28), Poland (ranked 25) and Romania (26), but also Turkey (27).²

So far we have examined which countries have substantial overlap in activity shares in GVCs. However, these countries may differ in terms of their key geographical markets to which they deliver their created value. Countries that have overlapping key activities *and* key markets are considered *key competitors*, whereas countries with overlapping key activities but not markets are *potential competitors*.

Table 2 shows GVC income shares by region in 2011. In general, the GVC income shares of Sweden by region look fairly similar to Finland, Denmark, and Austria. But the income shares by region are different from the Czech Republic and also to the United Kingdom

² Luxembourg is ranked 28 and appears to be an outlier.

(we added the UK here, because our findings suggest substantial overlap in revealed comparative advantage, as discussed in the next section).

Sweden, Finland, Denmark, and Austria receive about three quarters of GVC income from the EU 15. For Sweden in 2011, about 4% of GVC income is earned in China, higher than from the North American Free Trade Arrangement countries (3.6%). Finland's GVC income in China is higher compared to Sweden (5.8%), and also from the BRIIAT countries (3.9%; BRIIAT includes Brazil, Russia, India, Indonesia, Australia, and Turkey), in particular from Russia. Austria earns relatively more GVC income from Eastern European countries (EU12). In Appendix table 2 GVC income shares by region for all other countries is provided. Countries that have limited overlap in GVC income shares by region are Portugal and the United States, but also Romania which we identified as countries with complementary activities in the analysis above. This suggests that Romania has complementary activities but different key markets.

Table 2 Global value chain income shares by region, 2011

	Sweden	Finland	Denmark	Austria	United Kingdom	Czech Republic
East Asia	1,4	2,1	1,1	1,3	1,2	0,7
China	4,0	5,8	3,1	3,4	2,2	1,6
NAFTA	3,6	3,9	3,0	3,0	5,0	2,1
EU 15	75,6	74,5	79,1	77,8	81,0	23,1
EU 12	1,9	2,2	1,8	4,2	1,3	65,3
BRIIAT	2,7	3,9	1,9	2,5	2,5	2,4
ROW	10,9	7,6	9,9	7,9	6,8	4,8
Total	100	100	100	100	100	100

Notes: East Asia includes Japan, South Korea, and Taiwan; NAFTA includes Canada, Mexico and the United States; EU 15 are the fifteen European countries that joined the EU before 2004; EU 12 are the twelve European countries that joined in 2004 and 2007; BRIIAT includes Brazil, Russia, India, Indonesia, Australia, and Turkey; RoW is a heterogeneous group of all other countries that are not distinguished in WIOD.

Source: Authors calculations using the World Input-Output Database (November 2013 release).

4.2 Revealed Comparative Advantage in Activities

To further substantiate the competitiveness analysis, we examine revealed comparative advantage in activities in this section. The concept of Revealed Comparative Advantage (RCA) refers to the relative trade performance of economies in particular products (Balassa, 1965). If trade patterns reflect differences across economies in relative costs and non-price factors, it “reveals” the comparative advantage of the exporting economy. Traditionally, this is based on comparing an economy's share in world exports of a particular product group or industry to its share in overall exports.³ However, due to rapidly increasing production fragmentation, an economy that looks like a dominant exporter in a particular product or sector may in fact contribute very little value added to these exports.

³ An RCA analysis is based on observed trade patterns. Observed trade patterns can be distorted, for example due to government policies. As a result, they may misrepresent comparative advantage. Over time, the RCA index has been extensively criticized, but most agree that RCA measures are a useful proxy in determining whether or not an economy has a comparative advantage, though less useful in indicating the extent of comparative advantage (Balance et al., 1987). See Vollrath (1991) for a discussion and alternative measures.

As an alternative, RCA can be performed on the basis of domestic value added exports. Hence the usefulness of RCA analysis is retained, albeit with a different interpretation. The original RCA index can be rewritten as

$$RCA = \frac{s_f^i / \sum_{f=1}^F s_f^i}{(\sum_{i=1}^C s_f^i / \sum_{i=1}^C \sum_{f=1}^F s_f^i)}$$

Where s_f^i is the activity share of country i as before. The numerator represents the percentage share of a given activity in a country's GVC income. The denominator represents the percentage share of a given activity in world GVC income. Hence, the RCA index gives a comparison of a country's GVC income structure to the world GVC income structure. If the RCA index is above 1, the economy is said to be specialized in that activity.

The RCA in activities is shown in Table 3. Based on the activity shares of the countries distinguished in this analysis, Sweden appears to have a comparative advantage in R&D, sales and marketing, logistics, technology and process development. Sweden does not have a comparative advantage in core production and assembly activities.

The RCA for other countries is shown in subsequent columns of Table 3 and Appendix table 3. We ranked countries by the number of RCA matches. This suggests, the RCA in activities of Finland exactly matches to that in Sweden. For all nine activities distinguished, Sweden and Finland have the same RCA (above 1 indicating comparative advantage or below 1 indicating no comparative advantage). Also, Denmark has a substantial overlap in RCA (8 out of 9), whereas it is somewhat less for Austria. Appendix table 3 suggests limited RCA matches of Sweden with Portugal (4 out of 9) and Spain (3 out of 9).

Table 3 Revealed comparative advantage based on activity shares in manufactures Global Value Chains, 2011

Activity	Sweden	Finland	Denmark	Austria	United Kingdom
Research and Development of Products, Services, or Technology	1,06	1,36	1,05	1,04	0,88
Operations and assembly	0,94	0,88	0,97	1,03	0,78
Sales and Marketing	1,04	1,22	1,34	0,86	1,11
Transportation, Logistics, and Distribution	1,46	1,52	1,30	1,24	2,18
Customer and After-Sales Service	0,86	0,39	0,55	0,25	0,99
Technology and process development	1,26	1,37	1,19	1,03	1,30
Facilities Maintenance	1,55	1,40	0,93	1,46	0,88
Administration, and Back Office Functions	0,80	0,70	0,98	1,01	1,09
General and strategic management	0,71	0,55	0,56	0,65	0,90
Number of RCA 'matches' out of 9 possible		9	8	6	6

Sources: Author's calculations based on World Input-Output Database (November 2013 release) and occupation database.

4.3 The Competitive Situation of Sweden

Based on the analysis in the previous sections we can make a tentative mapping of the competitiveness situation of Sweden. Countries that specialize in the same activities (hence higher similarity indicator and stronger overlap in RCA) and the same geographical markets (based on the GVC income shares by region) are considered *key competitors*. Those that specialize in the same activities but are engaged in different markets are *potential competitors*. Those that specialize in different activities, but same markets can be *complementary* (as they are likely to have similar customers, but do different things for them). Those that do not overlap in any of these dimensions are not really competitors at all (in 2011).

Table 4 below provides a matrix with the current competitive position of Sweden. Finland, Denmark, and Austria have a very similar specialization pattern in GVCs as Sweden. This is borne out by the high similarity measure and the substantial overlap in RCA. In addition, these countries have rather similar geographical markets. Therefore, they are considered key competitors. The United Kingdom, the Netherlands, France, the Czech Republic, and Slovenia score somewhat lower on the similarity measure and overlap in RCA, but in general appear to be quite similar in activity specialization. However, the geographical market appears to differ: in relation to the United Kingdom, the Netherlands, and France, Sweden derives more GVC income from China and a set of other emerging countries (BRIAT; Brazil, Russia, India, Indonesia, Australia, and Turkey). For the Czech Republic and Slovenia, markets in Eastern Europe are much more important compared to their importance to Sweden.

Portugal and Greece provide largely complementary activities and have substantial overlap in geographical markets. Romania, Estonia, Poland, and Turkey also provide complementary activities, but have little overlap in geographical markets.

Table 4 The competitiveness position of Sweden

		Similar key activities	
		Yes	No
Similar key geographical markets	Yes	<i>Key competitors:</i> Finland, Denmark, Austria	<i>Potential complementarities:</i> Portugal, Greece
	No	<i>Potential competitors:</i> United Kingdom, the Netherlands, France, Czech Republic, Slovenia	<i>Other:</i> Romania, Estonia, Poland, Turkey

5 Future trajectories of Sweden's competitiveness position

This section is more speculative. It considers trajectories of Sweden's competitiveness position. How likely is it that Sweden's key competitors will remain key competitors in the short- to medium-run? Will potential competitors become key competitors in the near future? And what are the trajectories of countries that are now largely doing complementary activities?

We explore this issue using two approaches. First, we have occupation data for 2013. We use this occupation structure but with the 2011 world input-output structure (ideally we would like to use the world input-output structure in 2013 and compare changes, but the 2013 world input-output table is not available). Table 5 below show the activity shares using 2013 occupation data (Appendix table 4 shows results for other countries).

Table 5 Activity shares in manufactures Global Value Chains, 2013

Activity	Sweden	Denmark	Finland	France	Austria
Research and Development of Products, Services, or Technology	13.0	13.4	15.9	12.4	12.2
Operations and assembly	39.9	41.8	38.9	39.5	45.4
Sales and Marketing	8.4	9.6	8.6	7.8	5.4
Transportation, Logistics, and Distribution	9.6	9.3	8.7	8.6	7.3
Customer and After-Sales Service	1.5	1.0	0.7	0.6	0.5
Technology and process development	4.2	3.6	4.9	3.0	2.9
Facilities Maintenance	7.9	6.0	7.9	6.1	9.5
Administration, and Back Office Functions	10.7	11.8	9.5	14.0	12.9
General and strategic management	4.9	3.4	4.8	7.9	3.9
Similarity to Sweden		99.8	99.7	99.4	99.2
Rank		1	2	3	4

Table 5 suggests that Denmark, Finland, and Austria are also very similar in their activity structure when using occupation data for 2013. However, the similarity to Austria appears somewhat smaller and similarity to functional specialization in France now appears larger. Eastern European countries, such as Bulgaria, Romania, and Poland and also Turkey again appear rather dissimilar in activity specialization (see Appendix table 4).

Table 6 shows revealed comparative advantage in activities using occupation data for 2013 (other countries are shown in Appendix table 5). Also here, Finland and Denmark show substantial overlap in RCA, although the overlap is somewhat smaller compared to using occupation data for 2011. Again, Austria appears to have somewhat less overlap, and the Netherlands now appears to have greater overlap.

Table 6 Revealed comparative advantage, based on activity shares in manufactures Global Value Chains, 2013

Activity	Sweden	Finland	Denmark	United Kingdom	Netherlands
Research and Development of Products, Services, or Technology	1.13	1.39	1.17	0.84	0.65
Operations and assembly	0.92	0.90	0.97	0.86	0.96
Sales and Marketing	1.14	1.16	1.30	1.07	1.12
Transportation, Logistics, and Distribution	1.37	1.25	1.34	1.85	1.31
Customer and After-Sales Service	1.00	0.51	0.71	1.44	1.16
Technology and process development	0.95	1.12	0.83	0.96	0.88
Facilities Maintenance	1.30	1.30	0.98	0.99	1.32
Administration, and Back Office Functions	0.92	0.81	1.01	1.16	1.08
General and strategic management	0.67	0.65	0.47	0.88	1.01
Number of RCA 'matches'		7	6	6	6

Second, we examine changes in regional GVC income between 1995 and 2011. If past changes are a guide to future changes, these may inform about potential increased overlap in geographical markets. Changes in manufactures GVC income shares by region in Sweden appear very similar to that in Denmark. Trends are also similar compared to Finland, although GVC income shares in East Asia increased in Finland while they decline in Sweden, and GVC income from China increased at a faster pace for Finland.

Table 7 Change in manufactures' GVC income shares by region between 1995 and 2011

	East Asia	China	NAFTA	EU 15	EU 12	BRIAT	ROW
Sweden	-0.6	3.6	0.1	-9.3	1.0	1.3	3.9
Finland	0.3	5.1	0.6	-10.4	0.7	1.6	2.1
Denmark	-0.2	2.6	1.0	-9.1	1.2	0.8	3.6
Austria	0.3	3.2	1.0	-10.4	2.0	1.3	2.7
United Kingdom	-0.2	1.7	1.0	-7.0	0.9	1.3	2.2
Czech Republic	-0.2	1.4	-0.2	2.1	-6.0	0.7	2.2
France	-0.1	1.6	-0.6	-3.1	0.8	0.8	0.6
Netherlands	-0.9	2.7	-0.7	-4.5	1.6	0.2	1.6

Notes: East Asia includes Japan, South Korea, and Taiwan; NAFTA includes Canada, Mexico and the United States; EU 15 are the fifteen European countries that joined the EU before 2004; EU 12 are the twelve European countries that joined in 2004 and 2007; BRIAT includes Brazil, Russia, India, Indonesia, Australia, and Turkey; RoW is a heterogeneous group of all other countries that are not distinguished in WIOD.

Source: Authors calculations using the World Input-Output Database (November 2013 release).

Overall this suggests that in particular Denmark, but also Finland are key competitors and likely to remain so in the near future. Finland appears to be more involved in Chinese GVCs and Denmark less so compared to Sweden, which is one of the fastest and biggest markets (despite the recent slowdown in China, growth rates are still well above world average).

6 Integration of value chains across borders

A key assumption underlying the analysis this far has been that a higher degree of similarity in capabilities (i.e. competitiveness in the same activities) and main markets marks countries as particularly strong competitors. This is a standard assumption in competition literature, and it is an assumption that is well borne out in empirical studies that show that similarity leads to competitiveness and rivalry (Porter 1990).

6.1 Competitiveness in global value chains

Using a GVC lens on economic activity, however, allows us to disaggregate the sources of competitiveness of countries. In a global value chain economy, the competitiveness of the activities of a national economy is generated in part by the competitiveness of the economies from where intermediate inputs are sourced. Earlier studies of global value chains (Baldwin 2012) show that many of the value chains are fairly regional in scope.

If we look at where the value originates that goes into the sourced intermediate goods that enables Swedish value creation, we see that also the Swedish sourcing of intermediary goods is quite regional.

Table 8 Share of intermediate inputs in country value chain in 2011

	Germany	United Kingdom	France	Finland	Czech Republic	Denmark	Netherlands	Sweden
Germany		2,2%	3,4%	2,4%	9,0%	4,4%	4,4%	3,3%
UK	1,5%		1,1%	1,0%	0,8%	2,6%	4,3%	1,7%
France	1,7%	1,0%		0,6%	1,0%	0,7%	1,5%	1,1%
Finland	0,3%	0,2%	0,1%		0,1%	0,6%	0,3%	1,4%
Czech R	0,9%	0,2%	0,2%	0,2%		0,2%	0,3%	0,2%
Denmark	0,2%	0,3%	0,1%	0,5%	0,2%		0,3%	1,9%
Netherlands	1,9%	1,4%	0,9%	1,3%	0,9%	2,7%		1,0%
Sweden	0,5%	0,4%	0,2%	2,8%	0,3%	3,4%	0,6%	
<i>Imports as % of total intermediary products</i>	<i>23,3%</i>	<i>17,0%</i>	<i>17,8%</i>	<i>24,0%</i>	<i>32,7%</i>	<i>28,0%</i>	<i>34,3%</i>	<i>24,8%</i>

Source: Authors calculations using the World Input-Output Database (November 2013 release).

Table 8 shows that out of all the intermediate imported into Sweden, 3.3% originated from Germany, 1.7% from the UK and 1.1% from France. This measure is a bilateral extension of the offshoring measure suggested by Feenstra and Hanson (1999). The last row shows the share of total intermediaries used that are imported. In Sweden, about 25% of the intermediary inputs are imported, and 75% are sourced locally, in comparison with the Netherlands where about 34% of the inputs are sourced internationally. Looking to the share of imports of intermediaries from our Nordic neighbours, it is clear that Sweden is very deeply integrated into their value chains. 1.9% of all the intermediate imports into Sweden originate from Denmark – a higher value than from the UK or France. Even Finland, with 1.4% of the intermediary imports into Sweden, is heavily represented in Swedish value chains. Looking the other way, Sweden is heavily represented in the intermediary imports into Denmark and Finland, with 3.4% and 2.8% of their total

imported intermediaries respectively. In comparison to Czech Republic (which is responsible for only 0.2% of our intermediate inputs), which also scored high on the similarity in activities and markets rankings, our Nordic neighbours are also extremely important enablers of our competitiveness in global value chains.

7 Concluding remarks

One of the key insights from the GVC approach is that comparative advantage of nations is no longer solely determined within its borders. In the past goods were bundles of national inputs and the ultimate determinants of competitiveness were therefore national. Nowadays goods are bundles of many nations' inputs interlocking competitiveness across countries as the costs of imported intermediate inputs will also drive the comparative advantage of the importing countries. Unbundling of production processes magnifies the importance of transaction, transport and trade costs and the potential for international spillovers. Adjusting to on-going globalization is a task that requires multilateral assessment and coordination of policy measures in order to maximize regional competitiveness. Industrial and trade policies need to be well-aligned. Baldwin and Everett (2012) provide an excellent and extensive discussion of these policy issues.

The main purpose of this report has been to take this perspective and run its full course with respect to analyzing the competitiveness of a country. Specifically, the report provides a method and a measure of the competitive characteristics of Sweden – what is its global value chain profile and to what markets does it deliver economic value. By performing the same mapping exercise on the most significant other economies, a competitor mapping is provided. While there are few major changes in the listing of the main competitors to Sweden as compared to those that often figure in policy discussions (Denmark, Finland), the high similarity to Austria and the Czech Republic is less often recognized in policy discussions. Also the relative dissimilarity of the Netherlands, which often is used as a benchmark for policy development, is interesting to note.

By not only using the similarity dimension in activities to characterize the main competitors, but by juxtaposing the dissimilarity in activities with similarity in markets to which value is delivered, the current report also recognizes potentially important economies for collaboration. In the context of the current report, one could argue that Sweden could benefit even more from close cooperation with Denmark and Finland to increase its competitive position in global value chains, despite or because of the fact that we identified them as key competitors as their specialization and geographical orientation shows substantial overlap. This is yet another argument in favor of consciously seeking to develop the economic and policy collaboration and coordination between the Nordic countries. Now, even more than before, we could benefit from each other.

When value chains fragment economic activity and innovation is turning global the intellectual resources needed to compete successfully increases. For small countries the advantage of co-operation and division of labor therefore increases, in particular when as in Finland, Sweden and Denmark value chains are integrated to a large extent. We would argue that there are interesting possibilities for co-operation in areas for research funding, university collaboration and in standard-setting in new technology areas such as in new digital manufacturing technologies⁴.

In addition, both Finland and Sweden derive considerable GVC from China and other BRIIAT countries⁵. Thus, it is equally important to pool resources and activities when collaborating with these countries. Globalization of value chains increases the importance

⁴ See also <http://www.di.se/artiklar/2014/11/26/debatt-sa-raddar-vi-valfarden/>

⁵ Brazil, Russia, India, Indonesia, Australia and Turkey

of international co-operation with close competitors as well distant and potential important rivals.

A limitation in this material, as noted in the methods section, is that it only covers manufactures. Services are only included to the extent that they are part of a manufactured good. While this is regretful, it is a limitation that is at the moment not possible to work around.

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Appendix

Appendix table 1 Activity shares in manufactures Global Value Chains, 2011

Activity	RD	PROD	SAL	LOG	CUST	TECH	FAC	ADM	MAN	Similarity to Sweden	Rank
Slovenia	13.2	41.6	10.0	10.6	0.4	2.6	4.5	8.0	9.1	99.1	5
Hungary	13.1	44.7	6.3	10.1	0.5	2.5	5.6	9.0	8.3	98.7	6
Spain	10.4	38.2	8.4	11.4	2.6	1.7	7.2	8.8	11.3	98.6	7
Ireland	11.7	36.4	6.1	10.5	0.9	1.9	6.5	15.6	10.3	98.4	8
United States	14.7	37.6	11.5	4.1	2.3	5.4	2.9	11.1	10.4	98.2	9
Netherlands	10.5	35.7	7.6	9.9	0.9	3.5	4.8	14.2	13.0	98.1	10
Latvia	8.7	39.8	5.6	13.1	0.7	2.2	5.7	12.5	11.6	97.8	11
France	15.5	35.7	9.6	5.6	0.2	3.3	3.0	17.1	9.9	97.7	12
Belgium	10.8	34.1	8.4	7.2	1.1	4.2	5.6	14.8	13.9	97.5	13
Italy	8.3	45.3	6.8	9.9	1.3	2.0	4.7	12.4	9.2	97.5	14
United Kingdom	12.0	29.6	9.6	15.4	1.2	5.2	3.8	14.0	9.2	97.5	15
Malta	15.7	41.4	2.9	5.7	0.7	1.8	10.4	9.6	11.9	97.3	16
Greece	11.3	46.9	3.7	10.2	0.5	1.3	4.6	10.4	11.2	97.2	17
Portugal	8.0	43.9	6.3	11.2	0.8	1.6	4.7	9.8	13.7	96.8	18
Lithuania	7.0	43.2	8.4	14.8	0.3	1.3	5.4	8.1	11.5	96.8	19
Slovakia	9.0	49.5	5.0	12.9	0.3	2.3	5.6	6.9	8.4	96.6	20
Bulgaria	8.8	47.2	4.0	14.3	0.3	2.6	5.7	7.0	10.0	96.6	21
Germany	17.9	33.1	5.3	4.4	0.3	3.8	5.8	17.1	12.2	96.3	22
Cyprus	4.0	41.0	9.7	9.6	0.8	2.1	10.6	14.2	7.9	96.1	23
Estonia	8.3	39.2	7.8	16.3	0.5	2.5	5.0	5.5	14.9	95.9	24
Poland	7.8	55.7	6.1	10.4	0.2	1.4	5.1	6.3	6.9	95.0	25
Romania	14.8	58.2	2.6	9.6	0.2	1.5	5.0	3.5	4.7	94.5	26
Turkey	2.6	69.5	2.9	10.6	0.2	0.3	5.5	5.4	3.0	89.7	27
Luxembourg	12.1	26.0	5.5	4.7	0.9	4.0	4.2	22.2	20.4	87.5	28

Notes: See Table 1 for results for other countries. RD is Research and Development of Products, Services, or Technology, PROD is Operations and assembly, SAL is Sales and Marketing, LOG is Transportation, Logistics, and Distribution, CUST is Customer and After-Sales Service, TECH is Technology and process development, ADM is Administration, and Back Office Functions, and MAN is General and strategic management.

Sources: Author's calculations based on World Input-Output Database (November 2013 release) and occupation database.

Appendix table 2 Global value chain income shares by region, other countries in 2011

	East Asia	China	NAFTA	EU 15	EU 12	BRIIAT	ROW	Total
Belgium	1.3	3.2	3.8	78.0	2.4	3.9	7.4	100
Bulgaria	0.7	1.7	1.5	15.8	68.9	4.9	6.6	100
Cyprus	1.0	1.8	1.5	9.1	70.9	2.9	12.6	100
Germany	1.1	3.1	2.7	81.9	2.9	2.2	6.1	100
Spain	0.5	1.1	2.5	87.6	1.3	1.9	5.0	100
Estonia	1.3	2.2	3.0	21.7	59.4	4.3	8.2	100
France	0.9	1.9	2.2	86.9	1.2	1.8	5.1	100
Greece	0.7	1.1	1.3	84.9	0.9	1.4	9.8	100
Hungary	1.4	2.0	1.9	20.5	65.8	2.0	6.4	100
Ireland	1.4	2.5	7.3	75.4	1.0	1.5	10.8	100
Italy	0.6	1.9	1.9	87.7	1.6	1.9	4.4	100
Lithuania	0.7	1.3	1.5	13.1	69.0	4.4	10.0	100
Luxembourg	1.9	4.4	3.8	45.0	3.4	3.4	38.2	100
Latvia	1.1	2.8	1.9	15.5	61.3	4.0	13.4	100
Malta	3.9	8.2	4.8	15.4	57.1	2.6	7.9	100
Netherlands	1.0	3.2	3.4	81.8	2.4	2.1	6.1	100
Poland	0.5	1.3	2.0	17.2	73.1	1.8	4.1	100
Portugal	0.4	1.0	2.0	89.7	1.0	1.5	4.5	100
Romania	0.5	0.9	1.3	10.0	80.0	2.1	5.2	100
Slovakia	0.6	1.3	1.5	23.1	67.3	2.6	3.7	100
Slovenia	0.8	1.6	1.7	22.2	64.7	2.3	6.8	100
Turkey	0.4	0.8	1.1	6.5	1.1	86.2	3.8	100
United States	1.6	2.8	84.3	4.2	0.4	1.6	5.0	100

Notes: East Asia includes Japan, South Korea, and Taiwan; NAFTA includes Canada, Mexico and the United States; EU 15 are the fifteen European countries that joined the EU before 2004; EU 12 are the twelve European countries that joined in 2004 and 2007; BRIIAT includes Brazil, Russia, India, Indonesia, Australia, and Turkey; RoW is a heterogeneous group of all other countries that are not distinguished in WIOD.

Source: Authors calculations using the World Input-Output Database (November 2013 release).

Appendix table 3 Revealed comparative advantage based on activity shares in manufactures Global Value Chains, 2011, other countries

Activity	RD	PROD	SAL	LOG	CUST	TECH	FAC	ADM	MAN	Rank
Romania	1.08	1.53	0.30	1.36	0.14	0.38	1.15	0.27	0.46	6
Slovenia	0.97	1.09	1.16	1.50	0.28	0.65	1.04	0.62	0.90	6
Belgium	0.79	0.89	0.97	1.02	0.86	1.05	1.29	1.15	1.37	5
Bulgaria	0.65	1.24	0.47	2.03	0.25	0.65	1.32	0.55	0.98	5
Cyprus	0.29	1.08	1.13	1.36	0.68	0.54	2.43	1.11	0.78	5
Czech Republic	0.87	1.08	0.83	1.51	0.31	0.70	1.41	0.87	0.84	5
France	1.14	0.94	1.11	0.79	0.20	0.84	0.69	1.33	0.97	5
Hungary	0.96	1.17	0.73	1.43	0.39	0.62	1.30	0.70	0.81	5
Poland	0.57	1.46	0.71	1.47	0.13	0.36	1.18	0.49	0.68	5
Slovakia	0.66	1.30	0.58	1.83	0.28	0.59	1.29	0.54	0.83	5
Turkey	0.19	1.83	0.34	1.50	0.12	0.07	1.26	0.42	0.30	5
United States	1.08	0.99	1.33	0.59	1.81	1.35	0.68	0.87	1.02	5
Germany	1.31	0.87	0.62	0.63	0.21	0.97	1.34	1.33	1.20	4
Estonia	0.60	1.03	0.90	2.31	0.44	0.63	1.14	0.43	1.46	4
Greece	0.82	1.23	0.43	1.45	0.36	0.34	1.06	0.81	1.10	4
Ireland	0.85	0.96	0.71	1.49	0.76	0.49	1.49	1.21	1.02	4
Italy	0.61	1.19	0.79	1.40	1.03	0.51	1.07	0.97	0.90	4
Lithuania	0.51	1.13	0.98	2.10	0.20	0.33	1.24	0.63	1.14	4
Latvia	0.64	1.05	0.65	1.86	0.54	0.56	1.31	0.98	1.14	4
Malta	1.15	1.09	0.33	0.81	0.55	0.44	2.39	0.75	1.17	4
Netherlands	0.77	0.94	0.88	1.40	0.69	0.88	1.11	1.10	1.28	4
Portugal	0.59	1.15	0.73	1.59	0.61	0.39	1.08	0.77	1.35	4
Spain	0.76	1.00	0.97	1.61	2.08	0.42	1.67	0.69	1.11	3
Luxembourg	0.89	0.68	0.64	0.67	0.70	1.01	0.97	1.73	2.00	3

Notes: See Table 3 for results for other countries. RD is Research and Development of Products, Services, or Technology, PROD is Operations and assembly, SAL is Sales and Marketing, LOG is Transportation, Logistics, and Distribution, CUST is Customer and After-Sales Service, TECH is Technology and process development, ADM is Administration, and Back Office Functions, and MAN is General and strategic management.

Sources: Author's calculations based on World Input-Output Database (November 2013 release) and occupation database.

Appendix table 4 Activity shares in manufactures Global Value Chains, 2013

Activity	RD	PROD	SAL	LOG	CUST	TECH	FAC	ADM	MAN	Similarity to Sweden	Rank
Netherlands	7.4	41.7	8.3	9.1	1.7	3.8	8.0	12.6	7.4	99.0	5
United Kingdom	9.6	37.3	7.9	12.8	2.1	4.2	6.0	13.7	6.5	99.0	6
Germany	12.4	45.7	3.5	6.7	0.6	2.7	9.5	12.7	6.2	98.8	7
Belgium	8.8	39.0	6.5	8.4	1.1	3.0	10.2	13.7	9.2	98.6	8
Czech Republic	9.0	49.2	5.8	9.2	0.6	2.2	7.6	10.7	5.7	98.6	9
Ireland	8.2	45.6	5.6	7.6	1.4	1.4	8.5	14.3	7.2	98.4	10
Spain	8.7	46.0	6.4	10.3	3.9	1.5	10.0	7.3	6.0	98.4	11
Slovenia	9.0	50.9	8.0	7.7	0.5	1.4	7.2	8.3	6.9	98.2	12
Latvia	6.5	48.4	6.1	11.1	1.1	1.6	8.1	10.0	7.1	98.1	13
Italy	7.1	52.7	5.5	7.4	1.4	2.0	6.4	11.3	6.1	97.5	14
Hungary	7.8	53.3	5.1	9.2	0.8	2.0	8.6	8.1	5.2	97.5	15
United States	14.3	37.5	10.7	3.7	2.1	7.7	2.7	11.8	9.5	97.5	16
Greece	7.4	52.1	3.1	9.6	0.7	0.9	6.9	10.7	8.6	97.2	17
Estonia	5.4	48.5	6.9	12.1	0.8	2.0	8.5	6.4	9.5	97.0	18
Lithuania	5.0	52.4	7.6	12.1	0.2	0.9	7.5	7.0	7.4	96.8	19
Cyprus	3.7	47.7	4.9	8.4	1.7	1.6	12.6	13.9	5.7	96.7	20
Portugal	6.1	54.9	4.8	8.2	1.3	1.2	6.9	8.8	8.0	96.6	21
Malta	7.2	41.3	3.6	7.5	1.1	1.3	11.9	12.5	13.6	96.3	22
Slovakia	6.8	58.4	5.2	8.9	0.3	1.3	8.2	6.0	4.9	96.2	23
Bulgaria	4.7	57.8	3.2	11.8	0.4	1.7	7.2	7.6	5.6	95.7	24
Poland	6.3	61.3	5.2	8.5	0.2	1.1	6.9	6.1	4.4	95.6	25
Romania	8.6	65.7	2.2	9.5	0.2	1.0	6.5	3.5	2.8	94.5	26
Turkey	2.7	70.4	2.7	10.1	0.3	0.4	5.2	5.3	3.0	92.7	27
Luxembourg	9.0	30.6	4.7	5.1	1.2	4.3	6.6	22.6	16.1	90.2	28

Notes: See Table 5 for results for other countries. RD is Research and Development of Products, Services, or Technology, PROD is Operations and assembly, SAL is Sales and Marketing, LOG is Transportation, Logistics, and Distribution, CUST is Customer and After-Sales Service, TECH is Technology and process development, ADM is Administration, and Back Office Functions, and MAN is General and strategic management.

Sources: Author's calculations based on World Input-Output Database (November 2013 release) and occupation database.

Appendix table 5 Revealed comparative advantage, based on activity shares in manufactures Global Value Chains, 2013

Activity	RD	PROD	SAL	LOG	CUST	TECH	FAC	ADM	MAN	Rank
Spain	0.76	1.06	0.87	1.48	2.67	0.34	1.66	0.62	0.81	6
France	1.08	0.91	1.06	1.24	0.43	0.68	1.01	1.19	1.08	6
Slovenia	0.78	1.18	1.08	1.11	0.35	0.32	1.20	0.71	0.94	6
Austria	1.07	1.05	0.73	1.04	0.31	0.67	1.57	1.10	0.53	5
Bulgaria	0.41	1.34	0.43	1.69	0.28	0.40	1.19	0.65	0.77	5
Cyprus	0.32	1.10	0.66	1.21	1.16	0.36	2.07	1.18	0.77	5
Czech Republic	0.78	1.14	0.79	1.32	0.40	0.50	1.26	0.91	0.77	5
Hungary	0.68	1.23	0.68	1.32	0.58	0.47	1.42	0.69	0.71	5
Italy	0.62	1.22	0.75	1.07	0.99	0.46	1.06	0.97	0.83	5
Lithuania	0.43	1.21	1.03	1.74	0.12	0.20	1.23	0.59	1.01	5
Latvia	0.57	1.12	0.83	1.60	0.72	0.37	1.33	0.85	0.97	5
Poland	0.55	1.42	0.70	1.23	0.16	0.26	1.14	0.52	0.60	5
Romania	0.75	1.52	0.30	1.37	0.13	0.24	1.07	0.30	0.38	5
Slovakia	0.59	1.35	0.71	1.29	0.19	0.29	1.36	0.51	0.66	5
Belgium	0.77	0.90	0.88	1.22	0.76	0.69	1.69	1.17	1.25	4
Germany	1.09	1.06	0.48	0.96	0.39	0.62	1.57	1.08	0.85	4
Estonia	0.47	1.12	0.93	1.75	0.54	0.45	1.40	0.54	1.29	4
Greece	0.65	1.21	0.42	1.38	0.51	0.21	1.14	0.91	1.17	4
Ireland	0.72	1.06	0.76	1.10	0.95	0.33	1.40	1.22	0.98	4
Malta	0.63	0.96	0.49	1.08	0.78	0.29	1.96	1.06	1.85	4
Portugal	0.54	1.27	0.64	1.18	0.87	0.27	1.13	0.75	1.09	4
Turkey	0.23	1.63	0.37	1.45	0.17	0.10	0.85	0.45	0.41	4
United States	1.25	0.87	1.44	0.54	1.42	1.77	0.45	1.00	1.29	4
Luxembourg	0.78	0.71	0.63	0.73	0.84	0.98	1.08	1.92	2.19	3

Notes: See Table 6 for results for other countries. RD is Research and Development of Products, Services, or Technology, PROD is Operations and assembly, SAL is Sales and Marketing, LOG is Transportation, Logistics, and Distribution, CUST is Customer and After-Sales Service, TECH is Technology and process development, ADM is Administration, and Back Office Functions, and MAN is General and strategic management.

Sources: Author's calculations based on World Input-Output Database (November 2013 release) and occupation database.

Appendix table 6 Change in global value chain income shares by region between 1995 and 2011, other countries

	East Asia	China	NAFTA	EU 15	EU 12	BRIIAT	ROW
Belgium	-0.7	2.7	0.1	-10.5	1.6	1.7	5.1
Bulgaria	-0.3	1.5	-0.3	5.7	-10.5	1.8	2.1
Cyprus	-0.8	1.6	0.5	4.3	-12.6	1.3	5.6
Germany	0.0	2.8	0.7	-9.0	2.1	0.9	2.4
Spain	0.0	0.9	1.2	-6.5	1.0	1.4	2.0
Estonia	-0.1	2.0	1.2	2.8	-11.2	0.4	4.9
Greece	0.2	1.0	0.4	-10.4	0.3	0.7	7.6
Hungary	0.0	1.9	-0.1	6.3	-11.3	0.9	2.3
Ireland	-0.3	2.2	2.7	-13.8	0.7	0.6	7.9
Italy	-0.2	1.5	0.1	-4.5	1.0	0.8	1.3
Lithuania	-1.0	1.1	0.4	-1.0	-4.2	-0.5	5.2
Luxembourg	-3.4	3.4	-0.7	-34.2	1.9	0.7	32.4
Latvia	-0.3	2.4	-0.3	0.2	-6.4	0.3	4.1
Malta	2.8	7.7	2.4	-2.2	-16.3	1.8	3.8
Poland	-0.1	1.1	0.8	3.5	-7.9	0.7	2.0
Portugal	0.0	0.6	0.5	-5.2	0.8	0.8	2.5
Romania	-0.4	0.5	0.3	2.2	-3.9	0.2	1.2
Slovakia	-0.2	1.1	-0.2	1.8	-3.3	-0.3	1.0
Slovenia	0.3	1.4	0.2	3.8	-8.6	1.2	1.8
Turkey	0.0	0.7	0.2	3.1	0.8	-7.3	2.5
United States	-0.7	2.4	-3.3	0.7	0.3	0.9	-0.3

Notes: See table 7 for results for other countries. East Asia includes Japan, South Korea, and Taiwan; NAFTA includes Canada, Mexico and the United States; EU 15 are the fifteen European countries that joined the EU before 2004; EU 12 are the twelve European countries that joined in 2004 and 2007; BRIIAT includes Brazil, Russia, India, Indonesia, Australia, and Turkey; RoW is a heterogeneous group of all other countries that are not distinguished in WIOD.

Source: Authors calculations using the World Input-Output Database (November 2013 release).

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