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Decomposing Central and Eastern Europe's trade: Extending the evidence

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Abstract

In the early nineties Central and East European Countries (CEEC) took considerable liberalisation efforts which led to visible changes in CEEC trade. In the period under observation, from 1995 to 2016, these countries recorded high growth rates, which exceeded the performance of other regions, such as the OECD and Russia. These trade developments are described and interpreted in this note on a descriptive rather than an analytical basis. First, trade volumes by goods categories are examined to account for what kind of goods are the major trade growth drivers. The expansion of CEEC imports and exports can be accounted for by trade growth specifically of goods used in production, i.e., parts and components, capital goods and transport equipment. It can be associated with the development of vertical production networks among the old EU member states and the new EU-8 countries. Examining EU-8 exports to and imports from Germany confirms this finding: EU-8 states tend to import parts and components and intermediate goods from Germany to produce and export parts and components or final capital goods to Germany. Using the notion of comparative advantage further helps to attribute the extensive development of vertical linkages with the CEEC to the similarity of sectoral productivity vectors between the CEEC and the rest of the world. Second, the effects of liberalisation on the variety versus the intensity of trade are described. The liberalisation of the CEEC economies is expressed by the strong rise in newly traded goods, especially goods used in production, rather than volume growth in already traded goods. Considering imports, a higher input variety might thereby signal a change of the economy's state of technology.

JEL-Classification: F1

Keywords: CEEC, intensive margin, extensive margin, vertical production networks, comparative advantage

I would like to thank Richard Frensch and Michael Rindler for their guidance on this note.

Introduction

In this note, it is attempted to describe and interpret trade developments of the CEEC over two decades in the light of the globalisation of production networks. The nature of this note is descriptive rather than analytical, and focuses on illustrating the factors underlying CEEC trade growth.

In the first part, growth contributions of different goods categories are compared to changes in total trade. In the second part, extensive versus intensive trade margins are explored, i.e., changes in the variety versus the intensity of traded goods, again differentiating goods categories by use. This approach mirrors and extends Eck (2009) by introducing a larger number of countries and a second time frame to the sample.

Adding a group of Asian regions allows to assess the significant effects of liberalisation on CEEC trade as compared to the rest of the world. External liberalisation in CEEC during the beginning of the nineties was followed by tremendous export growth in the region. The growth can be mainly attributed to strengthening trade relations with neighbours in western Europe. The main difference influencing the trade developments of CEEC economies as compared to other countries in the sample, i.e., OECD or particularly the post-Soviet states, can be thus considered their unparalleled liberalisation effort.

Trade growth by goods categories and the development of production networks

Figures 1.1 and 1.2 illustrate the trade developments of different regions between 1995 and 2006 and 1995 and 2016, respectively. Except for the OECD, all growth rates observed surpass the 8% mark in Figure 1.1 and the 4% mark in Figure 1.2. Overall, China records the highest growth rates followed by the EU-8 and SE Europe. Russia as well as the OECD economies display lower trade growth. It can be seen that Russia's export growth rate exceeds its import growth rate in both figures. This deviation can be mainly explained by the comparatively high contribution of fuels and lubricants to Russian exports. which are part of the primary goods category.

The growth contribution of an individual goods category indicates the trade growth which would prevail assuming trade of all other goods categories stays constant. Consequently, the sum of all categories' trade contributions equals the growth rate of total trade. In both time frames, it can be observed that trade growth is mainly driven by capital goods, intermediate goods and its subset parts and components: on average, the contribution of these three goods categories together accounts for a two-thirds share of trade growth. Thus, it is not consumer goods which drive trade growth in any region, but rather goods used in production.

Particularly interesting are the comparatively high contributions of capital goods, and parts and components to the export growth rate of the EU-8 and China. On average, both categories together account for ca. 53% of total trade growth for Chinese exports and 46% for EU-8 exports. This is a phenomenon, which may well be connected with the globalisation of production networks. During the time period observed, production has generally spread across several countries within a particular region. This was a result of fragmentation, i.e., the division of production processes into increasing numbers of smaller production processes or tasks, which led to increasing numbers of parts, components and final goods as the outputs of these tasks. Fragmentation allows for more specialization and may potentially lead to the dislocation of individual tasks. This dislocation of tasks may take on international dimensions, leading to the globalization of production processes in the form of international vertical production networks of firms along the value chain: once firms start allocating sequential stages of the manufacturing process to firms in foreign countries, with different countries specializing in different stages of production, at least one country must use imported inputs in its stage of the

production process, and some of the resulting output must be exported in some sort of vertical linkage (Hummels et al., 2001). Thus, increasing trade in parts and components, i.e., inputs for capital goods, and capital goods may be interpreted as an indicator for the development of international vertical production networks (Frensch, 2015).

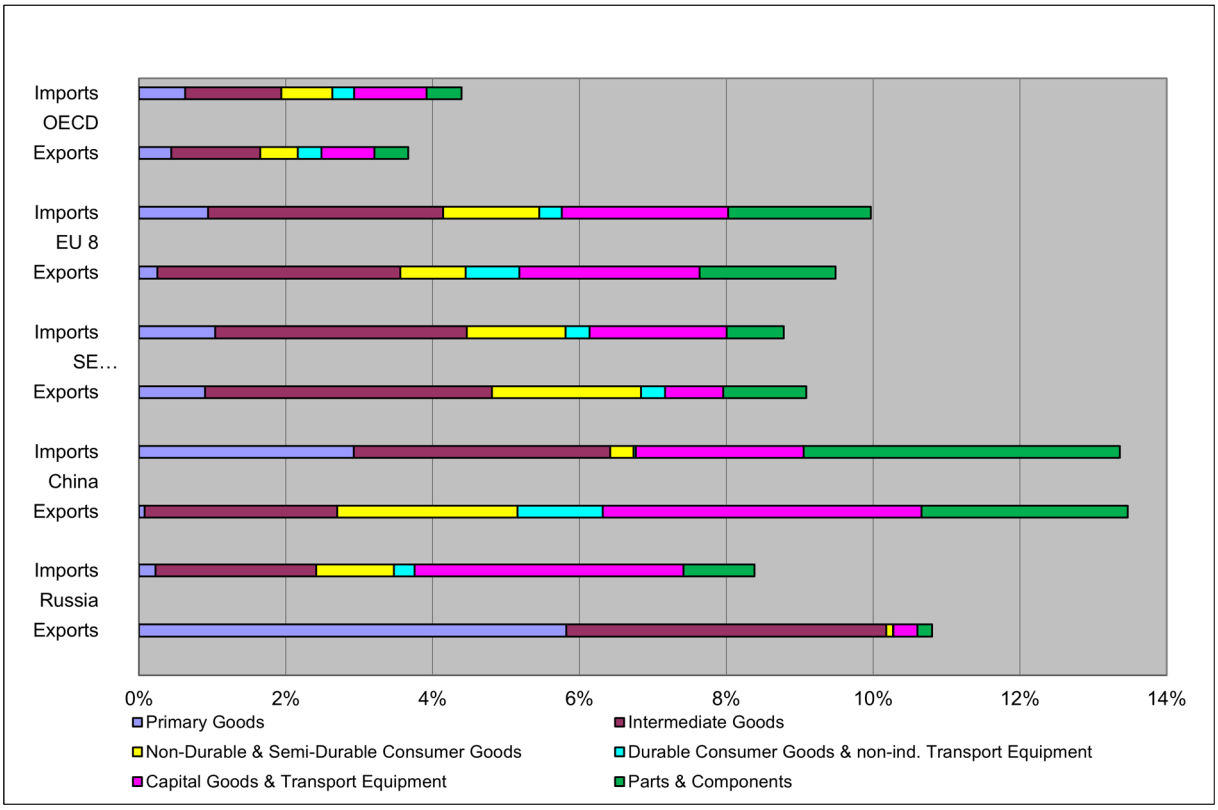

Figure 1.1: Average annual real rates of change of exports and imports, 1995.5 – 2005.5

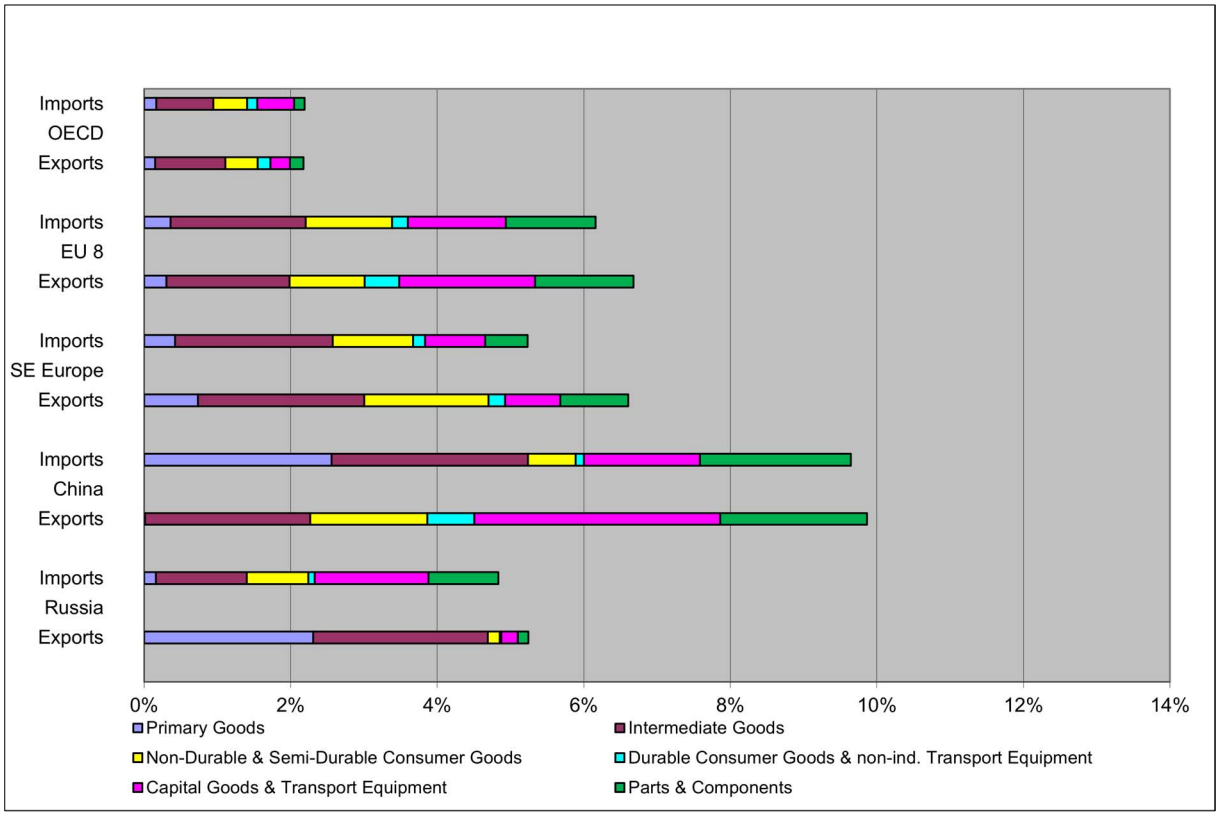

Figure 1.2: Average annual real rates of change of exports and imports, 1995.5 – 2015.5

Notes:

a) *Product Categories* – Data include all goods except BEC 7, goods not elsewhere classified; for more data background, see the appendix. „Parts & Components" are a subset of all intermediate goods and identical with the category "Parts & Accessories of Capital Goods" used by Eck (2009). "Intermediate goods" in this and subsequent figures are therefore all intermediate goods other than parts and components. The category "Capital Goods & Transport Equipment" is abbreviated as capital goods, and the category "Durable Consumer Goods & non-ind. Transport Equipment" as durable consumer goods. "Non-Durable & Semi-Durable Consumer Goods" are abbreviated as consumer goods. Consumer goods are separated according to their durability to account for the comparatively high contribution of durable consumer goods to the trade growth of certain countries, such as China. Regional rates of change represent the arithmetic mean for all countries in the region. Using the median does not produce a significantly different result.

b) *Regions* – OECD comprises the pre-1994 OECD countries in the database, i.e., Austria , Belgium and Luxembourg (treated as one country throughout), Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States; EU-8 is the Czech Republic, Estonia, Hungary, Latvia, Lithuania,. Poland, Slovak Republic, and Slovenia; SE Europe covers Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania and Slovenia. Russia is the Russian Federation; China covers Mainland China.

c) *Time Period* – The starting and the ending year each represent the mean values of two subsequent years. For instance, the average annual real rates of change of primary goods exported by Russia between 1995.5 and 2015.5 are the result of calculating the average annual real rates of change between the mean value of primary goods exported by Russia in 1995 and 1996, and the mean value of primary goods exported by Russia in 2015 and 2016. The rationale behind creating two time frames was to account for the negative average annual real rates of change during the 2008 financial crisis and 2011 economic crisis.

d) *Real growth rates* – The average annual real rates of change are based on real export values which are calculated by dividing the nominal export values by the GDP deflator retrieved from the U.S. Bureau of Economic Analysis.

This picture is sharpened in Figures 1.3 and 1.4 (Appendix B) which allow for a closer look at the trade patterns of the EU-8 on a country level. The figures show the export growth by exporter and goods category specifically to the German market over the same periods as in Figures 1.1 and 1.2. The main contribution to export growth to Germany from the majority of EU-8 countries indeed comes from parts and components, and capital goods. The CE4 countries, i.e., the Czech Republic, Slovakia, Hungary and Poland, display particularly high contributions: in Figure 1.3 both goods categories together represent between 47% (Slovakia) and 80% (Hungary) of export growth.

These trade patterns indicate that many firms joined international – especially east-west European – vertical production networks. Vertical production networks have been formed most prominently between firms in Germany and the CE4 especially in the automobile industry, but also in transport equipment more generally, and in fact in the whole area of capital goods production. Firms in Germany shifted large parts of their production to the CE4 as a result of large labour cost differentials paired with geographical proximity and relative cultural homogeneity. The trade links of Germany with the CE4 countries have thus strengthened considerably: over both time frames, exports from the CE4 countries experienced comparatively higher growth rates than exports from most other European countries (IMF, 2013).

Growth rates of imports from Germany tend even to be higher than for exports, with considerable contributions from capital goods. Figure 1.5 (Appendix B) confirms the existence of vertical linkages between Germany and the majority of EU-8 countries in parts and components. The increasing two-way trade in goods used in production thus indicates the development of production networks.

In general, the globalization of production occurred nearly simultaneously with the development of an increasingly favourable policy environment for the CEEC during the early nineties. Trade agreements led to the reduction of tariffs and the removal of non-trade barriers. Furthermore, new technological developments resulted in falling transportation costs and improvements in communication technologies which facilitated shifting production abroad to diverse locations. Thus, the early nineties were a particularly good time for integrating into international vertical production networks for the CEEC, a group of emerging industrialised economies with still comparatively low wages (IMF, 2013).

However, the question remains why western European firms engaged in vertical production networks especially with the CEEC. Can't the rest of the world offer to western Europe what the CEEC countries can offer? From the point of view of comparative advantage a country can "offer" specialization in production and trade: the more similar two countries, the less they have to offer to each other. For a worldwide sample of 79 countries Levchenko und Zhang (2012) estimate, on the basis of 19 different industrial sectors, similarity indices of sectoral productivities. The similarity of sectoral productivity vectors between the CEEC average and the average of the rest of the world is very high, with a coefficient of correlation beyond 0.9! I.e., from the perspective of western Europe, the CEEC represent a group of different countries that mirror the rest of the world quite well – but are closer, and thus cheaper to trade with. This may also explain the observation that Asian countries in the sample – with the exception of China and Vietnam – show generally lower growth rates in trade with Germany compared to the countries in the EU-8, let alone the CE4.

The effect of liberalisation: variety versus intensity of trade

The trade development of the CEEC may be viewed from a perspective other than trade growth in goods used in consumption versus production: there has been a strong rise in newly traded goods. When differentiating goods by country of origin or destination, trade growth accordingly occurs when countries trade more of the same goods with old partners (deepening trade intensity along the intensive margin), or begin trading new goods and/or with new partners (widening trade variety along the extensive margin). In Figures 2.1 and 2.2, the same trade growth rates already shown in Figures 1.1 and 1.2 are decomposed along the contributions of the extensive versus intensive margin. For the period overserved, it can be seen that more trade growth also means more growth along both margins.

However, there is significant variation between country groups in the contribution of their extensive margin to trade growth. While Russia's trade growth is driven by deepening trade intensity, an increase in product variety is largely responsible for trade growth in the EU-8 and SE Europe: on average, changes in product variety account for 22% of trade growth in Russia, 46% of trade growth in the EU-8, and 73% of trade growth in SE Europe in Figure 2.1. Figure 2.2 confirms this observation, but with generally lower growth rates.

The comparatively high contribution of the extensive margin in the EU-8 and SE Europe can be explained by the exceptional reform efforts in the CEEC. Trade liberalisation within the countries and with their major trading partner, the European Union, accounted for significant growth in the variety of goods traded. Frensch and Gaucaite Wittich (2009) confirm that growth in product variety plays an important role to the trade growth of the CEEC. They also attribute the product diversification to the rapid liberalisation of their trade.

Differentiating goods categories by use allows to examine the effects of liberalization on the variety of goods used in production. Figures 2.3 and 2.4 (Appendix C) show the growth along the extensive margin of imports from the two goods categories parts and components and capital goods and transport equipment, which have also been displayed in previous figures. It can be observed that growth along the extensive margin of parts and components has been higher than that for capital goods in most of the CEEC's imports.

Figures 2.5 and 2.6 (Appendix C) show the growth along the extensive margin of exports from the same two goods categories. In general, growth rates of export variety appear to be higher than that of import variety: the median growth rate in Figure 2.4 is 4% and in Figure 2.6 6%. Notably, Vietnam displays the highest growth rates along the intensive and extensive import margin for both goods categories. However, Asian countries generally record weaker growth rates than CEEC do.

Frensch and Gaucaite Wittich (2009) propose the variety of capital goods available for production as a direct measure of the state of technology. They suggest that there is conditional technological convergence among OECD economies and CEEC. Adopting new technology from abroad then involves capital goods imports along the extensive margin. This is indeed illustrated in Figure 2.3. On average, import growth along the extensive margin of goods used in production has been higher for the CEEC than for other countries in the sample – excluding Vietnam – which can be considered a sign of the liberalisation effects described above. Figure 2.4 appears to confirm this finding, however, with comparatively lower growth rates.

Furthermore, CEEC exports can be considered exports to the EU, and thus constitute EU imports due to the geographical proximity of the two regions. Trade liberalisation in both regions accordingly also touches on EU imports and should result in a similar pattern as observed in Figures 2.5 and 2.6. The comparatively lower growth rates in Russia and Ukraine in Figure 2.6 also confirm that that EU liberalisation towards both countries was not at all on the same level as with CEEC countries.

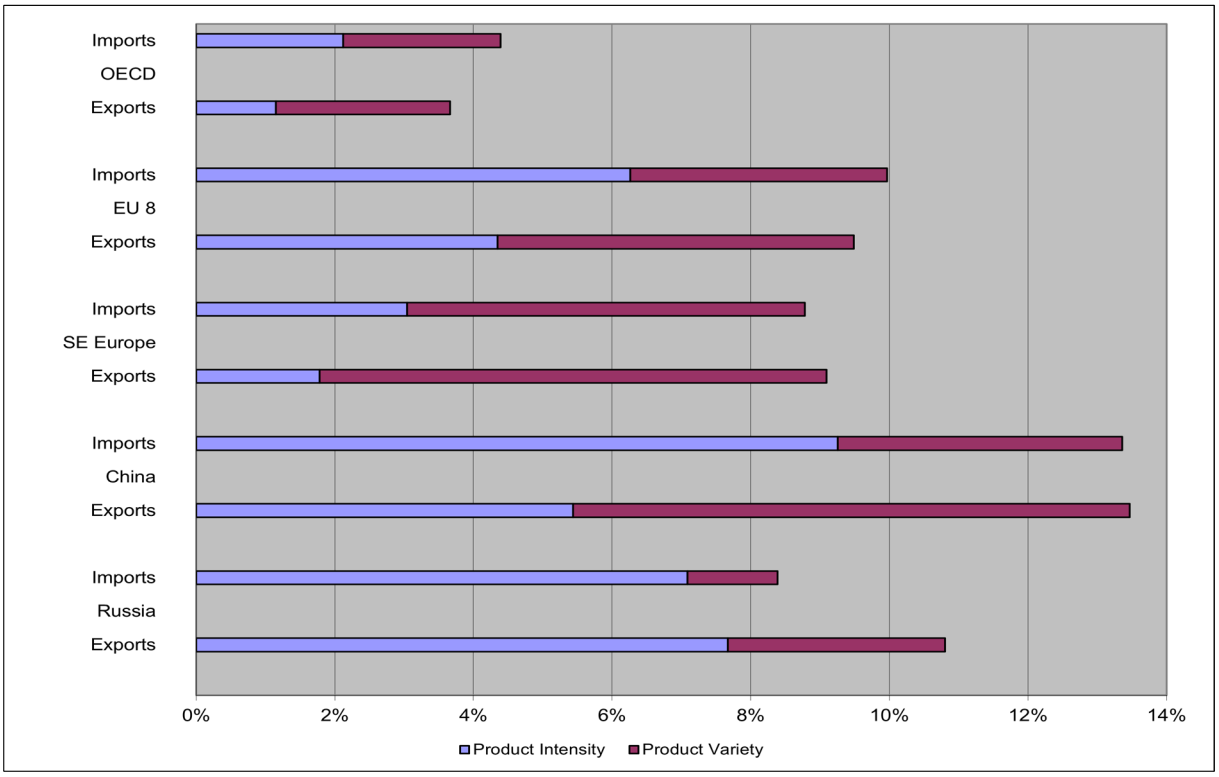

Figure 2.1: Average annual real rates of change of exports and imports, 1995.5 – 2005.5. Split into variety and intensity contribution

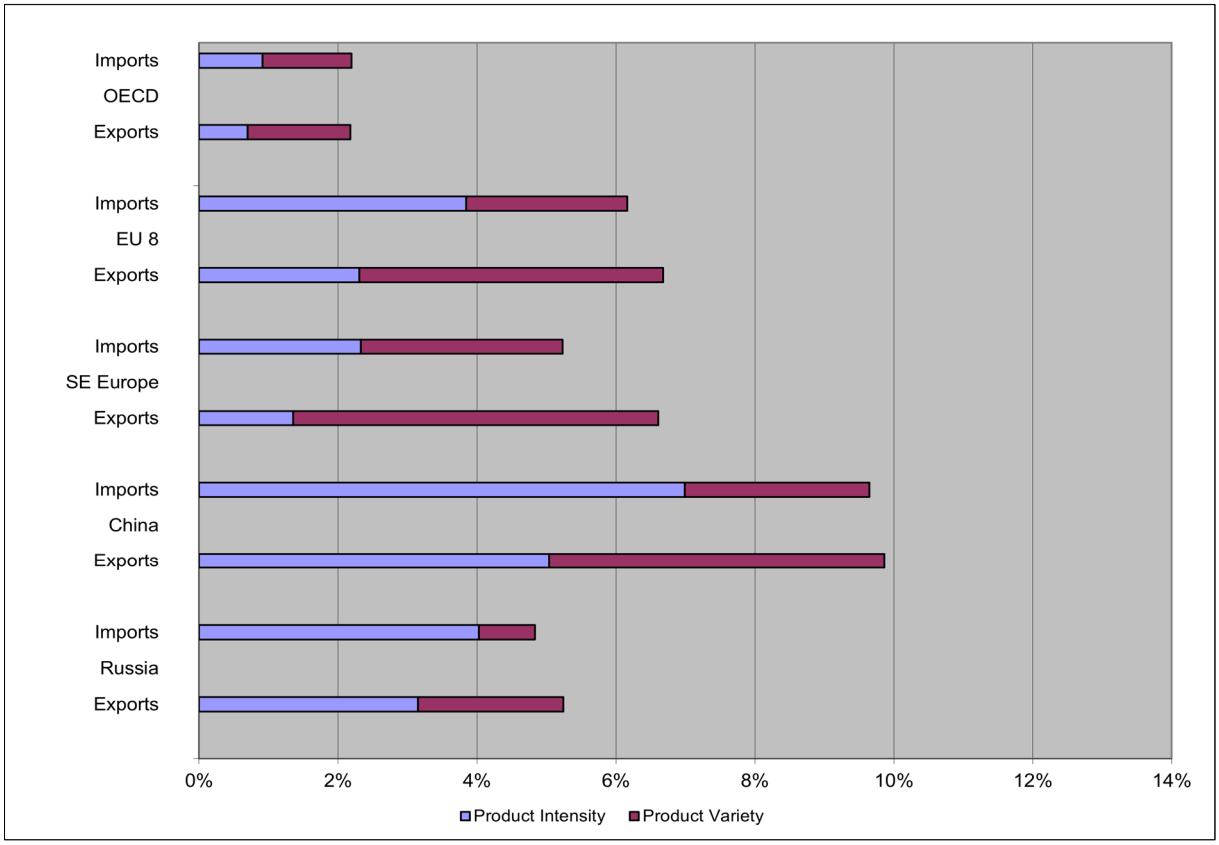

Figure 2.2: Average annual real rates of change of exports and imports, 1995.5 – 2015.5. Split into variety and intensity contribution

Note: Variety is defined as the number of goods differentiated by country of origin or destination. For this purpose, 42 individual countries are selected. Accordingly, intensity is real trade volume divided by variety. It can be assumed that the contribution of the extensive margin is generally higher than in Eck (2009) due to a more extensive product composition available in our data set. More product categories offer a higher possibility for differentiation which favours higher growth rates along the extensive margin.

Appendix A: Commodity classifications, country and time coverage

Commodity classifications

The United Nations Statistics Division's Classification by BEC allows for hs6 codes to be grouped into primary goods, intermediate goods, parts and components, non-durable and semi-durable consumer goods, durable consumer goods, capital goods and transport equipment using a conversion table.

Primary goods (BEC headings 111, 21, 31) includes primary food and beverages designated mainly for industrial use, primary industrial supplies (raw materials), and primary fuels and lubricants.

Intermediate goods (BEC headings 121, 22, 32, 321, 322, 42, 53) includes processed food and beverages designated mainly for industry, processed industrial supplies, motor spirits, processed fuels and lubricant (other than motor spirit); parts and components are a subgroup.

Parts and components (BEC headings 42, 53) is a subgroup of intermediate goods and includes parts and accessories essential for the maintenance of machinery, as well as unassembled components of machinery etc. that are used as supplies for assembling plants and are inputs to industry.

Non-durable and semi-durable consumer goods (BEC headings 112, 122, 62, 63) includes primary and processed food and beverages designated mainly for household consumption, semi-durable consumer goods (commodities which have an expected lifetime of more than one year but less than three years and are not of a relatively high value), and non-durable consumer goods (commodities with an expected lifetime of a year or less).

Durable consumer goods and non-industrial transport equipment (BEC headings 522, 61) includes non-industrial transport equipment, such as motorcycles and bicycles, and durable consumer goods, that is commodities which have an expected lifetime of more than one year and are of a relatively high value, such as refrigerators and washing machines, together with other commodities with a useful life of three years or more.

Capital goods and transport equipment (BEC headings 41, 51, 52, 521) includes capital goods (excluding transport equipment), that is machinery such as electric generators and computers, passenger motor cars, other transport equipment (except passenger motor cars), and industrial transport equipment such as finished ships, road vehicles, aircraft, railway and tramway rolling

stock; this category also includes other manufactured goods such as medical furniture, which are used by industry, government and non-profit private institutions.

BEC heading 7 is excluded from the rearrangement into the above categories. BEC 7, 'goods not elsewhere classified', comprises military equipment, including arms and ammunitions, special transactions, postal packages, etc., which are all excluded.

Country and time coverage

Reporting countries' data were extracted for 42 countries from Europe, Asia and North America. Belgium and Luxembourg are treated as one country throughout. The data cover 1995–2016 with all countries reporting consistently.

Appendix B: Trade with Germany

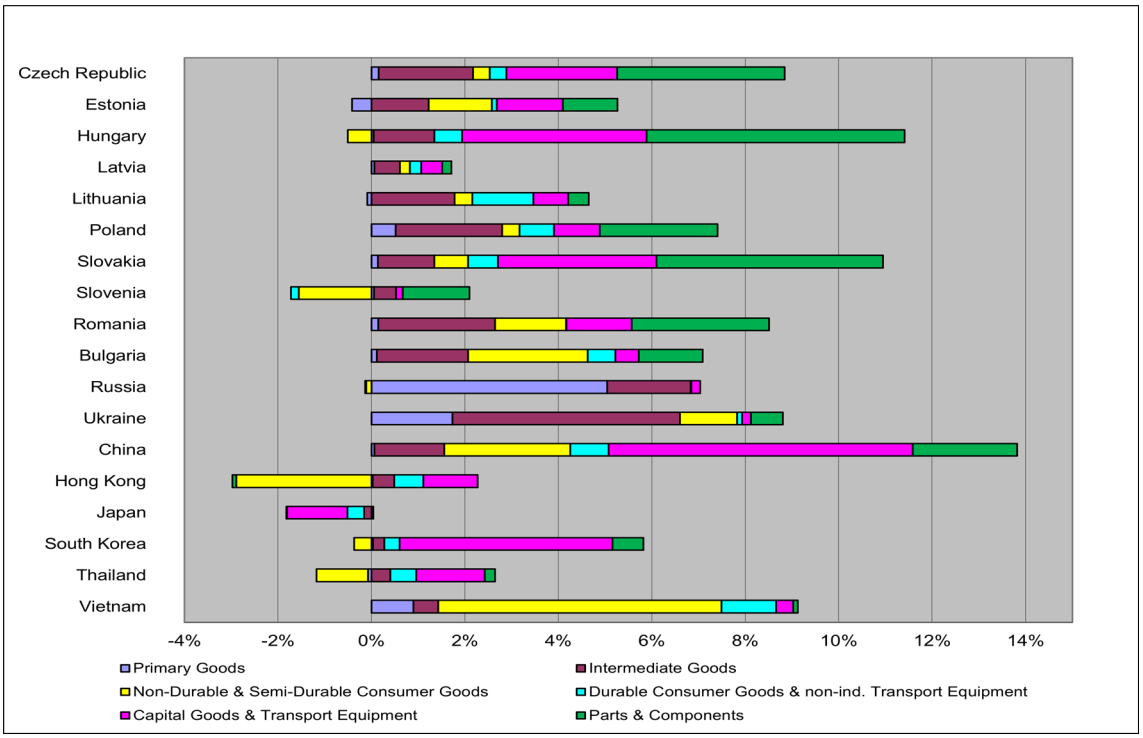

Figure 1.3: Average annual real rates of change of exports to Germany, 1995.5 – 2005.5. Split into growth contributions of different goods categories

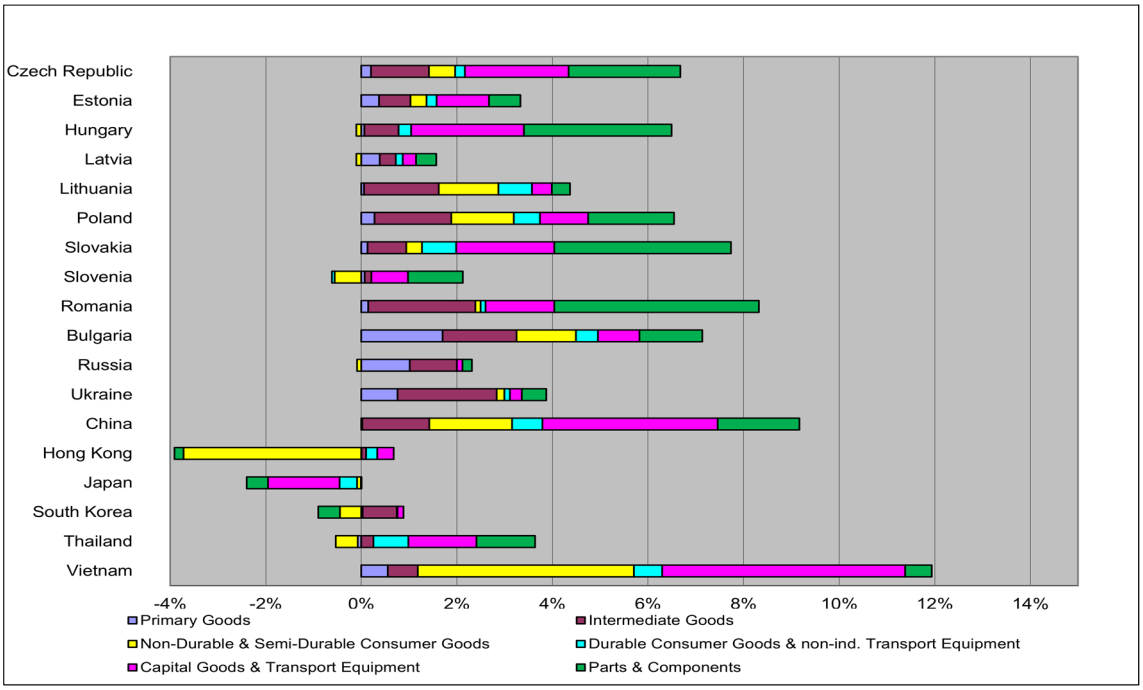

Figure 1.4: Average annual real rates of change of exports to Germany, 1995.5 – 2015.5. Split into growth contributions of different goods categories

Note: Negative bars have to be subtracted from positive bars to obtain total growth rates.

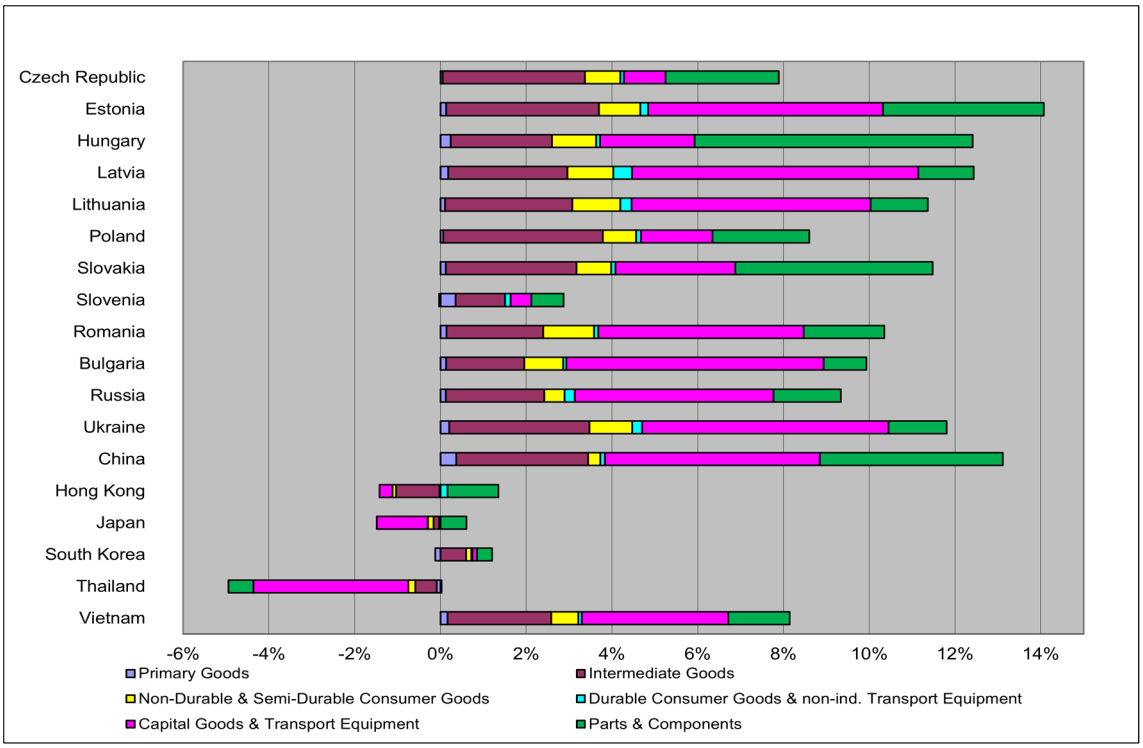

Figure 1.5: Average annual real rates of change of imports from Germany, 1995.5 – 2005.5. Split into growth distribution of different goods categories

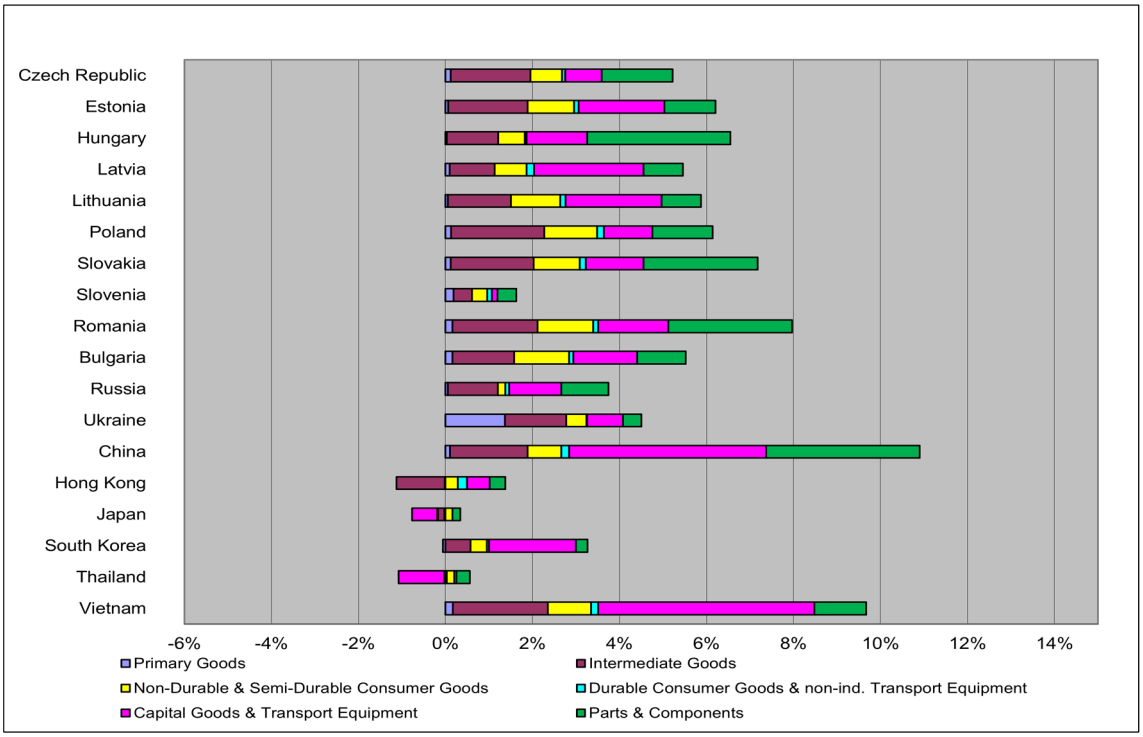

Figure 1.6: Average annual real rates of change of imports from Germany, 1995.5 – 2015.5. Split into growth distribution of different goods categories

Note: Negative bars have to be subtracted from positive bars to obtain total growth rates.

Appendix C: Trade variety

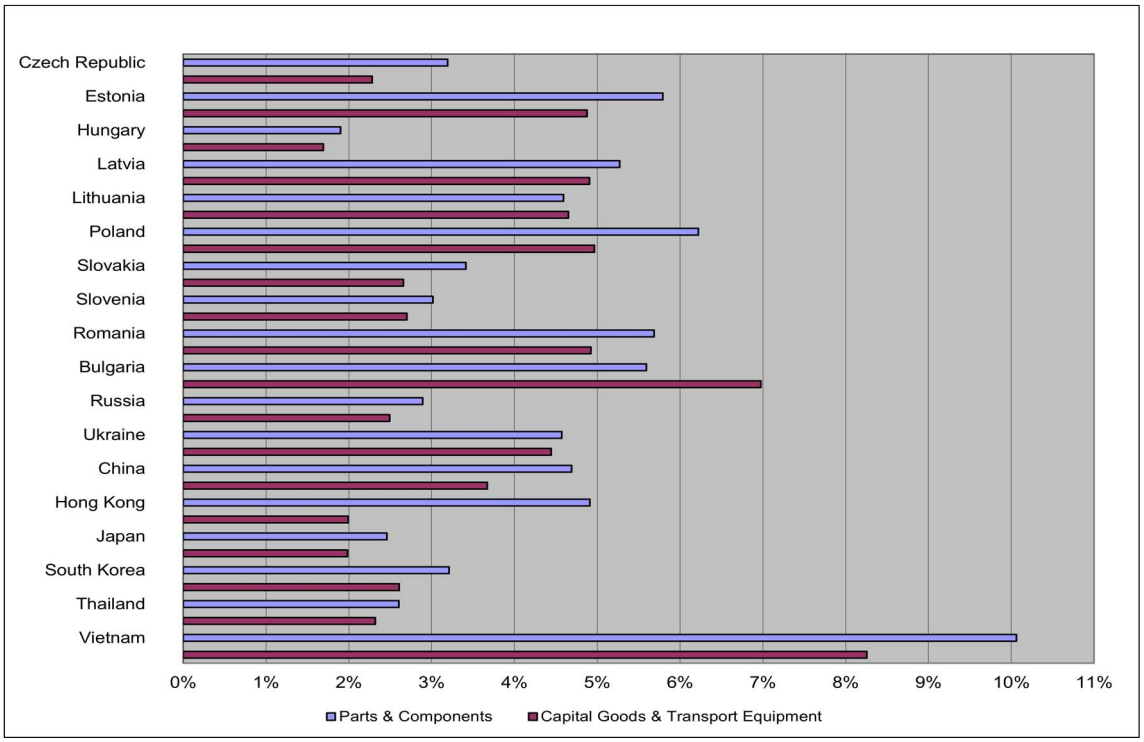

Figure 2.3: Average annual real rates of change of import variety, 1995.5 – 2005.5

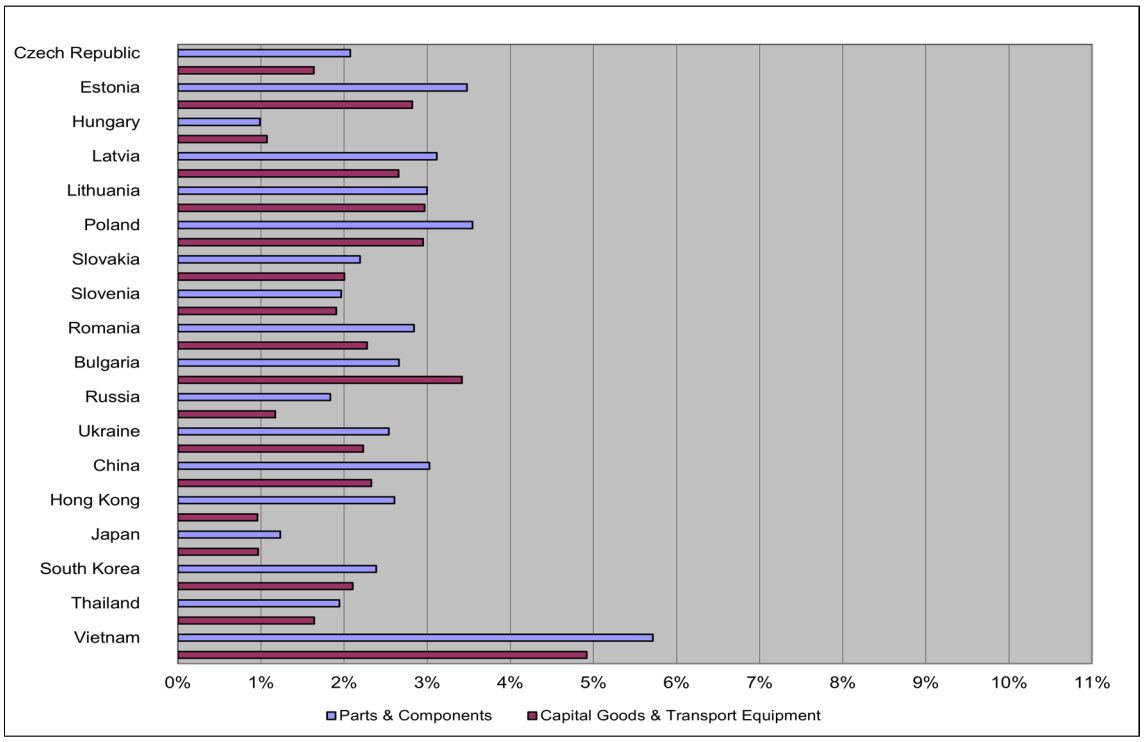

Figure 2.4: Average annual real rates of change of import variety, 1995.5–2015.5

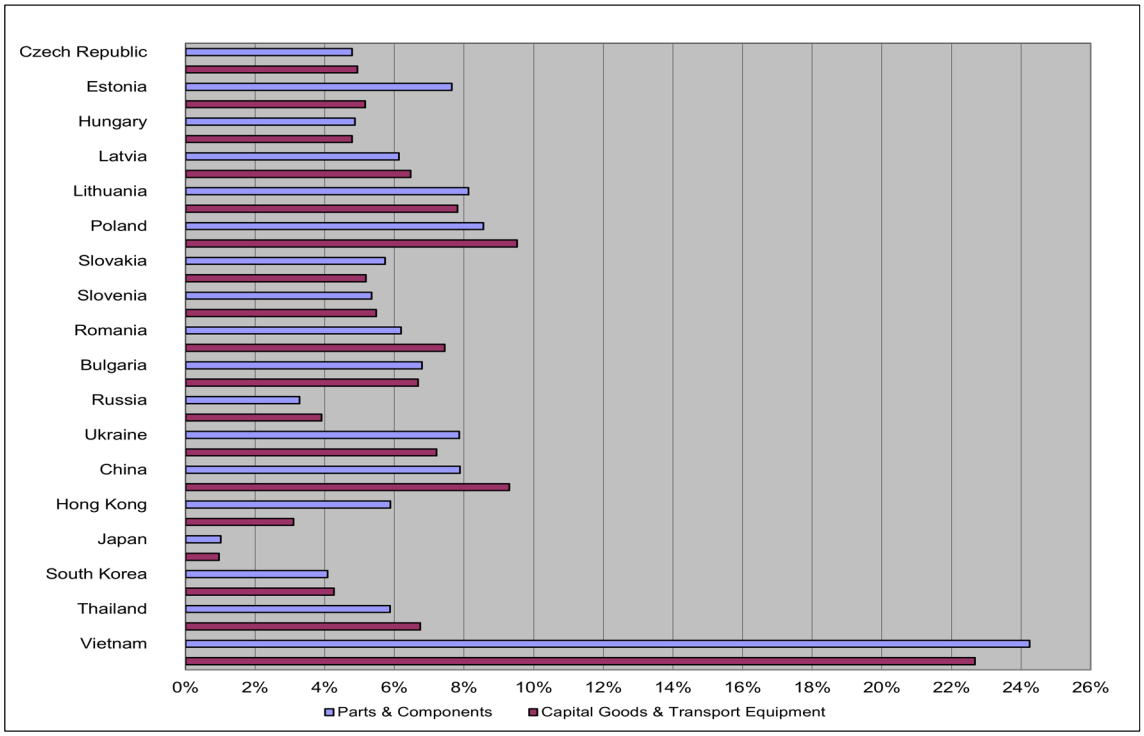

Figure 2.5: Average annual real rates of change of export variety, 1995.5 – 2005.5

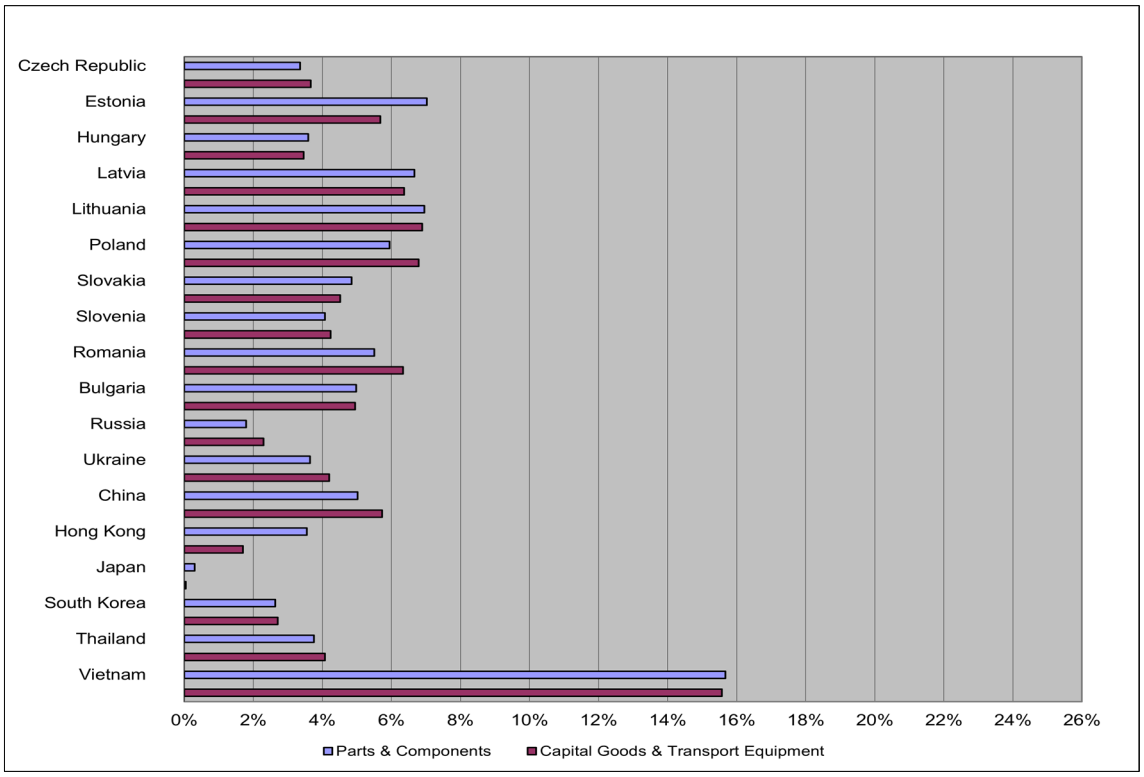

Figure 2.6: Average annual real rates of change of export variety, 1995.5 – 2015.5

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