UNIVERSITY OF LJUBLJANA
FACULTY OF ECONOMICS

MASTER'S THESIS

A VERTICAL SPECIALIZATION IN THE EU FOREIGN TRADE: PATTERNS OF THE EU PROCESSING TRADE

Ljubljana, June 2014 DARE DOLENC

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The undersigned Dare Dolenc, a student at the University of Ljubljana, Faculty of Economics, (hereafter: FELU), declare that I am the author of the master's thesis A VERTICAL SPECIALIZATION IN THE EU FOREIGN TRADE: PATTERNS OF THE EU PROCESSING TRADE written under supervision of prof. dr. Katja Zajc Kejžar.

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INTRODUCTION

The question – who sells what to whom – has been frequently addressed in the international trade literature. In our dynamic time, the face of the world trade is constantly changing. Nowadays, international trade is predominantly the trade in tasks along value chains, either on the regional or global level. The increased globalization of production resulted in specialization of different countries in different stages of production. In the economic literature, this has often been referred to as vertical specialization (Hummels, Rapoport & Yi, 1998). Goods often cross borders several times before they are sold as final products. Intermediate-input trade between companies within similar industries is prevailing over the trade in final goods to a final customer. Liberalisations of the trade together with considerable declines in communication and transportation costs have strengthened the role of global supply chains, and this has increased the global interdependence.

If a company decides to expand internationally, it can vertically integrate with an assembly plant in a foreign country or outsource the task to a foreign partner. Put differently, the company transfers production overseas, which can be defined as "offshoring" (Feenstra, 2011). One specific subset of offshoring, which I analyse in this thesis, is processing trade (hereinafter: PT) of the European Union (hereinafter: EU). PT refers to a business activity of importing intermediate inputs, such as parts and components, and after processing, transforming or assembling those inputs re-exporting them as finished products for final consumption. The goods or intermediates imported/exported under the PT regime are, unlike the goods under the normal trade regime, subject to tariff reliefs. Those goods are not allowed to be sold in the market where the processing took place, but they have to be re-exported back to the origin country. Tariff reliefs are the reason that custom authorities of the EU separately record ordinary and PT flows. As a starting point let's stress that the EU trade regime distinguishes between six different trade regimes (ordinary exports and imports, inward processing imports and exports, outward processing imports and exports). The data about these trade flows is gathered from the Eurostat database (Eurostat Comext, 2013) and accurately interpreted.

A healthy share of the writings analyses ordinary imports and exports, while other trade regimes, including PT, are largely overlooked. The main objective of the thesis is to place PT in the overall trade of the EU, outline the most important countries, partners and sectors, and most importantly, determine the factors which explain ordinary and PT of the EU. A lack of research on PT left some unanswered questions, which are potentially interesting for economists, policy makers or public at large.

As a preliminary point, I would like to outline these questions. What is the relationship between vertical specialization, offshoring, and PT? Are the EU trade patterns in ordinary trade identical to those in PT? Are the determinants of ordinary trade similar to those of PT? Why do countries/firms, in fact, use PT? Is PT of the EU more regionally or more

globally oriented? This paper looks into these questions, with a goal to provide new insights and evidence.

A gravity model is used as a workhorse to detect the determinants of processing and ordinary trade of the EU. This requires a huge upfront investment in collecting data from various sources. The choice of explanatory variables is driven by mainstream foreign literature. For reasons of data availability, trade flows for EU countries are analysed together with their external partners. The panel data covers the period 2000-2012. Despite the fact that the main objective of the paper is not gauging the adequacy of different estimation methods, it is necessary to deal with some econometric issues. In order to form an optimal equation, advice from several papers is followed, but predominately, I rely on the guidelines set by Anderson and Van Wincoop (2003), Shepherd (2012) and Bachetta et al. (2012). To verify the results, five different methodologies for estimation are applied:

- Ordinary least square (hereinafter: OLS) regression, where zero values of trade are automatically dropped
- OLS regression with correction for zero values
- Fixed effects panel data specification with country - pair fixed effects
- Poisson Maximum Likelihood Estimator
- OLS regression with time-varying exporter and importer dummies

Each methodology comes with important advantages and disadvantages. In addition, every method paints a different picture of the determinants of the EU trade flows. In light with the purpose of the thesis, all results are compared and interpreted.

By and large, I find that although PT represents a relatively small proportion of the overall EU trade, some industries, especially skill-intensive ones, are more heavily engaged in this type of trade than the others. Furthermore, PT is limited to few external partners and just some EU countries are largely involved. A glance at the data suffices that under PT enterprises assemble products with high quality and sophisticated attributes. Geographical distance and sharing common borders are found to have a significant role, which indicates supply chain regionalization. While some results are strongly confirmed empirically, the effect of some variables, for example foreign direct investment (hereinafter: FDI), is more puzzling.

The master's thesis consists of four main sections (excluding Introduction and Conclusions). I start from a very broad perspective and gradually proceed to the narrower aspects of the EU trade. The paper is organized as follows. The first section is fully theoretical and serves as an introduction to the field of the international trade. Similarly to the structure of other writings, it includes only the descriptive approach. I present the basics of the international theory, including relevant models and assumptions. Important characteristics of PT are highlighted. It also introduces the increasing role of global supply chains and issues in measuring the international trade statistics.

The second section outlines the emerging trade patterns which we are recently witnessing. The United Nations Conference on Trade and Development statistical database (UNCTAD, 2013) is my primary source. The insight into some basic international trade statistics gives us a sense of the evolving trade patterns, which are important to get a background about the role of the EU in the international trade and to see which the other important countries in our global world are. However, although indeed it is a very interesting topic, a more detailed study of the emerging trade patterns is out of scope of the thesis.

In section three, the attention turns to the analysis of PT. This section places PT in the overall trade of the EU, outlines the most important EU countries, sectors and partners. While previous chapters predominately deal with summing up the observations, findings and facts, this chapter includes some not yet published numbers and reflects some of my personal views.

Section four adopts econometric analysis to relate the different EU trade regimes to some explanatory variables e.g. gross domestic product (hereinafter: GDP), distance, regional trade agreements (hereinafter: RTA) common language, adjacency, and some others, which have not been, to the best of my knowledge, discussed and estimated in relation to PT yet. Since proper specification of the gravity equation comes with a number of difficulties, this is the most challenging part of the master's thesis. Because the aim is to gauge the extent to which different factors determine the EU trade, the paper attempts to form the most unbiased augmented gravity equation. Hopefully, the results will serve as guidelines and as a background for future researchers. The EU policy makers could use my results for promoting specific trade policies, which may act as incentives for companies to engage in PT.

The last section summarizes the main findings.

1 THEORETICAL BACKGROUND ON VERTICAL SPECIALIZATION IN INTERNATIONAL TRADE

1.1 Changing nature of international trade

In the broadest meaning, the term international trade is understood as the exchange of goods, parts, services and capital between countries or territories. Due to the increasing role of the international trade in the world it has become one of the key issues of economists, politicians, journalists and the public at large. Most of them agree that the international trade contributes to better economic welfare and global efficiency. Various gains from trade are identified in the trade theory e.g. if a country specializes in producing narrower ranges of goods, it is likely to be more efficient due to the benefits of large-scale production, or simply, trade increases economic welfare because a country is able to import goods which are hard to produce at home and export goods that can be efficiently

produced at home. In the absence of the international trade, countries would be limited to the raw materials, products and services within their respective borders, which would most likely inhibit the development of the world.

According to an often held view, countries do no longer rely solely on domestic resources to produce goods and services. More commonly, goods are produced in cost-effective countries and therefore cross borders several times before they are transformed into final products (IMF, 2011). The nature of trade is changing; in particular, we are witnessing an increase in the exchange of parts and components (Zeddies, 2011).

Among the traditional models used to explain the international trade, the most often applied are the Heckscher-Ohlin model (hereinafter: H-O) and the Ricardian model. The Ricardian model assumes that countries should tend to export those goods in which they have a relatively higher labour productivity and consider labour as the only factor of production (Krugman & Obstfeld, 2003, p. 66). The H-O model assumes two factors of production, labour and capital. Those two theories are usually not seen as competing but rather as complementary. In fact, they both rely on the comparative advantage when explaining patterns of the international trade. According to a definition by Krugman and Obstfeld (2003, p. 12) a country has a comparative advantage in producing a good if the opportunity cost of producing that good in terms of other goods is lower in that country than it is in other countries. If we assume that the developed countries are relatively capital abundant, they are expected to import labour-intensive goods while they export capital-intensive goods, and the developing countries, which are usually more labour abundant, are expected to do the opposite.

To proceed to the new theories of the international trade, we have to distinguish between intra- and inter- industry trade. Albeit their wording is almost identical, these terms have a different meaning. Intra-industry trade refers to the imports and exports of goods within a particular industry, or in other words, to the exchange of differentiated goods within the same industry. In contrast, inter-industry trade consist of the imports and exports of different types of goods, which belong to different industries. It is a necessity to differentiate between these two types of trade when making assumptions about the determinants of the international trade. As remarked by Wang, Wei and Lui (2010) inter-industry trade is probably higher when the difference between countries is higher, while the opposite is true for intra-industry trade. In particular, Wang et al. (2010) hypothesizes a high volume of intra-industry trade if partner countries have similar technological capabilities. Building on this argument, intra-industry trade is likely to take place between countries with similarities in factor endowments, where the term factor endowments captures natural resources, labour, capital and technological characteristics of a particular country.

When one is analysing contemporary international trade, it is important to note the following facts. Firstly, rather than flows to final costumers (hereinafter: B2C),

international trade reflects the trade between companies or within companies (hereinafter: B2B), which leads me to a prediction that a substantial proportion of the trade is in fact intra-industry trade. Secondly, in the much intertwined global economy, countries often link sequentially to produce a final good. Nowadays the production of goods is internationalized, countries are specialized in the production at different stages, and companies are seeking out the optimal way to produce. As a result, final products are passing through several borders before reaching the final costumer. This process of international fragmentation is mostly referred to as vertical specialization of countries.

1.2 Vertical specialization and offshoring

In an earlier paper, Hummels et al. (1998, p. 80) precisely explained the term vertical specialization as a process, where a country imports a good from another country, uses that good as an input in the production of its own good, and then exports this good to another country. Put differently, vertical specialization occurs when a country uses imported intermediate parts to produce goods it later exports. In the existing literature, vertical specialization has been referred to with a number of terms, e.g. global production sharing or product fragmentation. Product fragmentation has been well defined by Jones and Kierzkowski (2000) as a splitting up of a previously integrated production process into two or more fragments. The definitions of these terms are mostly synonymous, and they all emphasize the sharing of the production process among countries.

Despite the fact that vertical specialization is related to vertical integration, vertical FDI and outsourcing, these terms cannot be used interchangeably. Vertical specialization concerns the activities of countries, while outsourcing, vertical integration, and vertical FDI involve the behaviour of multinational firms (Hummels et al., 1998). When a company decides about its organizational form, it can choose among several options. In the first stage, a company can decide to integrate/outsource or buy components from an arm-length supplier and produce everything under "one roof" (Grossman & Rossi-Hansberg, 2008). In the case that the first option is chosen, it can either undertake production within (vertical integration) or beyond the boundaries of the firm (outsourcing). In addition, one has to decide whether to keep all the processes at home or to expand internationally. This leaves us with four possible scenarios, portrayed in Figure 1.

What this figure suggests is that if a company keeps the processes in-house, it is "vertically integrated", and if it decides to contract a process to another party, it is "outsourcing". Moreover, it can decide to keep the process in the home country or to move it abroad, which is represented along the side of Figure 1. Hummels et al. (1998) described vertical integration as a suitable term when multinational companies locate different stages of production in different countries. The same authors defined outsourcing as a relocation of one or more stages of the production of a good from the home country to another country.

Figure 1. Organizational choices of the company

		Ownership of production process	
		Vertical Integration	***Outsource***
Location of production process	***Home Country***	Domestic Integration	Domestic outsourcing
	Foreign Country	Multinational Integration	Foreign outsourcing

Source: R.C. Feenstra, *Offshoring to China: The Local and Global Impacts of Processing Trade*, 2011, p.32.

However, these definitions have been subject to an increasing scrutiny in new theories. Outsourcing at its basics is just contracting work out to a third party, which is not necessarily located in another country. Similarly, vertical integration does not necessarily take place in a foreign country. At this point it is useful to introduce offshoring. Grossman and Rossi-Hansberg (2008) and Feenstra (2011) pointed out the proper interpretation of offshoring. They argued that if a part of the production process is shifted overseas, then it is offshored, regardless of the ownership of the production process. Following the model of Feenstra (2011) there are two important differences between outsourcing and offshoring. Firstly, outsourcing does not necessarily take place in a foreign country, whilst offshoring does, and secondly, outsourcing is always a process of utilizing a third party, whilst offshoring is not. In my thesis, I follow the definitions by Grossman and Rossi-Hansberg (2008) and Feenstra (2011), and therefore, use the expression offshoring in the case of multinational integration and foreign outsourcing.

Many economists advocate the positive impact of production fragmentation, outsourcing and offshoring. For example, Arndt (1997) argued that companies use outsourcing of their less competitive operations to become more effective competitors in global markets. The former author also documented that offshoring greatly improves the overall economic welfare of the country. Jones and Kierzkowski (2000) added that fragmented production enables producers to benefit from production specialization, to enjoy benefits from

economies of scale and to exploit international cost differences. Contrary to a sizable body of literature demonstrating positive affects, conclusions of some authors (Kohler, 2004) are not so straightforward and they rather warn against negative economic welfare results.

In the latter paper, Hummels, Ishii and Yi (2001) estimated that the share of vertical specialization has grown considerably and now accounts for up to 30 % of the world exports. The relevant question is why has vertical specialization grown so fast? One explanation, given by Hummels et al. (2001) is that lower trade barriers and transportation costs facilitate and encourage companies to fragment production into several stages. In the same line, Grossman and Rossi-Hansberg (2008) argued that home firms broaden the range of tasks performed abroad if the cost of offshoring falls. A sizable body of literature points out similar reasons, for example lower communication costs and technological advancement, which make the coordination of production across countries easier. Following findings by Kaminski and Ng (2005), FDI and multinational corporations have been the driving forces behind vertical trade through establishing production capacities and linking them to international supply chains. A number of other factors, such as deregulation and opening of large markets such as China and Russia might also have caused an increase in the volume of vertical specialization in the international trade.

As someone would intuitively expect, fragmentation is easier in some industries, and thereby, not every industry is involved in vertical specialization to the same degree. Following the empirical evidence by Hummels et al. (1998) industries with the most vertical trade are motor vehicles, shipbuilding, aircraft, industrial chemicals, petroleum and coal products. On the contrary, industries with the least proportion of vertical trade are agriculture, mining, wood products and paper products. Grossman and Rossi-Hansberg (2008) pointed out business support activities, e.g. customer relations or bookkeeping, to be the most appropriate for performing remotely. While one might argue that routine tasks and labour-intensive activities are easier to offshore, the evidence by Feenstra (2011) shows that also more-skilled activities are often sent abroad. In any case, it does not make sense to offshore some products. Illustrative examples are agricultural products, because it is nearly impossible to split the production process in two or more parts.

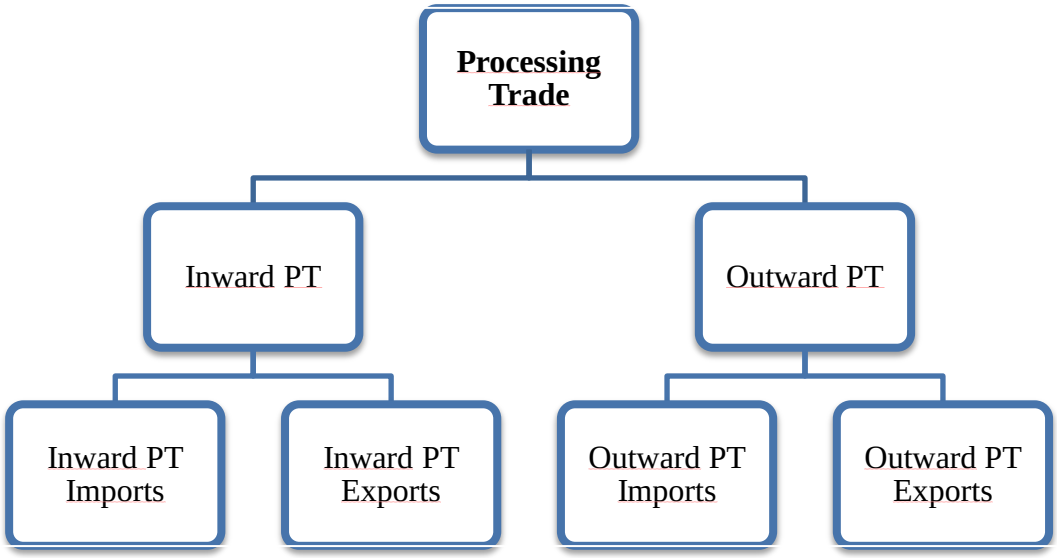
1.3 Vertical specialization and processing trade

In this subsection, I relate PT with the concepts described thus far. As noted before, offshoring occurs when a company transfers its production overseas, either in-house or by contracting a third party. Those goods, in principle, are not subject to tariff rebates, and this is where PT enters the picture. Goods under PT are eligible for tariff reliefs, and thus custom authorities of the EU separately record ordinary and PT flows. Consequently, one can distinguish between ordinary imports/exports, and imports/exports under the processing procedure. Because it can be important for boosting EU competitiveness, this regime is in my opinion unduly less explored.

1.3.1 Characteristics of processing trade

Following the definition by Eurostat (2006, p. 16) ordinary imports and exports are mainly goods exported definitively, or released into free circulation, either directly or via a customs warehouse. Most likely there is no problem with understanding what ordinary imports and exports are; however PT might need some further explanation. PT refers to a business activity of importing intermediate inputs, such as parts and components, and after processing, transforming or assembling those inputs re-exporting them as finished products for final consumption. According to Eurostat (2006) those goods benefit from an exemption from duties, levies or checks which would be carried out under the trade policy normally applicable to imported goods. PT is generally possible for all products and it can cover a wide range of operations (transformation, construction, assembly enhancement, renovation, modification) with a goal to improve the product or produce a new product (Eurostat, 2007). Custom authorities further distinguish between two major types of PT, outward and inward. Under the inward processing trade (hereinafter: IPT) intermediate goods are imported temporarily so that they can be processed and then re-exported as resulting products. On the contrary, under the outward processing procedure (hereinafter: OPT), intermediate goods are exported temporarily for processing and then they are re-imported back as resulting products. Re-imported products are eligible to full or partial exemption from duties and levies. As Figure 2 depicts, in the Eurostat Comext database processing trade is further subdivided. Inward processing imports (hereinafter: IPM) consist of intermediate goods imports from a foreign country for further processing in the home country. Re-exported goods under tariff exemption are measured as inward processing exports (hereinafter: IPX). On the other hand, outward processing exports (hereinafter: OPX) consist of intermediate goods exports for further processing in a foreign country, after which the goods are re-imported under tariff exemption. Re-imported goods are measured with outward processing imports (hereinafter: OPM) (Eurostat, 2007).

Figure 2. Processing Trade Decomposing



The characteristics of PT hint that to a great proportion this type of trade is likely to be part of intra-industry trade. In practice, this implies a high volume of PT among countries with similar factor endowments. This thesis is not a pioneer in relating PT to outsourcing and vertical specialization. For example, Zeddies (2011) claims that while in outsourcing goods typically cross international borders only once, under PT and vertical specialization goods cross borders at least twice. Cirrera, Petropoulou and Willenbockel (2012) defined PT as a mode of outsourcing, where inputs are required to be sent and processed offshore and are then re-imported, which allows countries to specialize in certain processing tasks. Following this explanation, I assume that PT is a specific subset of offshoring, through which the patterns of the EU vertical specialization can be explored.

1.3.2 Overview of existing literature on processing trade

Despite the focus of models and studies has so far been predominantly set on ordinary trade, there are also some interesting papers analysing PT. Since there is no data on PT available prior to 1988, it has not received considerable attention in the older literature. The literature does not say much about the impacts of the RTA, FDI, and trade policies effects nor does it explain the role of common language, colonial relationship and some other potentially interesting factors. Moreover, the literature cited below pays no more than lip service to value-added creation. Roughly one can compare the value of imports and exports in PT, but this approximation can be misleading since it does not include other intermediate inputs, needed for assembly.

In the early nineties, the OPT of Western European companies to Central and Eastern Europe (hereinafter: CEEC) has expanded rapidly. OPT accounted for almost one fifth of the CEEC exports in 1992, but for a much larger share in labour-intensive products, e.g. clothing, leather and shoes (Lemoine, 1998). However, after 1992, we can notice a relative decline of the importance of OPT. This can be attributable to a reduced role of clothing, leather and shoes in the overall exports of Western Europe. Nowadays, more sophisticated products, e.g. machinery, vehicles and other high-technology products are the driving force of the Western European economies.

A particularly important contribution to PT evidence has been given by a paper by Egger and Egger (2005). The paper analyses the growth of PT in Western Europe with the CEEC after the fall of the Iron Curtain in 1989. With the fall of the Iron Curtain, a new market opened for the multinationals. Consequently the shares of OPT have grown between 1989 and 1999 in the low-wage and infrastructure abundant CEEC (Egger & Egger, 2005). Accordingly, the growth rate of OPT might indicate that the EU companies perceive intermediate goods supply in the CEEC market as a substitute for the EU supply. The OPT is related to FDI, and an overwhelming share of FDI realized in CEEC originated from European countries (Egger & Egger, 2005). Apparently, OPT to CEEC has become one of the tools of the Western firms to take advantage of lower wages and to reduce production costs.

Using the data for the EU OPT during the period 1995-1997 by the EU manufacturing industries Egger and Egger (2001) demonstrated that OPT is more prevalent in the EU's relatively intensive low-skilled labour industries, and predominately takes place in countries that are labour-abundant. Later evidence from Egger and Egger (2005) demonstrates that IPT in the EU is likely relatively high-skilled labour intensive. Egger and Egger (2005) outlined some important factors affecting PT. Accordingly, the key determinants of EU's outward and inward processing trades are a country's relative price position and cost situation, the partner country's real effective exchange rate, and the level of taxes on profits and earnings. In addition, relevant factors that influence PT are a country's infrastructure and factor endowments (labour, land, capital). More recent evidence shows that machinery and electrical products have become increasingly important on both the import and the export sides while textiles have become progressively less important (Thorbecke, 2010). From these findings the author concludes that nowadays PT largely involves importing sophisticated parts and components to produce computers, telecommunications equipment, and other high-technology goods. Cirrera, Petropoulou and Willenbockel (2012) found that PT is likely to occur between nearby countries and when the quality or complexity of the final product or input is high. Furthermore, those authors suggest that cost minimization is not a paramount motivation to use PT.

Wang and Wei (2008) have related FDI to PT. Their evidence shows that foreign-owned firms handle most of processing exports. Beside this, the results by Görg (2000) indicate that the presence of the USA direct investment in the EU has a positive impact on receiving IPT from the USA, especially in the peripheral countries of the EU, while in the core countries the impact is less significant. Further, Görg (2000) found that a country's comparative advantage has a positive effect on its receiving of IPT. Contrary to some assumptions, the country size and the size of the market have no significant effect on PT (Egger & Egger, 2005). Intuitively, one would expect that the share of PT drops if tariff barriers are reduced. In particular, there is little correlation found between PT values and the level of tariffs (Cernat & Pajot, 2012).

Ferrarini (2011) has identified three major hubs of PT. The first is the European network with Germany at its centre, the second are the member states of the North American Free Trade Agreement (hereinafter: NAFTA), and the third are East and Southeast Asian countries, especially in relation to trade in parts and components in the China-Japan network. According to the retrieved articles, the most important partner for PT of the EU is the USA, followed by Japan and Russia. Interestingly, China has a lower share in the EU processing trade compared to the ordinary trade share. Cernat and Pajot (2012) further indicate that some sectors are much more important for PT than the others. On the export side, they outlined a high proportion of motor vehicles, especially in Germany. On the side of IPM, they pointed out a high share of tobacco and chemical raw materials. In the same line, Cirrera et al. (2012) stressed the importance of the vehicles sector in PT activities. As evident in further text, my findings are much in the line with those above.

Similar to the EU, China has a PT regime, under which materials and other inputs benefit from an exemption from duties as long as they are used solely for export purposes. As well as the statistical office of the EU, the China's Customs Statistics distinguishes between imports/exports linked to PT and ordinary imports/exports. Processed exports, as classified by the Chinese customs authorities, are goods that are brought into China for processing and subsequently re-exporting. Considering this, those goods are not allowed to be sold on the Chinese market, which is in line with the European PT rules. A favourable PT regime is one of the reasons for companies to move their assembly plants to China. According to a recent estimate, processing exports account for more than half of China's total export value, while processing imports constitute about 45 % of total Chinese imports (Alyson, Van Asshe & Hong, 2009). Aforementioned authors added that China heavily relies on its neighbouring countries, with more than three-quarters of its processing imports originating from East Asia. One interpretation is that the East Asian countries with their geographical proximity are more familiar with the complex Chinese business environment. Thorbecke (2010) added that two-thirds of China's imports for processing comes from Japan, the members of the Association of Southeast Asian Nations (hereinafter: ASEAN), and the newly industrialized economies, while only about 5 % comes from the USA and Europe.

1.4 Role of global supply chains

Due to their increasing importance, supply chains have been recently extensively discussed, and they sit at the heart of the international business landscape. Starting with the definition, a global supply chain is a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer (Mentzer et al. 2001, p. 4). Thereby, the term global supply chain captures different business activities along the supply chain, e.g. procurement, marketing, customer service, R&D, operations etc. With the increased globalization, global supply chain management is becoming an important issue for many businesses. According to a recent estimate, more than half of the world exports are made up of products traded in the context of the global value chains (OECD, 2012).

From a theoretical standpoint, different countries specialize in different stages of production. The question on what basis countries specialize has been well addressed in several papers. Koopman, Powers, Wang and Wei (2010) documented that if a country produces inputs for others, it is located upstream in the global value chain, and if it is using imported intermediates to produce final products, it is most likely to be located downstream. Another explanation is that the countries with a lower probability of making mistakes specialize in the later stages of production, where mistakes are more costly (Costinot, Vogel & Wang, 2011). Authors further explain that the poorest countries tend to specialize in the earlier stages of production, such as assembly, while the richest countries tend to specialize in the stages producing the most complex parts. Turning to the

preliminary findings by Görg (2000) a country with relatively low labour costs is more likely to be a hub for the production of fragmented components than a country with high labour costs. Jones and Kierzkowski (2000) argued that the production of components is usually dispersed globally according to the comparative advantages of countries. Similarly, Hanson (2012) claims that differences in technology and resources are a potential motivation for commerce, and that international specialization broadly follows the perceived patterns of comparative advantage. Accordingly, companies often offshore intermediate goods production to countries with a relative abundance of factors that are scarce at home.

The next noteworthy information is that the supply chains vary among regions. For example, following recent estimates, the supply chains of North America or Europe are less dispersed compared to the Asian supply chain (IMF, 2011). In Europe and North America the foreign input is imported directly from the hub while in Asia goods are crossing borders several times (IMF, 2011). Consequently, PT in Asia relies more on the region as a whole and the global supply chain is more regionally integrated. In some literature the expression ‘‘Factory Asia’’ is used to emphasise the interconnectedness and the growth over the last two decades. To the best of my knowledge, the most appropriate description of ‘‘Factory Asia’’ is given by Ferrarini (2011, p. 11), who defines it as fragmented production activities scattered across the region that typically involve the provision of high value added parts and components by leading economies, such as Japan and the Republic of Korea, for further processing in countries such as Malaysia and the Philippines, and final assembly in countries involving low labour costs and value added, predominantly in China. One possible explanation of why ‘‘Factory Asia’’ is such a phenomenon lies in the cost disparities among Asian countries. Evidence from Lemoine (1998) showed that wage differentials and overall disparities are much higher in Asia than in Europe.

Rugman, Jing and Chang (2009) suggested that challenges in the global supply chains, e.g. different taxes and duties, transfer prices, trade barriers, and differential exchange have discouraged companies to adopt global strategies. What is more, formations of RTAs among countries with similarities in cultural, economic and political dimensions have further reduced risks and costs of regional supply chains. In their empirical research, they have identified 183 large North American companies. They have examined whether firms are involved in global or regional supply chains. More than 85 % of the investigated firms were found to use mostly regional supply chains. These findings confirm the assumptions that despite the opportunities of distant offshoring, North American firms prefer to form regional supply chains in order to take advantage of the economic integration NAFTA between Canada, the USA, and Mexico. Finally, authors also hint that advanced countries of the EU may exploit low labour costs in Eastern European countries to develop products for the EU market, and not seek very distant countries. This is understandable, if we assume that Eastern European countries are in the geographical proximity of the developed

markets of Western Europe and have relatively low labour costs. Geographical and cultural proximities, together with delivery times and transportation costs, can be paramount when companies are deciding on outward FDI or where to offshore their activity. In this perspective, Eastern Europe offers obvious location advantages compared to more distant Asian producers. The internationalization strategy of the Western European companies was primarily to extend their production networks towards CEEC (Egger & Egger, 2001). However, with entry into the EU, and consequently higher labour costs, some of those countries have lost their competitive edge in the labour intensive industries. Moreover, we observe a shift towards more complex and higher value-added activities in CEEC, which is supported by findings that there has been a shift from the dominance of simple assembly operations to the processing and local production of parts (Kaminski & Ng, 2005).

Importantly, coordinating global supply chains comes with many perils. Global supply chain management usually involves a number of countries and therefore many considerations (Rugman et al., 2009). The number of external factors is beyond the control of a company, and conceivably even the most diligent companies risk experiencing losses. Since global supply management comes with a plethora of new difficulties, the multinationals of the developed countries might prefer to focus on regional supply chains in their geographical proximity (Zeddies, 2011). In this way they would avoid exchange rate fluctuations, wage inflation, and increase the speed of adaptability and agility (Rugman et al., 2009). Risk aversion after the crisis might encourage companies to abandon global strategies and maintain their operations closer from the regional perspective (WTO, 2012).

1.5 Issues of measuring international trade

In the international production chains, the value added originates in many locations. Traditionally, trade statistics records trade flows between countries on the basis of gross value. Therefore, statistics includes final goods and also intermediate outputs. The issue at this point is that the data are affected by intermediate goods that cross borders more than once. A supply chain covers various countries, hence it likely overestimates the true contribution, and double counting can take place (Koopman et al. 2010). The consequences of production sharing among countries are significant differences between the gross trade flows and the value added (Johnson & Noguera, 2012). Thereby, traditional statistics on trade values is becoming increasingly less reliable and gross exports/imports may be a misleading indicator. More suitable data to analyse the contribution of countries would be domestic value added (hereinafter: DVA) in exports, but it is not easy to track the real value. Input-output trade data to compute bilateral trade in value added would be a good solution; but there is a lack of data about the imports and exports of intermediate goods. This data is not directly observed either in conventional statistic or in national account data sources (Johnson & Noguera, 2012).

Despite some attempts to devise a methodology of measuring value-added trade the issue has not yet been perfectly addressed. Recently, the joint Organisation for Economic Co-operation and Development (hereinafter: OECD) – World trade organization (Hereinafter: WTO) Trade in Value-Added (hereinafter: TiVA**)** initiative addressed this issue by considering the value added by each country in the production of goods and services that are consumed worldwide (WTO, 2012). Under this approach, the value of imported intermediates is subtracted from the total export value. Johnson and Noguera (2012) estimated the value added by the measure of the intensity of production sharing. By combining input-output tables and bilateral trade data they documented the ratio of value added to gross exports (hereinafter: VAX). Under this approach, value added exports represent about 73 % of the world gross exports. The findings indicate that North and South America have the highest VAX rates, followed by South Asia and Oceania. East Asia and the CEEC countries have the lowest VAX. Interestingly, VAX ratios were not found to be related to the economic development of a country. Koopman et al. (2010) provided a comprehensive framework by combining the existing literature and the new approaches. The result is a framework that provides decomposition of gross exports into four different DVA components, respectively: (1) exported in final goods; (2) exported in intermediates absorbed by direct importers; (3) exported in intermediates re-exported to third countries; (4) exported in intermediates that return home. In respect to the characteristics of PT, IPT is likely to fall under category (1) and OPT under category (4).

To illustrate the problem of measuring, let's recall that China has a high share of foreign value added (hereinafter: FVA), and at the same time a high trade surplus with the developed economies, e.g. the USA, Japan and South Korea. Putting the findings discussed so far into a broader perspective, a trade surplus would decrease significantly or in some cases even turn into a trade deficit. Furthermore, Koopman et al. (2010) documented that since China is the final assembler in a large number of global supply chains, its trade surplus with the USA and Western Europe in value added terms is more than 40 % less than that measured in gross terms. Authors further claim that because Japan exports components for final assembly to low-cost Asian countries, it actually has a trade surplus with China, and not a trade deficit. Koopman et al. (2010) identified that the developed economies have the highest DVA, while China, Hong Kong, Malaysia, Philippines, Mexico and the peripheral countries of Europe have significantly more of FVA in their exports. Besides the advanced economies, Russia also has a low FVA due to the fact that it predominantly exports natural resources and energy products. Encompassed with this literature about the value added in exports, we should be aware of the defectiveness of statistics and understand the consequences of production sharing.

2 CHANGING PATTERNS OF GLOBAL TRADE

2.1 Trade expansion and liberalisation

Since the World War II international trade was growing steadily till the beginning of the financial crisis in 2009. During the recent crisis, the import volume fell for more than 20 %, but it recovered fast, and from 2011 it already exceeds the value it had in the years before the crisis (UNCTAD, 2012). The consequences of the crisis were a decreased demand, particularly in the developed countries, and the falling of commodity prices. According to the UNCTAD report (2009), the value of trade was deflated with a fall of the commodity price index for about 20 % between the beginning of 2008 and 2009. All the regions faced negative trade shocks in 2009, but some developing economies recovered faster in comparison to the developed counterparts. A weaker global economic growth in the developed economies in the recent years is one of the reasons for changing the patterns of trade. The rise of the developing countries as systematically important trading partners, not only in terms of trade but also in terms of the number of their important trade partners, has contributed to the expansion of the global trade.

The expansion of the global and regional trades is driven by important factors, e.g. trade liberalization, falling costs of global transport and communications, vertical specialization, deregulation with the opening of some traditionally closed markets, income convergence etc. In particular, Hummels et al. (2001) linked trade growth to vertical specialization growth, and documented that the sectors with the most export growth are identical to those with the most apparent vertical specialization growth. Tariffs and non-tariff measures have dropped since the 1980s and the removal or the reduction of restrictions or trade barriers has simplified the international trade. Furthermore we can observe an increasing number of bilateral and multilateral agreements (WTO, 2012). Noteworthy are also reciprocal trade agreements between two or more partners in a specified area or region, which have become increasingly prevalent since the early 1990s, and now cover more than half of the international trade (WTO, 2012). The WTO estimates that there are currently around 400 preferential trade agreements in force. However, the majority of least developed countries is still not a part of the RTAs or the WTO and are potentially harmed. Nowadays, the RTAs are also one of the main factors powering the development of the global supply chains. However, tariffs are still an important issue in the South-South trade, especially in some Asian and African countries (WTO, 2012). On the contrary, the economies in transition of Latin America, the Caribbean and also East Asia have relatively low tariff rates. Many of the developing and the least developed countries still have to address key trade concerns to simplify their import-export procedures.

Besides this geographical change we also witness changes in the structure of trade, more precisely a rising share of higher technology goods (IMF, 2011). On one hand, the share of lower technology exports declined. On the other hand, the share of medium and high-technology products or components increased, thus increasing the overall value of the

international trade. However, the quality and the price of the developing economies exporting products are still differentiated from those of the developed economies (Schott, 2008).

A natural slowdown is anticipated when the optimal level of productive efficiency will be reached (WTO, 2012). If we measure the growth of the world trade as a sum of the volume of exports and imports, it declined from 12 % in 2010 to 6 % in 2011 and dropped further in 2012 to 3 % (UNCTAD, 2013). Labour intensive stages of production such as final assembly are moved to a host country with a lower cost of unskilled labour, while activities that are relatively intensive in skilled labour (marketing, R&D, patenting, innovation) are retained in the headquarters (Tanaka, 2009). For instance, mobile phones production involves both skill intensive and labour intensive stages. Examples of skill intensive stages in the mobile phones production are designing and development, while an example of a labour intensive stage is the final assembly. The same logic can be applied to numerous other products. Following findings by Tanaka (2009) in future, companies are expected to keep the core processes in the domestic headquarters and most likely offshore just relatively labour intensive stages. Looking from this perspective, the global production sharing will not increase unlimitedly.

2.2 The evolving structure of global trade

In this subsection, the amenability is directed to the evolving trade patterns, which we have witnessed recently. The development in the global trade has important effects on changing the patterns of the global trade. The world trade is recovering strongly after the financial crisis, but some of the developed economies are rising at a much slower pace. The trade patterns that we see emerging suggest some shifts in the world trade importance, which have been subject to an increasing scrutiny from the theoretical point of view. In this section, all the data, unless explicitly quoted, is gathered from the UNCTAD statistical database (UNCTAD, 2013). I present the basic evolving patterns, with the details left to Appendix F. The understanding of the evolving structures is helpful for the interpretation of the results presented in the remaining of the paper.

The first point to note is that the share of the developed countries in merchandise exports dropped from 65 % in 2000 to 50 % in 2012, while the share of the developing countries grew from 31 % to 44 % over the same period. The economies in transition also increased their share from 2,3 % to about 4,5 %. We observe similar patterns in merchandise imports. Growth was the fastest in the developing economies of Asia, while slower in the developing economies of Africa, South America and Oceania. Some developed economies still struggle to return to the sustained growth. The growth in most developed economies will be further weighted down by fiscal tightening, deleveraging in private sectors, as households and businesses pay off debt, and aging populations (Ernest & Young, 2011). Turning now to the import data, the share of the Asian developing countries sharply rose from 21 % in 2000 to about 32 % in 2012. However, the developed economies remain

largely a dominant export destination for the least developed countries, but the global demand is expected to continue shifting from the West to the East.

The domination of Japan, the USA, and countries of the EU was once unassailable, but recently it is uncertain. Even though the crisis has more clearly outlined the new patterns of the world trade, changes were happening in the last decades. In addition to Japan, the Four Asian Tigers (Hong Kong, Korea, Singapore, and Taiwan) built their pathway to the economic growth by entering the global production chains and by specializing in the production of labour-intensive goods. Through the accumulation of human and physical capital they moved into the production of more capital-intensive goods (Hanson, 2012). Led by China and India, which adopted similar strategies to those applied by the Asian Tigers, the share of the developing economies in global exports more than doubled between 1994 and 2008 (Hansen, 2012). In particular, those two countries almost tripled their share in both, merchandise exports and imports between 2000 and 2012. According to the data, China overtook Germany in 2010 and became the second largest trading country after the United States (UNCTAD, 2012). Nowadays China is not just an important trading hub for labour-intensive goods, but also for high-technology products. There is plenty of evidence that China's overall export sophistication level is exceptionally high (Schott, 2008). Furthermore, a recent estimation shows that China's export structure as a whole has begun increasingly to resemble that of the advanced economies, and the unit values of its exports have also risen over time (Wang & Wei, 2008) but Schott (2008) observed that Chinese exports have significantly lower unit values or prices than those of other countries, which hints that the quality of Chinese products is still perceived as lower. The share of exports of Eastern Asia grew from 12 % in the year 2000 to more than 18 % in the year 2012, while the shares of South Eastern Asia (7 %) and South Asia (3 %) remain relatively less important. East Asia growth is mainly attributable to a significant increase of China's share in the merchandise trade in the last decade. We also observe a moderate expansion of the South Korean's share, while the share of Japan, one of the earliest industrialised Asian nation, dropped for three percentage points and now represents 4,5 %. In South Asia, the growth is lead by India, and in South Eastern Asia by Vietnam and Bangladesh. If we revert to the case of the world's largest manufacturing power China, rising wages and labour costs there will open opportunities for other low-cost producers of the emerging markets in Asia and Africa. At this point it is important to stress a risk that China could lose its competitive edge more quickly if wages rise faster than productivity (Ernest & Young, 2011). However, wages are rising mostly in costal China; therefore other parts could keep their competitive edge and remain an attractive destination for labour-intensive industries.

The import volume growth in the developed countries of Europe has been negative since the end of 2011, and the import share has been steadily decreasing since 2008. Between 2000 and 2012, among the developed countries of Europe there were no remarkable changes in the shares of the merchandise trade in Germany, Switzerland and Austria.

However, the data shows that four important economies (the United Kingdom, Italy, France and Spain) considerably deteriorated their shares. The peripheral countries are suffering from austerity measures, and even the recovery of the core countries cannot nullify the overall problems of the EU. Despite the efforts of the EU, low intraregional import demand remains a cause for concern. East Asian countries can feel the influence of lower demand in the developed countries, and some of them witnessed a decline in their exports in 2012.

In the context of the non-European developed countries, the share of the USA exports shrank from 12 % to 8 %. Also Canada, another highly developed country of North America, is obviously affected by the economic crisis, since its share is declining in the last years. In the year 2000 its share was more than 4 %, but in 2012 it represented less than 2,5 %. The downturn is especially visible in their merchandise exports, and not very optimistic global economic prospects might further lower the demand for Canadian exports.

In the years 2000 to 2012, the accumulated shares of Central and South America remain between 5 % and 6 %. Nonetheless we can notice some shifts of shares among counties, for example, Brazil and Chile augmented their share at the expense of a lower share of Mexico. As it will become evident later, South America is not an important player in terms of EU processing trade, and therefore a more detailed research of this territory exceeds the frames of my thesis.

As they open and diversify, the economies of the Middle East are increasing their proportion of accumulated merchandise exports and imports. An increase between 2000 and 2012 is especially notable in Saudi Arabia and the United Arabian Emirates. Furthermore, the data indicates that Bahrain, Qatar, Kuwait, Oman and Yemen might provide important trade opportunities in the future. A final country worth mentioning in this section is Russia, which has undergone remarkable changes since the collapse of the Soviet Union in 1991. After an 18 years long negotiation process, the Russian Federation accessed the WTO on 22 August 2012. With Russia's membership the WTO now includes all the biggest economies.

Despite witnessing emerging trade patterns, the developed economies traditionally tend to be upstream in the supply chain, while the emerging economies tend to be downstream (Koopman et al., 2010). Even if China is increasing high-technology exports, it remains a downstream hub for the Asian supply chain. Mexico in the West has a similar role, while South Africa has this role in Africa. Albeit the importance of the developing countries is increasing, the developed countries continue to capture most of the value added generated by the global supply chains. A great proportion of the value added is created in more skill-intensive stages, while typically only limited value is created in the manufacturing stages.

3 ANALYSIS OF THE EU PROCESSING TRADE PATTERNS

3.1 Dataset and country groups

In the previous sections I summarized and explained the crucial theoretical background, necessary for the understanding of the following part of the thesis. Against this theoretical background, the rest of the paper is organized as follows. Firstly, I present the crucial import and export data of the EU (Section 3), and secondly, I analyse the important factors with the gravity model (Section 4). Prior to the empirical research about the factors affecting the trade in the EU, it is useful to place PT in the overall trade of the EU, identify the most important EU countries, sectors and partners. Before proceeding to the results, it is also important to stress that the EU underwent an important enlargement after the year 2000. In the year 2004, the fourth enlargement happened, with ten countries of Central, Eastern and South Europe becoming members of the EU (Slovenia, Czech Republic, Latvia, Lithuania, Estonia, Hungary, Malta, Poland, Slovakia and Cyprus), while Romania and Bulgaria joined the EU in 2007. Since then the EU includes 27 Member States. Nevertheless, one can access the data for all EU27 Member States trade from 1999 onwards, and thus the enlargement, at least directly, is not the cause for the movements of values of the EU trade regimes. Croatia, which entered the EU in June 2013 as the 28th Member State, is not part of estimation due to data unavailability.

In this section the data from the Eurostat Comext Database (Eurostat Comext, 2013) for ordinary trade, IPT and OPT is my primary source. The database contains EU27 trade since 1999 under Harmonized Commodity Description and Coding System (HS) by the extra EU trading partners. The Eurostat Comext database enables me to analyse ordinary trade and all types of PT separately. Unfortunately, the statistical recordings of PT are available only for the trade with the non-member countries.

To make my thesis more transparent, I have firstly formed seven different groups:

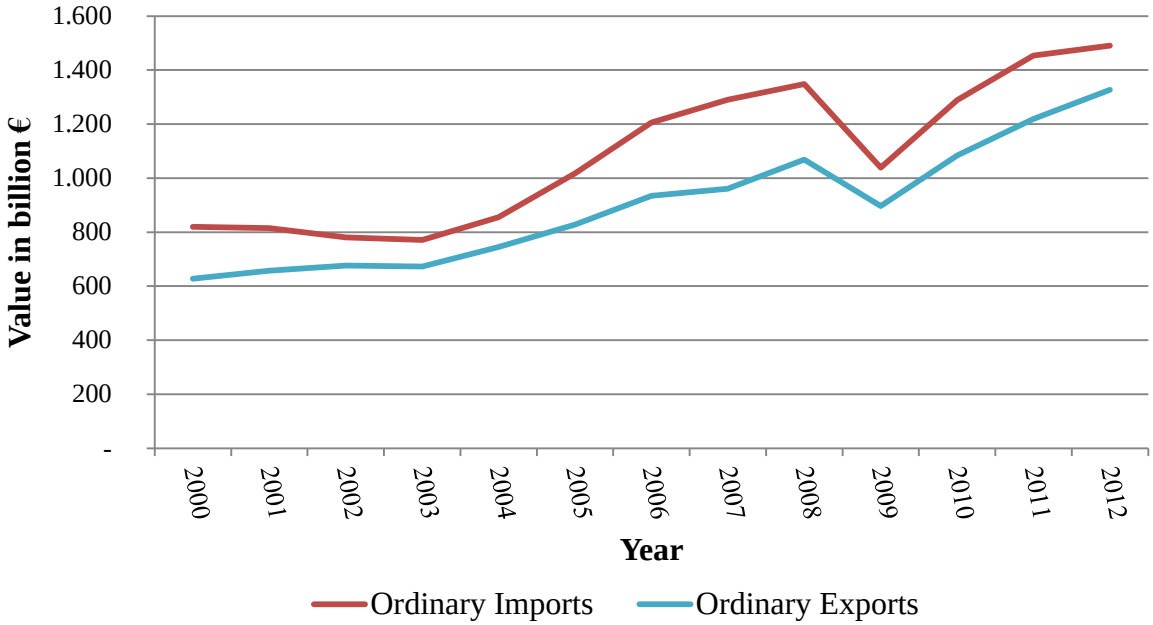
- NAFTA (the USA, Canada and Mexico)
- BRIC (Brazil, Russia, India and China)
- EFTA (Switzerland, Norway, Iceland and Liechtenstein)
- Developed Asia (Japan, South Korea, Singapore, Hong Kong and Taiwan)
- South America (Countries of South America excluding Brazil)
- Other Non EU European countries (Appendix C)
- Rest of the World (Appendix C)

3.2 PT versus Ordinary Trade since 2000

As a starting point, let's compare the flows of imports and exports of the EU under different trade regimes since the year 2000 onwards. Let me first briefly discuss the movement of ordinary exports and imports of the EU. As it can be seen from Figure 3,

trade value was growing steadily till the beginning of the financial crisis in 2008, when the value of trade decreased. After the plummet in the trade of goods we witnessed a recovery of the international trade, with an increasing value of imports and exports. Nowadays, the value of trade already exceeds the value before the crisis.

Figure 3. Ordinary imports and exports of the EU in billion € for 2000 – 2012



Source*: Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

Table 1 shows that in the year 2012 about 10 % (€169 billion) of all EU exports was conducted under IPX. The share of IPM was lower and it represented about 4 % (€73 billion). Due to the difference between exports and imports of IPT we can assume that through PT the EU adds a significant value. However, let's recall that this is overestimated since it does not include other intermediate inputs, needed for the assembly. In comparison to IPT, the value and the share of OPT are less important. Albeit OPT accounts for only 0,8 % (€13,1 billion) of imports and less than 0,8 % (€13,4 billion) of exports we can witness some interesting patterns, further described in the thesis. If we compare the EU with China (Alyson et al., 2009), the EU has a much lower share of PT in its international trade structure. Also, the share of EU processing trade with China is not as high as in ordinary trade, which can be explained by findings that PT in China heavily relies on its neighbouring countries (Alyson et al., 2009; Thorbecke, 2010; Fally, 2011).

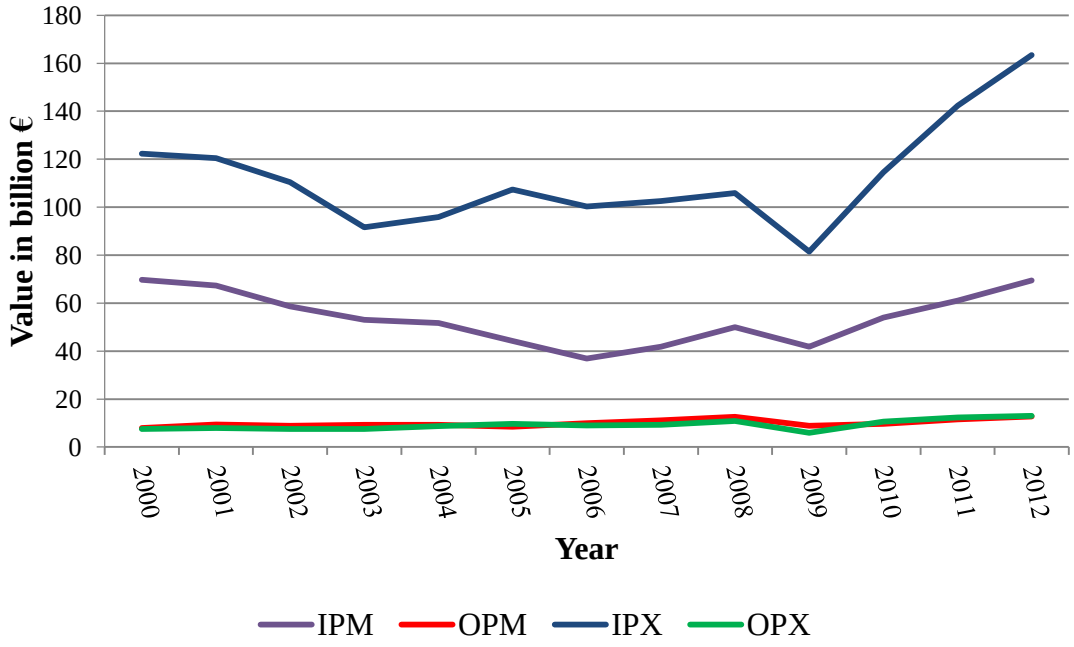
Table 1. Values of different trade regimes, 2012

TRADE FLOW	EXPORTS				IMPORTS			
Trade regime	Ordinary	IPX	OPX	Total	Ordinary	IPM	OPM	Total
Value in billion €	1459,79	168,82	13,34	1641,95	1657,52	72,89	13,13	1743,54
Percentage (%)	88,91	10,28	0,81	100,00	95,07	4,18	0,75	100,00

Source*: Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

Turning now to the trends in PT, we can see that the values of IPM and IPX were higher in the year 2000 than in the year 2008. Consistent with the overall import and export flows, the values were lower at the beginning of the financial crisis. Similar to ordinary trade the decrease is visible in 2009. As someone would intuitively expect, the value of IPT has been growing since 2010. Several more facts emerge from a closer look at Figure 4. Firstly, it is evident that IPX has grown the most considerably in the last three years. The gap between IPX and IPM is becoming significantly higher, thus indicating a high value added through processing. On the other hand, the values of OPX and OPM have been fairly constant over the time, with a modest decline during the crisis. Apparently, the value of IPT clearly exceeds the value of OPT in the entire period.

Figure 4. PT of the EU in billion € for 2000 - 2012



Source: *Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8*, 2013.

3.3 Main EU trading partners

In the previous subsection, I have compared PT with ordinary trade in the EU. Let's now look at the main trading partners of the EU under PT. To facilitate the comparison between the ordinary trade regime and PT, let me first stress the main partners of the EU under the ordinary trade regime (Tables 2 and 3). The most important are the BRIC countries (33 % of imports and 20 % of exports), followed by the NAFTA (13 % of imports and 20 % of exports) the EFTA (12 % of imports and exports) and Developed Asia (9 % of imports and 11 % of exports). When focusing on individual countries, the EU imports the most from China (17 %) while exports the most to the USA (16 %). As you will see in further text, there are some important differences in the shares between ordinary and PT. If we compare normal and PT imports we can notice a higher share of the USA in PT, matched with lower Chinese and Russian shares (Table 2).

Table 2. Main trading partners for ordinary trade and PT of the EU, 2012

	ORDINARY TRADE		**INWARD PROCESSING**		**OUTWARD PROCESSING**	
	EXP	IMP	IPX	IPM	OPX	OPM
PARTNER	**Shares in %**					
USA	16,09	10,45	28,90	36,37	53,18	41,80
China	8,14	17,20	14,54	5,92	2,87	4,20
Russia	7,63	11,93	6,88	6,95	0,75	1,16
Switzerland	8,80	6,01	2,64	6,06	2,71	2,15
Norway	3,13	5,53	2,23	1,94	0,70	0,49
Turkey	5,04	2,85	0,89	0,66	0,31	0,20
Japan	3,21	3,47	4,87	6,90	2,57	9,47
Brazil	2,47	2,13	1,99	2,41	0,03	0,07
India	2,49	2,17	1,18	1,56	0,78	2,10
South Korea	2,26	2,12	2,60	2,77	2,82	5,27
Saudi Arabia	1,78	2,04	2,38	1,02	0,08	0,01
Canada	1,78	1,68	2,95	2,99	1,18	1,59
U.A.Emirates	2,31	0,45	1,97	1,20	0,41	0,27
Vietnam	0,34	1,10	0,15	0,10	0,86	2,02
Serbia	0,58	0,25	0,07	0,04	2,67	2,92
ROW	33,95	30,60	25,75	23,09	28,07	26,28
Grand Total	100,00	100,00	100,00	100,00	100,00	100,00

Source: *Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

Turning back to the regional groups (Figures 5 and 6) by far the most important group for IPT is the NAFTA (IPM 40 %; IPX 33 %), followed by the BRIC (IPM 17 %; IPX 25 %), Developed Asia (IPM 12 %; IPX 12 %) and the EFTA (IPM 8 %; IPX 5 %). The shares of non-EU European countries and South America are in both cases very low (1 %). I have

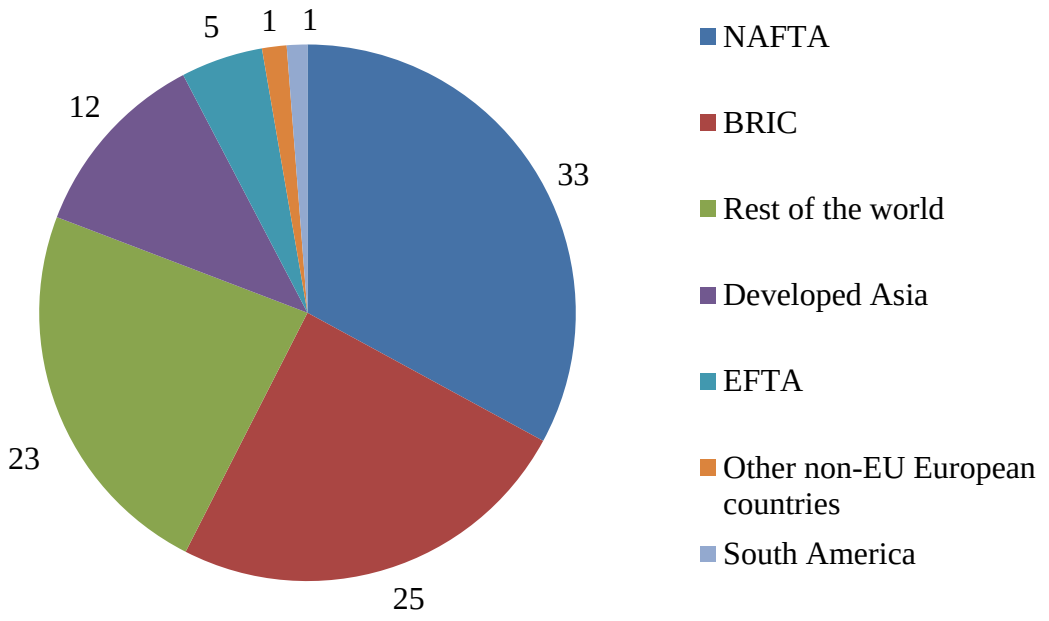
intuitively expected a low share for South America, but however, I have been expecting a slightly higher share for other non-EU European countries.

Table 3. Structure of ordinary trade and PT of the EU by regional groups/blocks, 2012

	ORDINARY TRADE		INWARD PROCESSING		OUTWARD PROCESSING	
	EXP	IMP	IPX	IPM	OPX	OPM
GROUP	**Shares in %**					
BRIC	20,73	33,43	24,59	16,85	4,43	7,53
Developed Asia	10,42	8,75	11,53	12,27	9,59	17,77
EFTA	12,13	11,77	4,95	8,04	3,42	2,66
South America	2,41	2,64	0,95	0,95	2,78	1,02
NAFTA	19,65	13,27	32,94	40,11	54,39	43,43
Other non EU European c.	4,01	1,93	1,44	0,95	14,99	17,15
Rest of the world	30,65	28,21	23,30	20,83	10,39	10,43
Grand Total	100,00	100,00	100,00	100,00	100,00	100,00

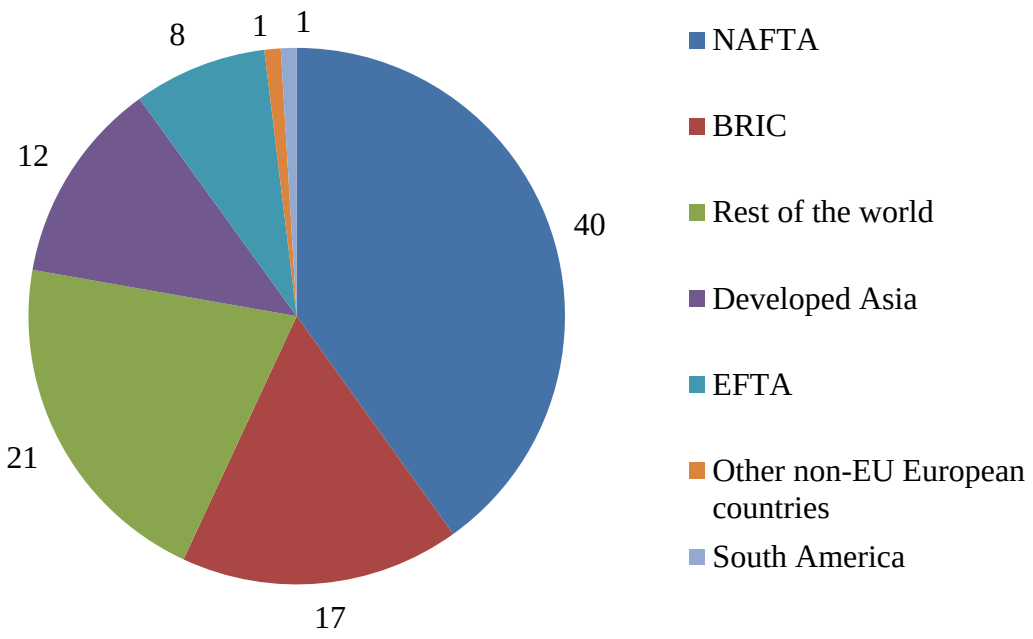
Source: *Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

Figure 5. Structure of IPX of the EU by regional groups in %, 2012



Source*: Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

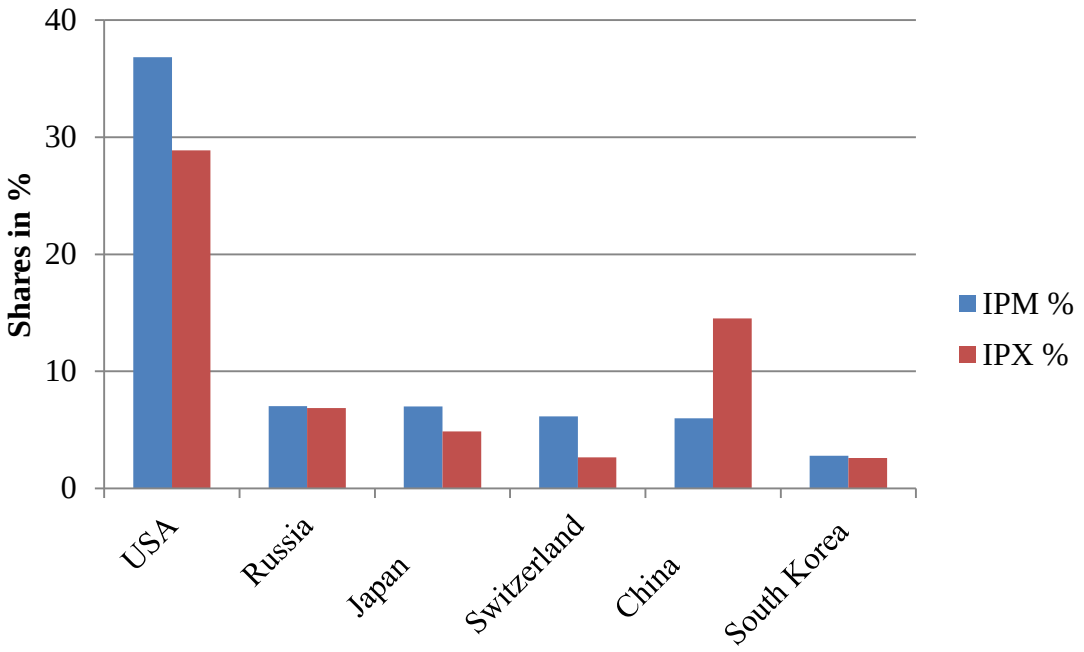
Figure 6. Structure of IPM of the EU by regional groups in %, 2012



Source*: Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

Groups analyses provides a basic picture of the important flows in PT. However, for further analysis it is also reasonable to separately outline the most important EU partners. In Figure 7 the column chart indicates the percentage shares in IPT. Regarding IPM, by far the most important partner of the EU is the USA with roughly 36 % (€26 billion), followed by Russia and Japan 7 % (€5 billion), Switzerland and China 6 % (€4,5 billion). In the case of China, the IPM share is considerably lower than the share in ordinary imports. One might argue that China heavily relies on its neighbouring countries, and therefore the role of the EU in China's PT regime is limited. The individual share of other countries remains under 3 % and to achieve a greater transparency they are excluded from the figures. The ratio is similar in IPX, with a dominant share of the USA 29 % (€49 billion), followed by China 15 % (€25 billion), Russia 7 % (€11 billion) and Japan 5 % (€8 billion). An interesting case to look at is again China. In IPX, its share is even higher compared to the ordinary export share. The discrepancy hints that China perhaps uses the EU countries for assembling sophisticated products with a high value added, which is in the line with the upstream position of the EU countries in the global supply chains. In most of the smaller or poorer developing countries the role of IPT with the EU is marginal at the best. This is in line with the findings by Cernat and Pajot (2012) which indicate that there were no significant shifts from the year 2011.

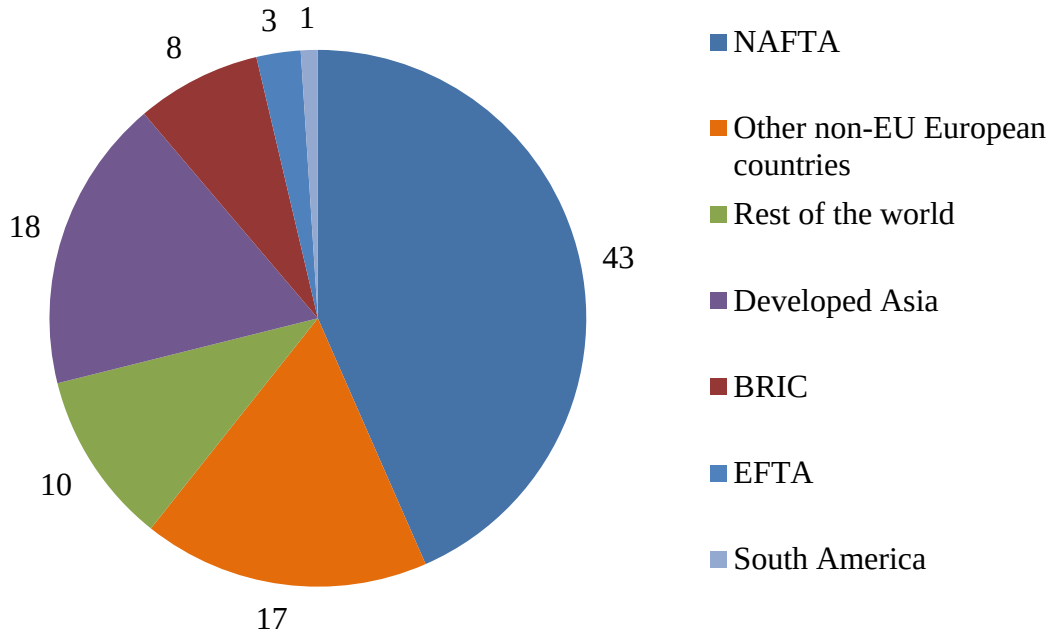
Figure 7. Percentage shares of IPT of countries with the EU, 2012



Source: *Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

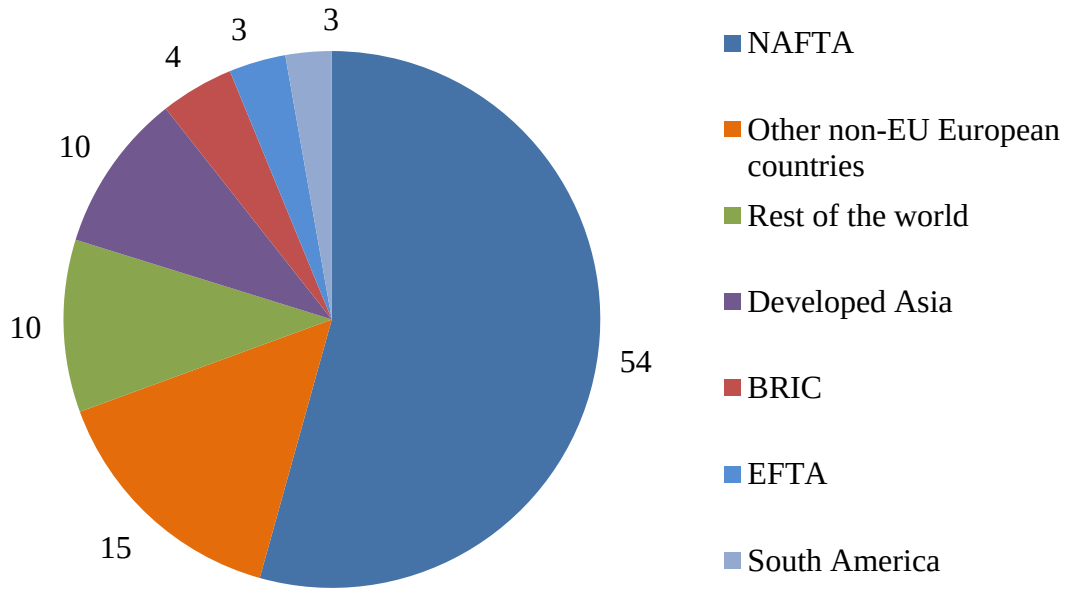
As it can be seen from Figures 8 and 9, the picture is slightly different when we analyse OPT of the EU for the year 2012. Consistent with IPT, the most important is the NAFTA (OPM 43 %, OPX 54 %). Importantly, non-EU European countries are having a more prominent role with OPM 17 % and OPX 15 %. I interpret this as an indicator that the EU countries try to take advantage of the lower production costs of the countries in their geographical and cultural proximity, which is in the line with the conclusions by Rugman et al. (2009). The next by relevance are countries of Developed Asia with OPM 18 % and OPX 10 %. Surprisingly, a relative importance of the BRIC countries (OPM 7 %, OPX 4 %) is notably smaller compared to IPT. In addition, the EFTA countries share deteriorated to about 3 % in both OPM and OPX.

Figure 8. Structure of OPM of the EU by regional groups in %, 2012



Source*: Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

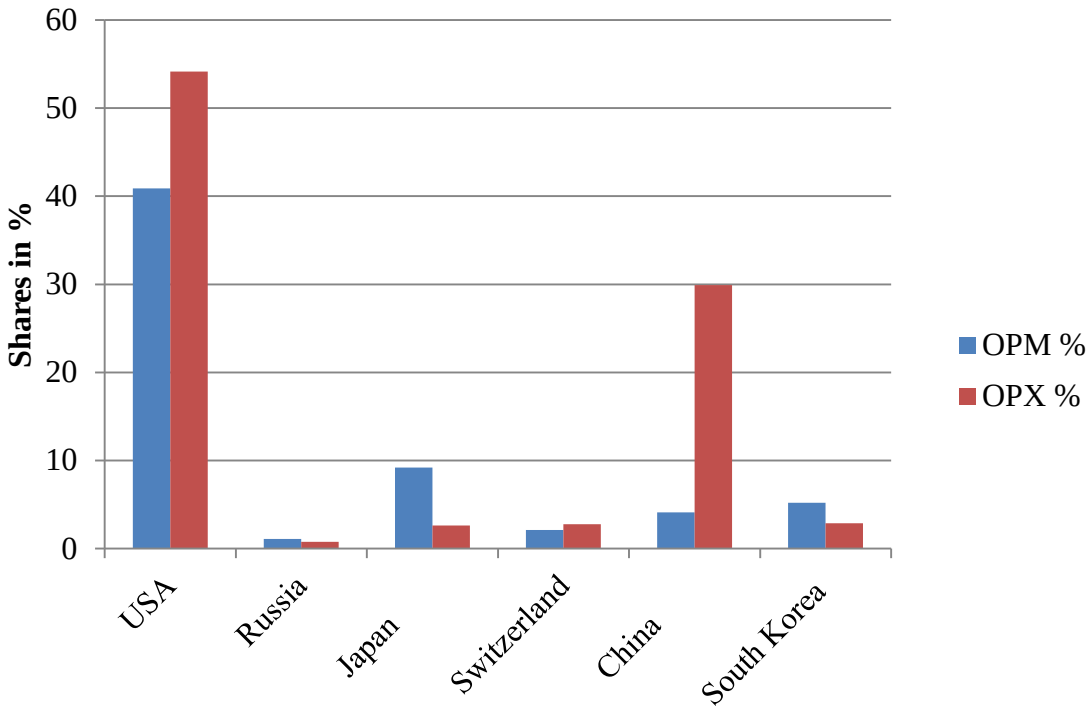
Figure 9. Structure of OPX of the EU by regional groups in %, 2012



Source: *Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

Figure 10 depicts that in terms of countries, the dominance of the USA (OPM 42 %, OPX 53 %) is even more apparent. The USA is followed by two developed Asian countries, Japan (OPM 9 % and OPX 2%) and South Korea (OPM 5 % and OPX 3 %). A noticeable difference between OPM and OPX indicates that these two Asian countries are adding a significant value, much in the line with their position at the top of the global value chains. Surprisingly, the shares of China (OPM 4 %; OPX 3 %) and especially Russia (OPM and OPX about 1 %) are much smaller compared to IPT or ordinary trade. Intuitively, one would expect a much higher share of those two countries in OPT due to relatively low costs of work or many barriers to trade, which would be bypassed with the PT regime. The reason might lie in the nature of the Asian supply chain, which is very regionally concentrated. The EU, certainly, is not a part of "Factory Asia", and the geographical distance might discourage European enterprises to send goods for further processing to China. Interestingly, we also witness a difference of the Serbian shares; less than 0,05 % in IPT and about 3 % in OPT (Table 2). We notice a similar pattern in another low costs country, Bosnia and Herzegovina, but to a lesser extent.

Figure 10. Percentage shares of OPT of countries with the EU, 2012



Source: *Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

Despite recent theoretical assumptions about the rising economies of the Middle East and Asia, which are expected to become more important players in the international trade, their share in PT is still insignificant. If we revert to Table 2, the only noteworthy proportions are those of the U.A. Emirates and Saudi Arabia with IPX and OPX shares of about 3 %. The shares of Turkey and India in PT are much lower than their shares in ordinary exports

and imports. Beside OPT to Vietnam (2 %) the shares of emerging economies of Asia, e.g. Bangladesh, Philippines and Malaysia are generally less than 1 %. This data is another indicator that PT in the EU is limited to only a few important trade partners. Apart from the BRIC countries, the developing countries are not yet involved in PT with the EU to any significant degree. If one excludes a few French ties to the francophone Africa, the African countries are largely cut off from the EU processing trade network. The PT of the EU is seen to regionally concentrate around two global hubs, namely the NAFTA and Asia, especially China, South Korea and Japan. Respectively, Latin America and Africa appear not to be strongly involved in the PT of the EU.

3.4 The most important EU countries in processing trade

I have observed now the most important partners of the EU in PT. However, it is also important to know which countries of the EU contribute most of the PT. The decomposition of the individual EU countries imports and exports is presented in details (Tables 4, 5, 6) and shortly described in further text.

The next section highlights the fact that the participation of the EU member states in PT varies considerably. On one hand, Germany is responsible for about 32 % of IPT, the United Kingdom for about 22 %, France for 8 % and Italy for 7 %. On the other hand, some countries have only a minor role. To illustrate the marginal role of the peripheral countries, let's note that the accumulated share of the 15 countries with the lowest share of IPT together represents only about 6 % of all IPT in the EU. At this point it would be interesting to mention that Slovenia is responsible for only 0,03 % of IPT, while for example in ordinary trade, it has a share of about 0,5 %. This is one of the numerous examples indicating that the shares of PT are not proportional to those of ordinary trade. The picture is very similar regarding OPT, shown in the outermost columns of Tables 4 and 5. In accordance with that, the share of the 15 Member States with the lowest proportion is also only about 6 %, while the share of Germany is 41 %, of France 11 %, of Belgium 8 %, of Italy 7 % and the share of the United Kingdom is 5 %, respectively. Conspicuously, there is a big difference in the case of the United Kingdom between IPT (22 %) and OPT (5 %). The UK is particularly strong in engineering, machinery and vehicles products. The extensive IPT share suggests that non-EU member states use the UK as an assembly platform for aforementioned sophisticated products, where the cost-saving motive is not important, while the United Kingdom just rarely uses OPT to send goods abroad for further processing. A great proportion of inward FDI comes from the USA, which is the largest partner of the UK in all trade regimes, and a great proportion of the goods to be processed in the UK is sent from the USA. Germany is seen as dominating the region's PT, much in line with its reputation as one of the world's top economic and trading powers. The data indicates that countries of Western Europe have a dominant role in both, IPT and OPT, while the role of the countries of Central, Eastern and South Europe is usually smaller.

The dominant share of the Western European countries in PT is not surprising and it has already been emphasized by Görg (2000) and Egger and Egger (2005). Since the dominance of Western Europe is most likely to continue this should be a cause for concern for the other EU countries. The peripheral countries of Europe are suffering from a contraction of economy, austerity measures and negative economic trends. At this point, it would be interesting to see if the shares under the PT regime are correlated with the shares under normal trade. In comparison with the ordinary trade regime, the disparities among the countries are higher. To illustrate, Germany as a dominant player represents about 22 % of the external EU ordinary trade, while the share of the 15 Member States with the lowest proportion represents about 10 %, which is significantly more than under the PT regime (Table 4).

Table 4. Member states' shares (in %) in ordinary and PT in the EU, 2012

DECLARANT	GRAND TOTAL	ORDINARY TRADE			INWARD PROCESS.			OUTWARD PROCESS.		
		TOTAL	EXPORTS	IMPORTS	IPT	IPX	IPM	OPT	OPX	OPI
Germany	22,20	21,17	25,83	17,03	32,54	39,55	16,03	41,37	38,11	44,67
U. Kingdom	13,44	12,76	10,66	14,62	22,54	19,06	30,74	5,59	4,70	6,49
Netherlands	11,17	11,64	7,48	15,34	6,12	6,74	4,67	5,52	7,60	3,42
France	10,44	10,61	11,76	9,60	8,27	5,39	15,04	11,00	15,17	6,79
Italy	9,95	10,25	11,12	9,48	6,68	4,71	11,33	6,72	6,03	7,41
Belgium	6,40	6,42	6,38	6,45	5,94	6,83	3,85	7,83	4,64	11,05
Spain	6,21	6,62	5,53	7,58	1,44	0,63	3,34	4,39	3,94	4,84
Poland	2,45	2,44	2,06	2,79	2,60	2,08	3,83	1,71	3,40	0,00
Sweden	2,33	2,29	2,71	1,92	2,89	3,63	1,17	1,24	0,74	1,76
Austria	1,86	1,87	2,18	1,59	1,53	1,73	1,06	3,85	6,65	1,02
Cz. Republic	1,55	1,62	1,46	1,76	0,79	0,79	0,80	1,08	1,06	1,09
Ireland	1,51	1,49	2,11	0,95	1,82	2,47	0,29	0,02	0,02	0,02
Finland	1,42	1,51	1,75	1,30	0,43	0,39	0,50	0,38	0,24	0,52
Greece	1,39	1,48	1,19	1,73	0,46	0,33	0,78	0,47	0,44	0,50
Hungary	1,28	1,28	1,20	1,35	1,14	1,14	1,15	2,75	2,71	2,78
Denmark	1,25	1,30	1,67	0,96	0,78	0,71	0,95	0,77	0,53	1,01
Portugal	0,92	0,98	0,95	1,01	0,25	0,19	0,39	0,10	0,12	0,08
Romania	0,87	0,91	0,92	0,90	0,25	0,21	0,35	2,12	2,11	2,14
Slovakia	0,81	0,71	0,44	0,95	2,00	2,01	1,96	0,72	0,35	1,08
Lithuania	0,63	0,67	0,63	0,70	0,17	0,15	0,22	0,16	0,18	0,14
Bulgaria	0,59	0,63	0,56	0,68	0,25	0,21	0,36	0,07	0,08	0,06
Slovenia	0,51	0,53	0,56	0,51	0,03	0,03	0,02	1,78	0,92	2,65
Luxembourg	0,23	0,25	0,19	0,31	0,01	0,00	0,03	0,05	0,01	0,10
Latvia	0,22	0,23	0,28	0,18	0,09	0,08	0,13	0,21	0,19	0,23
Estonia	0,21	0,18	0,25	0,12	0,53	0,39	0,88	0,08	0,03	0,14
Malta	0,10	0,08	0,09	0,07	0,41	0,55	0,09	0,02	0,01	0,02
Cyprus	0,08	0,08	0,05	0,11	0,02	0,02	0,03	0,00	0,00	0,00
Grand Total	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**

Source: *Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

Table 5. Shares of PT in individual EU countries, 2012

	IMPORTS			EXPORTS		
	Ordinary	IPM	OPM	Ordinary	IPX	OPX
Austria	96,47	3,00	0,53	88,67	8,69	2,64
Belgium	95,92	2,67	1,41	87,80	11,58	0,62
Bulgaria	97,56	2,37	0,07	95,49	4,37	0,14
Cyprus	98,89	1,09	0,01	95,70	4,29	0,01
Czech Republic	97,43	2,06	0,52	93,15	6,19	0,66
Denmark	94,78	4,36	0,85	94,72	4,99	0,29
Estonia	74,64	24,61	0,74	83,62	16,28	0,09
Finland	97,89	1,77	0,34	97,18	2,68	0,13
Germany	93,77	4,11	2,11	83,12	15,68	1,20
France	92,67	6,77	0,56	93,54	5,28	1,18
Greece	97,71	2,05	0,24	96,38	3,27	0,35
Hungary	94,57	3,76	1,67	87,76	10,30	1,94
Ireland	98,57	1,41	0,01	87,37	12,62	0,01
Italy	94,13	5,24	0,63	94,56	4,93	0,50
Latvia	95,77	3,19	1,04	96,17	3,19	0,64
Lithuania	98,40	1,43	0,17	96,88	2,85	0,27
Luxembourg	99,25	0,48	0,28	99,87	0,09	0,04
Malta	93,65	6,14	0,21	55,94	43,98	0,08
Netherlands	98,42	1,39	0,19	89,22	9,90	0,88
Poland	93,99	6,01	0,00	87,68	10,91	1,42
Portugal	98,16	1,77	0,07	97,48	2,40	0,12
Romania	96,27	1,77	1,97	95,23	2,63	2,14
Slovakia	90,42	8,70	0,88	63,87	35,63	0,50
Slovenia	95,57	0,19	4,24	97,84	0,58	1,59
Spain	97,47	2,00	0,53	97,95	1,37	0,68
Sweden	96,50	2,74	0,76	85,68	14,10	0,23
Utd. Kingdom	90,77	8,89	0,35	81,66	17,99	0,35
Average	**95,17**	**4,07**	**0,76**	**89,80**	**9,51**	**0,69**

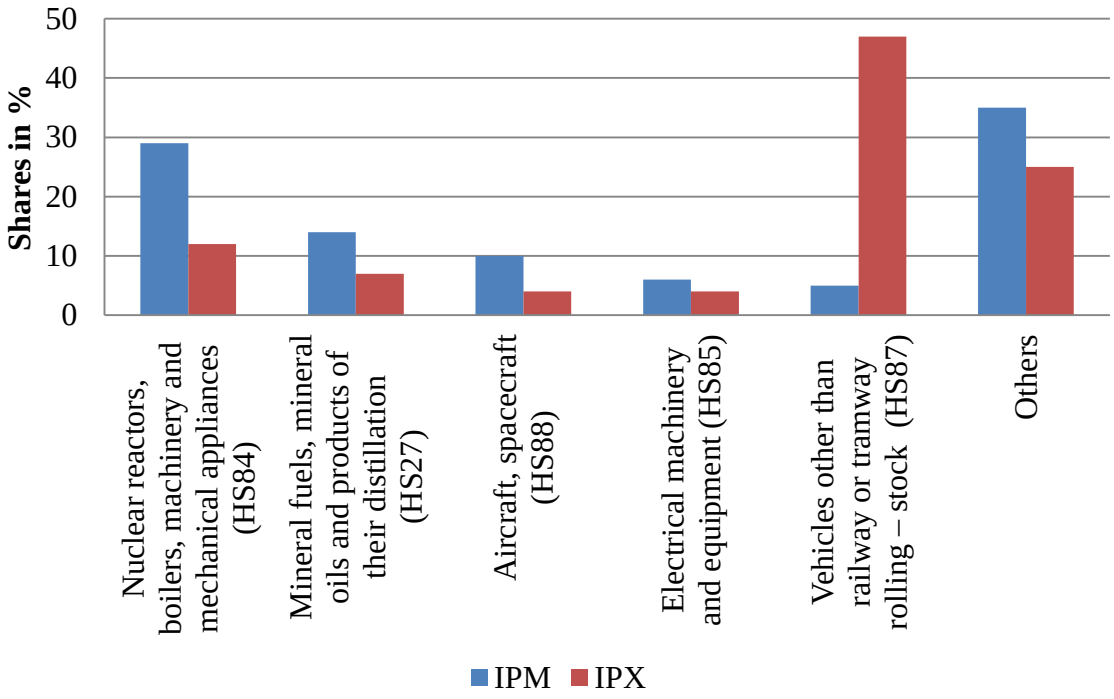
Source: *Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

3.4.1 Key industries in inward processing trade

Now we are familiar with the ratio of the relative importance of PT within the EU and with the major EU's external trade partners. Hereby, it is useful to outline the sectors with the predominant share in PT. As seen from the data, several industries are more heavily engaged in PT than the others. The identical five sectors are the most important in both, inward imports and exports with their accumulated share of about three quarters of all the IPT (Figure 11). However, the composition of exports among sectors differs a lot from the composition of imports. In IPM, the most important are HS84 (nuclear reactors, boilers, machinery and mechanical appliances) with about 30 %, while looking at the share of exports, by far the most important are the exports of motor vehicles with the dominant

share of 47 %. If we compare an almost half share in IPX with only 5 % share in IPM, I interpret these findings as a high value added in vehicles in the EU. In particular, this data hints that sophisticated products are prevailing in IPT. Overall, the data confirms the findings by Thorbecke (2010) that PT largely involves importing sophisticated parts and components with the purpose to use them for the production of skill-intensive products. I confirm the findings by Egger and Egger (2005) that IPT in the EU is likely to be relatively capital-intensive. The data also confirms the assumptions that the developed countries of the EU are specialized in more capital-intensive and high quality stages of production, much in the line with the observations by Costinot et al. (2011) and Koopman et al. (2010).

Figure 11. Percentage shares of IPT exports and imports by sectors, 2012



Source: *Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8*, 2013.

Due to their dominant share in value, vehicles (HS87) deserve a more detailed study. In this industry, the international fragmentation of production is high. As documented by Ferrarini (2011) regional concentrations of the automotive industry are reflected in Europe, Asia and the NAFTA. The European hub of automotive industry is centred in Germany, France, the United Kingdom and some Eastern European countries. I am well aware that some components are often associated with the automotive industry, and therefore automotive parts might be located in diverse HS categories (40, 68, 70, 74, 84-87 etc). To make my research more transparent, I only use the goods and the intermediates subsumed under category HS87.

Counting the total value, including the exports and the imports of all three statistical regimes vehicles accounted for about €220 billion. A further composition shows that about €165 billion is the consequence of exports. Out of €165 billion worth vehicles exports, 46 % or about €75 billion were produced under IPX. Reciprocally, with the relative unimportance of OPT, the share of OPX is only about 1 %. Within the EU, Germany has a high participation in all the statistical regimes, reflecting its large car assembly activities. We also observe the above average shares in HS87 PT of the United Kingdom, France, Sweden, Czech Republic and Slovakia, while the share of Spain is much below 1 %. According to the data, Germany is clearly the driving force at the centre of the EU auto industry.

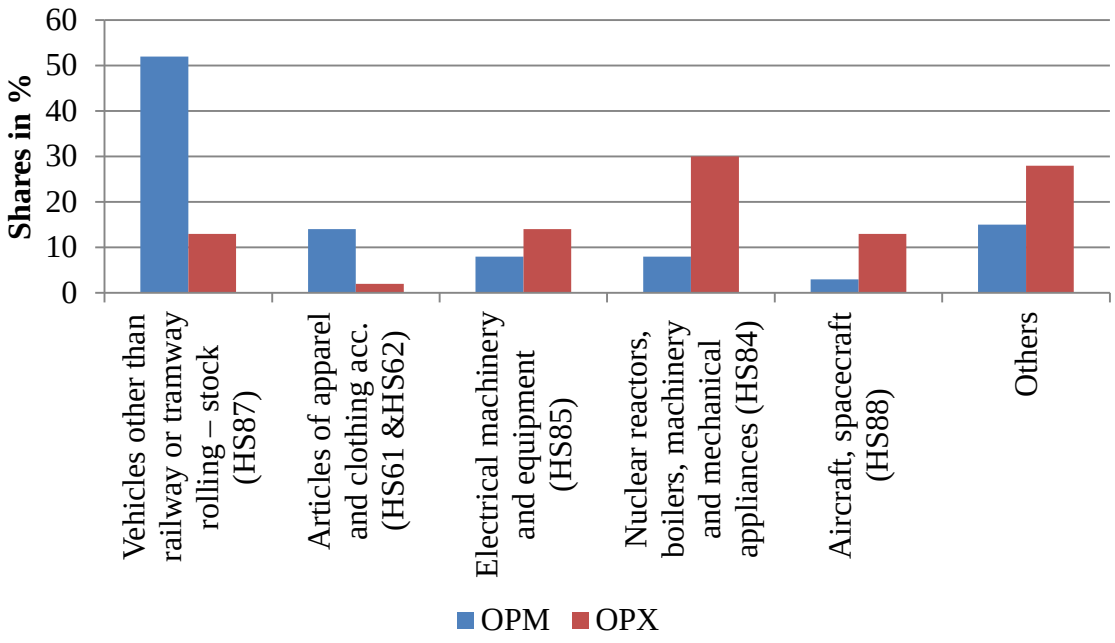
As calculated before, the imports of vehicles had a value of about €55 billion in the year 2012. The composition here is completely different and PT seems to have a much less important role. Only 7 % of imports was realized under IPM, while 13 % was produced under OPM. The vast majority of import value is achieved under ordinary trade.

Let's recall that the IPX of vehicles represents the highest value of PT. Therefore, it is useful to determine the location of these exports. The final destinations of more than one third of IPX are the countries of the NAFTA (36 %) and the BRIC countries (34 %). About 13 % of IPX goes to the developed countries of Asia. Since the data indicates that IPX are mostly intended to be sold in the relatively distant countries, obviously geographical and cultural proximity does not play an important role in this sector. To illustrate, the accumulated proportion of the EFTA and other non-EU European countries is less than 3 %. The location of the production is not close to the final markets. At this point it is also interesting to note that about 60 % of IPM comes from the countries of Developed Asia, while only 22 % from the NAFTA.

3.4.2 Key industries in outward processing trade

Figure 12 shows that sophisticated parts and products are also the most important in OPT. However, there are some differences in comparison to IPT. Not the same sectors are the most important in exports and imports. For instance, in OPM we observe an increased proportion of the textile industries (apparel, clothing, footwear, gaiters, articles of leather, etc). This data may suffice that EU countries are trying to take the advantage of the lower production costs in the less skill-intensive industries. These findings can be linked to findings by Lemoine (1998) who documented that the majority of the EU clothing imports results from PT, engineered by the West European firms in the CEEC, and by the Asian firms in China. However, a further analysis of the data for the year 2012 shows that only about 5 % of imports of the €80 billion worth textile sectors (HS61-HS64) is nowadays the result of PT.

Figure 12. OPT exports and imports by sectors, 2012



Source: *Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8*, 2013.

The five sectors, mentioned in Figure 12, represent about 90 % of all OPM and more than three quarters of OPX. This data strongly implies that just few sectors are largely involved in OPT. Representing more than half of all OPM, the share of vehicles is dominant, and this hints at the fact that low cost countries are used as the final assembly platforms also in the high-skilled industries. In turn, vehicles other than railways and tramways (HS87) are responsible for more than half of all OPM, while just for about 13 % in OPX. This implies huge assembly actives in the automotive sector of the EU countries under OPT.

The overview of the data seen in the last section confirms to some degree the findings by Egger and Egger (2001) that the EU's net exporting industries are usually more skill intensive than the EU's net importing industries. For example, clothing, footwear and other labour-intensive industries have a convincingly higher share in OPM than in OPX. The next interesting fact is the disparity between the shares of OPX and OPM. The value of OPM, this is the value after processing in a third country, is not always higher than the value of OPX. In some cases (HS84, HS88) it is even considerably lower. To explain this statistical paradox, we have to outline four possible scenarios. Firstly, if the goods shipped to a third country under OPT are not intended to return back to the origin country, they will be recorded as ordinary imports. Secondly, it is likely that they are recorded as ordinary imports if the EU does not have a tariff or another trade barrier on a particular good. Thirdly, some goods might remain in a foreign country for a longer period. Therefore, they might be recorded as OPX in a given year, but recorded as OPM in the next year. Lastly, products can be changed through processing to a large extent. In this case they can be imported back under another category classification. If we compare these findings with the

more outdated researches (Lemoine, 1998; Egger & Egger, 2001) we notice a shift from the more labour-intensive industries to the more skill-intensive industries. Despite the fact that some labour-intensive industries still have a fairly high proportion in OPM, their relative importance is decreasing. Görg (2000) already emphasized that new technological developments have led to an increase of PT in the electronic sector, which, combined with falling communications and transport costs, have extended the tradability of the electronics products. As noted in the OECD report (2012) the industries with the highest index of fragmentation are motor vehicles, electrical machinery and equipment, television and communications equipment, and other transport equipment among the others, which also partly explains the industry composition of the PT.

4 EMPIRICAL ANALYSIS OF THE EU PROCESSING TRADE DETERMINATS

4.1 Theoretical framework of gravity equation

Thus far, I have outlined the important data regarding different EU trade regimes, by paying particular attention to PT. Some interesting features that emerge from the analysis of the EU processing trade patterns call for a further analysis of the factors driving the identified changes in the trade patterns. For this purpose, I use the gravity model as a basis for the econometric analysis of the determinants of both normal and PT flows of the EU. The gravity model has become a common model to study bilateral trade flows and it was for the first time used in economics already back in 1960s. Since then, it has been a common model used to estimate the patterns of international trade or to make predictions on bilateral trade flows. Hence, a number of empirical studies have analysed the international trade on the basis of the gravity equation. The gravity equation has been modified by many authors with numerous suggestions for the improvements of the estimating models. The goal of the researchers is to develop a model that would provide the most accurate results. In its really basic form, the gravity model of bilateral trade flows assumes that only the distance between the countries and the country's GDP as a measure of its economic size are the important determinants of international trade.

As remarked by Head (2003) this much simplified equation, which undoubtedly comes with many pitfalls, can be written as:

$$F_{ij}=G\frac{M_i^{\alpha}M_j^{\beta}}{D_{ij}^{\theta}} \quad (1)$$

Where F_{ij} stands for trade flows (value of trade) from country i to country, M_i^{α} and M_j^{β} denote the country's economic size (usually GDP) and D_{ij}^{θ} denotes the distance between locations i and j. Lastly, G stands for the gravitational constant. As remarked by Head (2003) let's recall that according to Newton's law $\alpha = 1$, $\beta = 1$ and $\theta = 2$. Despite the

pitfalls of the model it is usually quite reliable. The equation logically expects a more distant pair of countries to trade less and a pair of larger countries to trade more, ceteris paribus. According to the objective of the research, the general gravity equation proposed above has been augmented with a number of additional explanatory variables.

Rather than being just an econometric tool, nowadays a gravity model can derive from different international trade theories. Using a number of standard repressors, e.g. distance among countries, adjacency, common language, common borders and currency, colonial links, island/landlocked, infrastructure, exchange rates, institutions, etc. gravity models relate bilateral trade flows to many variables/factors. For example, if two countries are located in a geographical proximity, and have a similar business environment or a common language, this most probably decreases information and transportation costs. Hence, companies are likely to search for suppliers, partners or final customers in countries with similarities in the cultural, economic and political dimensions. Bearing this and various other similar predictions in mind, researchers are seeking to establish an optimal gravity equation. As further proposed by Shepherd (2012, p. 9) the estimation is preferably based on a logarithmically transformed model. In respect to this author, the model in its basic log-linerized form can be written as:

$$lnX_{ij}=c+ b_1 lnGDP_i+ b_2 lnGDP_j+ b_3 lnt_{ij}+ e_{ij} \quad (2)$$

Where X_{ij} denotes country *i's* exports to country *j* in a given year, *c* is the given constant, GDP_i and GDP_j stand for each country's GDP, e_{ij} stands for the random error term and t_{ij} denotes the trade costs between two countries, where the distance is used as an approximation of the costs. The error term is a result of the misstated actual relationship between the independent and the dependent variables in the model.

The WTO & UNCTAD guide by Baccheta et al. (2012, p. 105) suggests to capture the country's specific effects, to take natural logarithms of the variables and to obtain a log linear equation estimated by ordinary least square regression (OLS). With the use of OLS, the sum of squared errors *e* can be minimized (Shepherd, 2012, p. 27). Furthermore, by using the linear estimation and logarithms, the interpretation of the coefficients is straightforward. The coefficient obtained simply expresses the elasticity between the two variables. However, the OLS model also assumes that the errors are uncorrelated with the dependent variables. The equations mentioned so far are appropriate for analysing the cross-sectional data, observing many subjects at one point in time. When the use of the panel data is possible, and we control for the country's specific effects, the gravity equation can take the form (Baccheta et al. 2012, p. 108):

$$lnx_{ijt}=a_0+ a_1 l_{it}+a_2 l_{jt}+a_3 lnt_{ijt}+a_4 l_t+e_{ijt} \quad (3)$$

Where a_0 is a constant, l_t denotes a dummy variable for a specific year, l_{it} stands for the country *i's* time-varying individual effects, l_{jt} stands for the country *j's* time-varying

individual effects, and t_{ijt} are the trade costs in a specific year. Which variables to include in the trade costs has been a subject of discussion among the economists for decades. As noted by Anderson and van Wincoop (2004) trade costs are not related only to distance but include all costs related to getting a good from the producer to the final user. This broader definition includes transportation costs, policy barriers, contract enforcement costs, regulatory and legal costs, information costs and local distribution costs. One commonly used example of how to treat the trade costs in a gravity model is shown in equation 4. This commonly used approach can be specified as follows (Baccheta et al. 2012, p. 107):

$$t_{ij} = d_{ij}^{\delta 1} * exp(\delta_2 cont_{ij} + \delta_3 lang_{ij} + \delta_4 ccol_{ij} + \delta_5 col_{ij} + \delta_6 landlock_{ij} + \delta_7 RTA_{ij}) \qquad (4)$$

Where d_{ij} is the geographical distance between country *i* and country *j*, and the variables in the parentheses are denoting the important determinants of the international flows in the following order: whether countries share a common border ($cont_{ij}$) have a common official language ($lang_{ij}$) have been colonized by a common country ($ccol_{ij}$) or if a country was a former colony of the other examined country (col_{ij}), whether countries are landlocked or islands ($landlock_{ij}$) or if they have a regional trade agreement currently in force (RTA_{ij}).

In the next paragraph, some potential shortcomings of the initial gravity equation are summarized. Baldwin and Taglion (2006) identified the golden, the silver and the bronze medal errors of the gravity equation. Under the golden medal error we understand biased results because of the omitted variables, such as remoteness (Head, 2003) or multilateral resistance terms (Anderson & van Wincoop, 2003). The silver medal mistake suggests that trade flows should be treated separately each way, and not with the average of the two-way flows, which is the common practice of most researches. Finally, the bronze medal error refers to the inappropriate deflation of the nominal trade flows by the USA aggregate price index due to global trends, such as inflation rates. As suggested by Baldwin and Taglion (2006) including a time dummy might reduce this error. Burger, van Oort and Linders (2009) emphasize three major problems of analysing bilateral trade: the bias created by the logarithmic transformation, the failure of the homoskedasticity and the way how zero-valued trade flows are treated.

4.2 Data

The estimation of a gravity model requires collecting data from various sources. For the purpose of this analysis, over time bilateral data (panel data) on trade flows (value of ordinary trade, IPT and OPT) for the period 2000-2012 is obtained from the Eurostat Comext database (Eurostat Comext, 2013), which includes the data for EU27 Trade Since 1999 by HS2, HS4, HS6 and CN8. The data about the FDI flows is gathered from the OECD database (OECD, 2013) which covers the flows for the period 1985-2011. In the database, FDI is subdivided into outward and inward FDI. Inward FDI refers to the investments by foreigners in the domestic enterprises/business, or put differently, this is foreign capital invested in local resources. In contrast, outward FDI refers to investments

from the home country to a business abroad. The selection of the explanatory variables is guided by an underlying theory, which presumes that the geographical distance and the GDP are the most important variables explaining trade flows. In addition, other variables that have been found as important determinants have been added.

It is a common practice to include some dummy variables to explain factors that might influence bilateral trade flows. In this model, it is also relevant if a country has entered into an RTA with the EU. This data is obtained from the WTO Regional Trade Agreements Information System (WTO, 2013). To capture the effects of the agreements, the dummy variable RTA is added. Furthermore, I have added a list of Beneficiaries of the Generalized System of Preferences (hereinafter: GSP) currently in operation with the EU. This data is available on the UNCTAD List of Beneficiaries (UNCTAD, 2011). The data about GDP is obtained from the World Development Indicators (The World Bank, 2013) and used as an approximation of the relative economic and geographical size of the country. In addition to that, I include a number of other dummy variables, which were developed by Head, Mayer and Ries (2010) and are stored in the CEPII database. All the variables with their sources are listed in Appendix B. The data is merged into a single database to estimate the gravity model with STATA. The use of the panel data helps to mitigate the bias generated by heterogeneity across countries, because it is possible to control for exporter and importer specific effects (Baccheta et al., 2012, p. 108). Moreover, this large sample size enables me to provide stable and precise conclusions.

4.3 Empirical specification

4.3.1 Methodological issues of the gravity equation

The literature above gives me a crucial backdrop for estimating the gravity model while it also warns me against certain issues regarding the gravity equation. To deal with the above mentioned issues and to test the robustness of the results I undertook the analysis of the augmented gravity model (equation 5) using different methodologies. In this section, I focus on the discussion of the concerns, which strongly relate to our equation. The initial step is to transform the data from various sources into logarithms (except dummies). Secondly, since the unit of observation is not a country, but a pair of countries in a given year, all possible country-pair-year combinations are formed, which leads me to 26.433 possible observations.

Since my dataset contains a large number of zero observations, let this be the first issue to address. As mentioned before, the usual procedure to estimate a gravity model is to use logarithms. The logarithmic function is not defined for the number zero and hence zero trade flows are dropped from the estimation. Thereby, the logarithmic model is struggling how to deal with the zero value flows. Ignoring this issue might result in inefficient and biased estimates (Burger et al., 2009). Firstly we have to distinguish whether zero trade is a reporting error or it actually has the value zero. For example, the trade between two

countries might not be zero, but it is not reported due to misleading statistics. The value can also be misstated because of the rounding errors, but in this case, the value is certainly low. Now imagine two very distant countries that do not have much in common. In this case, countries can simply do not trade with each other due to several reasons, e.g. huge geographical distance, lack of historical and cultural links, strict forms of trade restrictions, smallness/closeness of countries etc. A large proportion of bilateral flows actually have the value zero, which is supported by findings by Burger et al. (2009) stating that about 50 % of bilateral flows are such. In practice it is very difficult to determine whether trade is actually zero or it is a consequence of false reporting. One solution, pointed out by Burger et al. (2009) is to simply replace zeros with a small positive number. Alternatively, a number of authors (Santos Silva and Tenreyo, 2006; Burger et al., 2009; Baccheta et al., 2012; Shepherd, 2012) suggest using the Poisson Maximum Likelihood Estimator (hereinafter: PPML) to deal with zero values. In my research, both methods are applied. In the first analysis, reported in Table 7, all the trade flows taking the value zero are automatically dropped from the sample, which presents sample selection bias. In the next model I choose to follow the path of Burger et al. (2009) among the possible ways to avoid the truncation of zeros. Therefore, in the second analysis, zero observations are replaced with a small positive constant (1). The corresponding results are presented in Table 8. In addition, I also use the PPML estimator, which naturally includes the observations with the zero value (Table 10).

Trade flows are not the only data with zero observations in my dataset. I have to deal with the same problem when I consider inward and outward FDI. Since the large proportion of FDI flows has the value zero or negative, they would turn into missing values with the logarithmic transformation. Therefore, in all the applied methodologies of this thesis all zero FDI values are replaced with a small positive constant. It is important to stress that FDI flows can also be negative, which indicates, for example, disinvestments in assets. To solve the problem of the negative values, I firstly cap all the negative FDI flows to a zero, and then add a small constant. When this is done we can take the natural logarithms of all FDI flows. This is a simple path to avoid inconsistent results and the dropping of a large proportion of the sample.

Following the findings from an important paper by Anderson and van Wincoop (2003) multilateral trade-resistance terms (hereinafter: MRT) are also important when estimating the model. Under MRT we understand a number of different trade barriers that a country faces in trade with all its trading partners, and not just with one particular partner. Without respecting the MRT the only factors that influence the trade between countries *i* and *j* are included in the analysis, which is creating a so called omitted variable bias in the intuitive equation. As further noted by Adam and Cobham (2007) it would be interesting to illustrate the third-party effects. For example, imagine that the country *i* lowers its trade barriers with a third country, but does not change its barriers with the country *j*. This might result in a diversion of the bilateral trade – the country *i* would start to trade more with the

third country and less with the country *j*. The issue at this point is a difficulty of collecting the appropriate data (Baccheta et al., 2012, p. 106). Having this caveat in mind, fixed effects for importers and exporters are sometimes used as an alternative to the MRT (Baccheta et al., 2012, p. 108; Shepherd, 2012, p. 33). Accordingly, fixed effects (dummies) for the origin and the destination countries are used in order to capture country-specific characteristics. Following this procedure, one such variable takes the value 1 if the exporting country is, for example, Austria, and 0 in the case of the exporting country being another country. The same logic is applicable to the imports and all the other countries. Further, Mátyás (1997) argued that one should include country-specific effects and time fixed effects for proper gravity specification in order to control for the changes in the global economy, such as slowdowns and booms, which are common for all countries, but differ from one year to another. In the guide by Bachetta et al. (2012, p. 124) this path is revised and suggested to be followed. In my thesis, annual dummies are included in all the empirical specifications. Since I have to deal with the panel data, the relevant literature suggests using a set of time-varying fixed effects both for the exporter and the importer to control for the time-varying MRT which I use in my last specification.

The next issue that arises in my estimation is the problem of endogenity. In contrast to exogenous, endogenous variables are systematically affected by the changes in other variables within the model. In particular, among the variables of my gravity equation, RTA and FDI have been subject to an increasing scrutiny from the econometric point of view, mainly supported by the explanation that RTA and FDI are likely to occur among pairs of countries with historical, geographical or political linkages (Baier & Bergstrand, 2007; Wang et al., 2010; Baccheta et al., 2012). As highlighted by Baccheta et al. (2012, p. 118) countries are likely to form RTAs with countries with which they already trade a lot. Hence, a certain pair of countries would trade a lot even without the RTA and the impact of the agreements is likely to be overestimated. To solve this problem, one should first gauge whether there is or there is not a correlation between the two dependent variables. To deal with this problem, Shepherd (2012, p.41) suggests to use the two stage least square technique (hereinafter: TSLS), or alternatively, one can also use some other Ad Hoc solutions, for example lags. However, a preferable option to deal with endogenity is TSLS. The biggest issue here is to find an instrumental variable (hereinafter: IV), which has to be strongly correlated, exogenous and excludable with potentially endogenous explanatory variable (for more, see Shepherd, 2012, pp. 41-47). Despite the fact that one would like to use the IV approach, this path is generally not followed. The consistency of the results depends on the validity of the IV and an inappropriate choice can lead to even more biased results than in the case if one simply ignores endogenity. Another option is to lag potentially endogenous variables, which is what is done in my thesis. Shepherd (2008) points out that despite the fact that the current values are endogenous the past values are unlikely subject to the same problem. In our case, RTA and FDI are potentially endogenous so they enter the empirical model in the lagged form.

I close this section with three additional adjustments. Firstly, the data about the imports and the exports from the Eurostat is in EUR, while the data about FDI (OECD, 2013) and GDP (The World Bank, 2013) is given in USD. To avoid misleading results as a consequence of currency fluctuations, all the data about cash flows should preferably be in the same currency. Therefore, USD is transformed to EUR with the corresponding exchange rates (Appendix E). Secondly, as remarked by Shepherd (2012, p. 29), errors are likely to be correlated with a country pair. For example, the variable *distance* is the same if we analyse the imports or the exports and is also the same for any year. Thus, country-pair observations are most likely not independent. To address this issue, I create a cluster (*distance*), which enables me to independently analyse each country pair. Lastly, I also use another patch widely used in the empirical research work, which is *robust standard errors*. Shepherd (2012, p. 28) outlined this option as a simple way of fixing violations of the homoskedasticity assumptions.

4.3.2 Augmented gravity model specification

Not correcting the gravity equation with the rectifications described above leads to severely biased results. Now that we are familiar with the basic econometric ways to resolve the problems, we proceed to augmented gravity specification. In addition to the variables from the elementary model (GDP and distance) the variables for inward and outward FDI are added. I include also eight dummy variables, which is common practice to explain factors that could influence the international trade. Those variables help to understand to what extent the RTA, common border, common language, any type of colonial relationship, being a member of the General Agreement on Tariffs and Trade (hereinafter: GATT) or WTO, or having benefits from the GSP influence the analysed trade flows.

Under this set-up the gravity model can be written as follows:

$$\begin{aligned} ln\, F_{ijt} = {} & \alpha_0 + \alpha_1 lnGDP_{it} + \alpha_2 lnGDP_{jt} + \alpha_3 lnDIST_{ij} + \alpha_4 lnOutFDI_{ijt} + \alpha_5 lnInFDI_{ijt} + \\ & \Big[\beta_1 comlang_{off_{ijt}} + \beta_2\, contig_{ijt} + \beta_3 colony_{ij} + \beta_4\, comcol_{ij} + \beta_5 currcol_{it} + \\ & \beta_6\, RTA_{ijt} + \beta_7 GATT/WTO_{jt} + \beta_8 GSP\ PTA\ benef_{jt}\Big] + \delta_i + \delta_j + \delta_t + \varepsilon_{ijt} \end{aligned} \quad (5)$$

Where, respectively:

- F_{ijt} = value of analysed trade flows in EUR (ordinary imports, ordinary exports, IPX, IPM, OPX, OPM) depending on which flow is analysed between countries *i* and *j* in year *t*
- GDP_{it} = GDP in EUR of origin country *i* in year *t*
- GDP_{jt} = GDP in EUR of destination country *j* in year *t*
- $DIST_{ij}$ = distance between country *i* and country *j*
- $OutFDI_{ijt}$ = Outward FDI in EUR from country *i* to country *j* in year *t*

- $InFDI_{ijt}$ = Inward FDU in EUR from country *j* to country *i* in year *t*
- a_0 = constant
- $comlang_{off_{ijt}}$ = If the countries *i* and *j* have a common official primary language in year *t*
- $contig_{ijt}$ = If the countries *i* and *j* share a common border in year *t*
- $colony_{ij}$ = If the countries *i* and *j* have ever been in a colonial relationship
- $comcol_{ij}$ = If the countries *i* and *j* had a common colonizer post 1945
- $currcol_{ij}$ = If the countries *i* and *j* are currently in a colonial relationship
- RTA_{ijt} = If the countries *i* and *j* have an RTA in force in year *t*
- $GATT/WTO_{jt}$ = If the destination country *j* is a member of GATT/WTO in year *t*
- GSP PTA $benef_{jt}$ = If the destination country *j* has benefits described under GSP (applicable just for imports) in year *t*
- δ_i = vector of dummy variables for country *i*
- δ_j = vector of dummy variables for country *j*
- δ_t = vector of annual dummies
- ε_{ijt} = error term

Let's note that the coefficients for a_1- a_5 are simply elasticities, while the dummy variables in the parentheses are not in logarithms but they are taking value one if "yes" and taking value zero otherwise. Thereby, the coefficients β_1-β_7 have to be transformed with equation 6 to interpret them as elasticities.

$$elasticity=exp^{\alpha} - 1 \quad (6)$$

4.4 Empirical estimations and results

I undertook the analysis of the augmented gravity model using different estimators which are frequently employed in the empirical works. In the first estimation, equation 5 is estimated with the OLS regression, where zero values of trade have been automatically dropped by STATA. As a way of dealing with zeros, the second model reports the OLS estimates using ln ($F_{ijt}+1$) if $F_{ijt}= 0$. The third model uses country-pair fixed effects, while the workhorse of the fourth model is the PPML estimator. The fifth model adds time-varying fixed effects for exporter and importer to control for time-varying MRT. The results are presented in Tables 6-10.

4.4.1 Model 1: Ordinary least square estimation

Several important features are apparent from Table 6. Firstly, the number of observations is decreasing from column (1) to column (6). The interpretation is straightforward – ordinary trade values are much higher than the values of IPT and especially OPT or, put differently, PT has a higher number of zero observations than ordinary trade. Hence, the total possible number of observations in OPM is just 4,267. In addition, the explanatory power of the

model (adjusted R Square) ranges from about 80 % in ordinary exports to about 55 % in OPM. The biggest drawback of this method is a reduced sample size due to the missing values, which potentially leads to a loss of precision (Burger et al., 2009). To interpret the model results, we need to look more closely at the estimated coefficients. It has to be noted that I focus on the interpretation of only statistically significant results, denoted stars, one star (*) if the result is significant at a 10 % level, two stars (**) if at a 5 % and three stars (***) if it is significant at a 1 % level.

Table 6. Model 1 - OLS estimation

VARIABLES	(1) lnexports	(2) lnimports	(2) lnIPX	(4) lnIPM	(5) lnOPX	(6) lnOPM
lngdp_currEUR_o	1.117***	0.191	0.725***	0.325	2.317***	0.847
	[0.155]	[0.190]	[0.253]	[0.348]	[0.594]	[0.620]
lngdp_currEUR_d	0.386***	0.616***	0.324***	0.236	0.325	0.308
	[0.060]	[0.098]	[0.105]	[0.173]	[0.236]	[0.290]
lndist	-1.862***	-1.905***	-1.713***	-1.234***	-1.598***	-1.343***
	[0.103]	[0.126]	[0.125]	[0.176]	[0.215]	[0.257]
rta_updatelag	0.071**	0.215***	0.013	-0.007	-0.122	-0.016
	[0.036]	[0.045]	[0.073]	[0.101]	[0.125]	[0.144]
comlang_off	0.697***	0.472***	0.167	0.231	0.413**	-0.143
	[0.094]	[0.145]	[0.139]	[0.183]	[0.208]	[0.287]
contig	0.180	-0.076	0.504**	1.000***	1.874***	1.293***
	[0.358]	[0.447]	[0.251]	[0.347]	[0.410]	[0.480]
colony	1.048***	1.137***	0.449***	0.562***	0.531**	0.834***
	[0.110]	[0.161]	[0.145]	[0.209]	[0.209]	[0.284]
comcol	1.569***	1.105***	0.384	1.443***	0.156	0.133
	[0.173]	[0.199]	[0.237]	[0.318]	[0.447]	[0.616]
curcol	-0.044	0.911	2.286*	1.631	3.550***	0.625
	[1.751]	[1.546]	[1.282]	[1.290]	[0.716]	[0.824]
gatt_d	-0.139*	0.088	0.039	0.559**	0.051	-0.132
	[0.078]	[0.111]	[0.164]	[0.278]	[0.336]	[0.338]
lnoutfdi_EUR_corrlag	0.011***	-0.002	0.038***	0.044***	0.038***	0.035***
	[0.004]	[0.006]	[0.005]	[0.007]	[0.008]	[0.009]
lninfdi_EUR_corrlag	0.002	-0.014**	0.037***	0.026***	0.025***	0.019*
	[0.005]	[0.006]	[0.006]	[0.008]	[0.009]	[0.010]
GSP	/	-0.266	/	-1.166	/	-6.969***
	/	[0.617]	/	[1.655]	/	[2.428]
Constant	-14.965***	1.989	-6.414	-1.526	-54.018	-10.561
	[4.247]	[5.414]	6.883	[9.977]	[16.996]	[18.822]
Observations	23,668	22,648	15,713	11,156	5,714	4,267
R-squared	0.806	0.748	0.615	0.584	0.616	0.575
Adj. R-Squared	0.804	0.746	0.610	0.576	0.601	0.555
Time FE	YES	YES	YES	YES	YES	YES
Exporter FE	YES	YES	YES	YES	YES	YES
Importer FE	YES	YES	YES	YES	YES	YES
Country-pair FE	NO	NO	NO	NO	NO	NO
Exporter and importer time-varying effect	NO	NO	NO	NO	NO	NO

*Note. *Robust standard errors reported in parentheses. ***p<0.01, **p<0.05, *p<0.1.*

Firstly, the value of trade is positively correlated with the GDPs of the origin and the destination countries, although not all the coefficients are statistically significant.

However, if we eyeball the results for the GDP of the origin country elasticities are the highest for ordinary exports and OPX. To illustrate how to interpret a coefficient, let's look at the coefficient in the first row of column (1). The coefficient 1.117 means that a 1 per cent increase in the GDP of the origin country tends to increase the value of exports for about 1.117 per cent. The next point noteworthy is that the GDP of the destination country seems to be less important for processing trade than for ordinary trade. This finding is in the line with a rule that goods under PT have to be exported back to the origin country, and therefore, goods are not allowed to be sold in the market of the destination country. As expected, all trade regimes are strongly negatively correlated with the distance, and they are statistically significant at a 1 % level.

The dummy variable *RTA* captures the effect of belonging to the same regional trade agreement. While the results imply that the existence of an RTA generates an increase in ordinary trade, we cannot claim this for PT. To understand this, it is necessary to revert to the characteristics of PT and RTA. Usually, an RTA is formed to ease the access to a market abroad, in particular, to reduce trade barriers, including tariffs. Goods imported and exported under PT regime are eligible for tariff exemption even if the partner country and the EU do not have an RTA agreement in force. Hence, pairs of countries without an agreement might tend to bypass tariffs and other trade barriers with a PT regime.

The dummy variable *common language*, as anticipated, positively influences all trade regimes, except, quite surprisingly, the coefficient for OPM is negative, although it is not statistically significant. The most apparent positive correlation is in the case of ordinary exports (0.697). The picture is reverse if we eyeball the results for *common border*. Sharing a common border is strongly positively correlated with PT, while elasticity for ordinary trade is more ambiguous. Since this is a dummy variable, we need to use equation 6 to interpret the coefficients in the same way as the continuous variables. In the case of IPM, two countries that share borders are found to trade about 1.7 times more than those which do not share the border ($\exp^{1,000} - 1 = 1.718$). This finding supports the prevalence of regional supply chains (Tanaka, 2009; Rugman et al., 2009).

Despite the fact that transportation costs are steadily decreasing, geographical contiguity plays an important role in PT. Here, once again, we have to revert to the features of PT. In the case of PT, goods are exported/imported temporarily for processing, and then, re-exported/re-imported back to the origin country. Therefore, if goods have to be shipped twice the same way, adjacency might have a greater influence in PT than in ordinary trade. The coefficients are especially high in OPT, which indicates that the EU countries are taking advantage of low cost nearby countries, which has already been studied by Egger and Egger (2005).

If the destination country was a former colony of the origin country that seems to influence all trade regimes, but predominantly ordinary trade. For example, the coefficient for ordinary exports is four times higher than those for OPM. Despite the fact that the

coefficients are positive in sign, colonial history matters less for PT. If the destination country is a member of the GATT/WTO has equivocal impacts and it is not found to be statistically significant, except in the case of IPM (0.559).

The indicator for the outward FDI is slightly positive for all regimes, except for ordinary imports. The positive relation between FDI and PT has already been emphasized by Görg (2000), Egger and Egger (2005) and Rugman et al. (2009). This might, for example, indicate the investments of the EU countries into production plants/companies which are involved in processing their goods. Among the surprising results, it is worth mentioning a negative impact between the inward FDI and the ordinary imports. For all four types of PT, the linkage is positive. Apparently, there is either a "substitution" (ordinary imports) or a "complementary" (PT) relationship. As someone would expect, the relation is the most apparent in the case of IPT. This was already emphasized by Görg (2000) who particularly documented that the inward FDI to the EU has a positive impact on receiving IPT.

The last variable estimated is *GSP*, which denotes if a developing country enjoys tariff reductions and other benefits on their exports to the EU, prescribed under GSP. As is evident from the list of the countries (Appendix D) the traditionally developed important EU trade partners are excluded from the list. Therefore, the negative values are not surprising and can be backed up with several interpretations. The first possible explanation is given by Wang et al. (2010) who documented, under assumptions that most of the trade is intra-industry trade, that the countries with similar GDP are likely to trade more with each other. The beneficiaries of GSP, contrary to the EU countries, normally have a lower level of GDP. The second explanation is that PT involves the trade of high technology goods, while countries, eligible for GSP are mostly labour abundant and technologically lagging.

4.4.2 Model 2: Ordinary least square estimation with corrections for zero values

If we use the OLS and replace zero trade flows in equation 5 with a small positive number, we do not get identical results, but however, similar to a large extent. To remember, rather than throwing away the observations with $F_{ijt}=0$, I estimate the model using $(F_{ijt}+1)$ in the case of the zero value in a dependent variable. What we can see from Table 7 is that the number of observations is uniform (26.433) for all columns. The explanatory power of the model (adjusted R square) is similar to the one in the previous estimation. In the line with the first model, the selected variables explain ordinary trade as the best while OPT as the worst.

Table 7. Model 2 - OLS estimation with corrections for zero values

VARIABLES	(1) lnexport_corr	(2) lnimport_corr	(3) lnIPX_corr	(4) lnIPM_corr	(5) lnOPX_corr	(6) lnOPM_corr
lngdp_currEUR_o	1.005***	-0.054	-0.059	1.095***	0.560***	1.267***
	[0.144]	[0.153]	[0.209]	[0.220]	[0.117]	[0.119]
lngdp_currEUR_d	0.424***	0.506***	0.478***	0.127	0.096*	0.024
	[0.063]	[0.079]	[0.100]	[0.100]	[0.058]	[0.057]
lndist	-1.424***	-1.306***	-1.443***	-0.910***	-0.427***	-0.480***
	[0.374]	[0.353]	[0.242]	[0.182]	[0.118]	[0.128]
rta_updatelag	0.092**	0.243***	-0.605***	-0.658***	-0.230***	-0.309***
	[0.040]	[0.046]	[0.131]	[0.117]	[0.084]	[0.080]
comlang_off	0.624***	0.548***	0.422***	0.424***	0.030	-0.049
	[0.129]	[0.150]	[0.158]	[0.127]	[0.117]	[0.120]
contig	0.178	0.011	0.883*	1.752***	3.403***	2.003***
	[0.700]	[0.709]	[0.469]	[0.454]	[0.454]	[0.579]
colony	1.219***	1.176***	0.637***	0.563***	0.328*	0.351*
	[0.143]	[0.186]	[0.186]	[0.201]	[0.199]	[0.205]
comcol	1.901***	1.278***	0.936***	0.888***	0.344***	0.391***
	[0.197]	[0.196]	[0.218]	[0.179]	[0.112]	[0.110]
curcol	0.437	1.535	0.689	0.885	0.875	-0.688
	[1.738]	[1.613]	[1.803]	[1.762]	[1.172]	[0.581]
gatt_d	-0.096	0.127	0.240	0.245	-0.025	-0.131
	[0.078]	[0.101]	[0.148]	[0.174]	[0.112]	[0.119]
lnoutfdi_EUR_corrlag	-0.000	0.007	0.064***	0.074***	0.146***	0.109***
	[0.005]	[0.006]	[0.007]	[0.008]	[0.009]	[0.009]
lninfdi_EUR_corrlag	-0.008	-0.016**	0.038***	0.066***	0.109***	0.089***
	[0.006]	[0.007]	[0.008]	[0.010]	[0.010]	[0.011]
GSP	/	-0.419	/	-0.724*	/	-0.445*
	/	[0.499]	/	[0.409]	/	[0.249]
Constant	-17.065***	5.378	7.272	-22.664***	-12.821***	-28.597***
	[5.250]	[5.475]	[6.126]	[6.227]	[3.481]	[3.545]
Observations	26,433	26,433	26,433	26,433	26,433	26,433
R-squared	0.821	0.791	0.615	0.650	0.611	0.535
Adj R-Squared	0.820	0.789	0.610	0.647	0.608	0.531
Time FE	YES	YES	YES	YES	YES	YES
Exporter FE	YES	YES	YES	YES	YES	YES
Importer FE	YES	YES	YES	YES	YES	YES
Country-pair FE	NO	NO	NO	NO	NO	NO
Exporter and importer time-varying effect	NO	NO	NO	NO	NO	NO

*Note: *Robust standard errors reported in parentheses. ***p<0.01, **p<0.05, *p<0.1.*

Likewise, in the first estimation, all the statistically significant coefficients of GDP of the origin country are positive. Surprisingly, the coefficients for IPX and imports are negative, although not statistically significant. The negative distance indicator once more implies that the further away the trading partner is, the lower the trade intensity is, regardless of which trade flow is the subject of estimation. However, this estimation shows that for OPX the distance is less important. These results have to be interpreted with caution because of the following two reasons. Firstly, all zero values are replaced with a positive constant. As a consequence, a number of OPT flows (including very distant countries) that

actually have the value zero are artificially added to the estimation. The severity of inconsistencies depends on the particular characteristics of the sample, and the results for flows with a larger proportion of zeros are more biased. Secondly, let's recall that the value of OPT represents less than 1 % of all trade. Therefore, even adding a small constant can yield less consistent results than in the case of other trade flows, where the value is considerably higher.

Similarly to the first analysis, belonging to the same RTA is positively related to ordinary trade while negatively to PT, but here this result is backed up with statistically significant coefficients at a 1 % level. The results for colonial relationship, common language and sharing common borders do not differ much from the first analysis. The only noteworthy difference to mention here is that for OPT sharing a border shows an even stronger impact. Also, the results for outward and inward FDI do not change drastically from the first estimation. The coefficients remain small and positive, except for ordinary imports, which is somehow surprising. The GSP coefficients are still negative, but the number is much smaller compared to Table 6. As already mentioned in the previous paragraph when interpreting variable distance, this model has some drawbacks that have to be taken into account when explaining the results. However, most of the results are in line with intuition and consistent with the literature.

4.4.3 Model 3: Fixed effects model estimation with country – pair fixed effects

To exploit the panel data nature of our database the estimation proceeds with the fixed effects model that controls for country-pair heterogeneity. The difference from the previous regressions, where fixed effects for the origin and the destination countries are used, is that with this analysis I use country pair-fixed effects, with a total number of 4.448 country pairs. The biggest shortcoming of this model is that it is impossible to estimate the time-invariant coefficients, e.g. distance, common border, common language etc. Those explanatory variables are omitted due to perfect collinearity with the fixed effects and therefore they are dropped from the estimation. Since we are particularly interested in estimating the coefficients, this is not the most viable option. Despite these drawbacks, I proceed with the analysis.

Unsurprisingly and in the line with the previous specifications, all the statistically significant coefficients for GDP are positive. Furthermore, as computed in the previous two models, the coefficients for RTA are negative for PT and positive for ordinary trade. The analysis suffices that having an RTA agreement has detrimental effects on PT and positively influences ordinary trade, while a higher GDP of the countries has a beneficial impact on all trade regimes. Among the surprising results I would like to point out that inward FDI have negative and statistically significant coefficients for IPT, which is at odds with the previous regressions. In addition, if a destination country is a member of the GATT/WTO, the coefficient is found to be negative for OPM, but just small and significant at a 10 % level.

Table 8. Model 3 - Estimation with country-pair fixed effects

VARIABLES	(1) lnexport_corr	(1) lnimports_corr	(1) lnIPX_corr	(4) lnIPM_corr	(5) lnOPX	(6) lnOPM
lngdp_currEUR_o	0.986***	-0.048	-0.130	1.010***	0.404***	1.144***
	[0.098]	[0.113]	[0.159]	[0.157]	[0.096]	[0.096]
lngdp_currEUR_d	0.424***	0.512***	0.489***	0.143*	0.127***	0.043
	[0.047]	[0.054]	[0.076]	[0.075]	[0.046]	[0.046]
rta_update	0.053	0.275***	-0.474***	-0.493***	-0.170***	-0.334***
	[0.043]	[0.050]	[0.070]	[0.069]	[0.042]	[0.042]
gatt_d	-0.085	0.150*	0.183	0.184	-0.027	-0.142*
	[0.075]	[0.086]	[0.121]	[0.120]	[0.073]	[0.073]
lnoutfdi_EUR_corrlag	-0.002	0.005	-0.002	-0.012**	-0.005	-0.012***
	[0.003]	[0.004]	[0.006]	[0.005]	[0.003]	[0.003]
lninfdi_EUR_corrlag	0.001	-0.001	-0.022***	-0.016***	0.005	-0.002
	[0.004]	[0.004]	[0.006]	[0.006]	[0.004]	[0.004]
Constant	-17.065***	-4.097	-3.757	-26.197***	-	-28.788***
	[5.250]	[3.104]	[4.377]	[4.327]	11.975***	[2.649]
					[2.645]	
Observations	26,433	26,433	26,433	26,433	26,433	26,433
Number of cntry_pair	4,428	4,428	4,428	4,428	4,428	4,428
R-squared	0.057	0.007	0.006	0.036	0.004	0.020
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Exporter FE	No	No	No	No	No	No
Importer FE	No	No	No	No	No	No
Country-pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Exporter and Importer time-varying effects	No	No	No	No	No	No

*Note: *Robust standard errors reported in parentheses. ***p<0.01, **p<0.05, *p<0.1.*

4.4.4 Model 4: Poisson Maximum Likelihood Estimator

An alternative estimator of the OLS regression, which is gaining attention in more recent works, is PPML. In particular, Santos Silva and Tenreyro (2006, 2009) are persistent recommenders of this model. Several advantages of the model have been emphasized in their former work back in 2006, for example, they pointed out that the PPML estimator naturally includes zero observations, that the model is consistent in the presence of fixed effects and that the interpretation of the coefficients is straightforward (independent variables are generally given in logarithms). In their latter work (2009) they added that the model performs well even if a dependent variable is frequently equal to zero, as in our case the OPT. This estimation method paints a different picture of the determinants of the EU trade regimes. Turning first to the explanatory power of the model we observe a higher R Square of the model, which hints that the model fits the data better than the OLS estimations. The modification is the most evident in the case of PT, which can be attributable to the findings by Santos Silva and Tenreyro (2009) that the model behaves well also when a dataset with a large proportion of zero observations is used.

Table 9. Model 4 - Poisson Maximum Likelihood Estimator

VARIABLES	(1) Exports	(2) Imports	(3) IPX	(4) IPM	(5) OPX	(6) OPM
lngdp_currEUR_o	0.439***	0.427**	0.086	1.683***	2.058*	-2.535
	[0.165]	[0.186]	[0.432]	[0.409]	[1.064]	[1.611]
lngdp_currEUR_d	0.651***	0.734***	0.599***	0.687***	-0.325	-0.449
	[0.048]	[0.068]	[0.190]	[0.241]	[0.271]	[0.416]
lndist	-1.131***	-1.296***	-1.168***	-1.130***	-1.249***	-1.351***
	[0.113]	[0.114]	[0.312]	[0.339]	[0.440]	[0.510]
rta_updatelag	-0.034*	-0.039	-0.004	0.111	-0.149	-0.292
	[0.018]	[0.026]	[0.082]	[0.154]	[0.929]	[0.222]
comlang_off	0.464***	0.521***	0.103	0.044	0.186	0.805*
	[0.148]	[0.125]	[0.146]	[0.183]	[0.309]	[0.488]
contig	0.300	0.464***	0.503	0.485	1.943***	2.186***
	[0.207]	[0.176]	[0.407]	[0.387]	[0.452]	[0.589]
colony	0.271**	0.157	-0.185	0.463*	0.014	-0.478
	[0.135]	[0.126]	[0.183]	[0.205]	[0.237]	[0.364]
comcol	1.407***	0.958***	0.798*	1.482***	0.775	0.737
	[0.345]	[0.327]	[0.408]	[0.491]	[0.716]	[0.806]
curcol	1.632***	0.851	-1.874	-4.220***	1.787	0.822
	[0.438]	[0.659]	[1.235]	[1.253]	[1.201]	[1.725]
gatt_d	-0.109*	0.209**	-0.160	-1.396*	0.431**	0.320
	[0.060]	[0.062]	[0.103]	[0.719]	[0.179]	[0.273]
lnoutfdi_EUR_corrlag	0.002	-0.001	-0.002	-0.014**	0.005	0.006
	[0.003]	[0.003]	[0.004]	[0.007]	[0.007]	[0.008]
lninfdi_EUR_corrlag	0.008***	-0.008***	0.004	0.016**	0.008	0.015**
	[0.003]	[0.002]	[0.003]	[0.007]	[0.006]	[0.006]
GSP	/	2.25***	/	3.178**	/	-15.603***
	/	[0.37]	/	[1.486]	/	[3.352]
Constant	-5.799	-9.435*	0.522	-46.934***	-37.920	102.965**
	[4.942]	[5.206]	[12.030]	[13.883]	[29.383]	[41.303]
Observations	26,433	26,433	26,433	26,271	25,947	24,435
R-squared	0.947	0.924	0.929	0.855	0.777	0.875
Time FE	YES	YES	YES	YES	YES	YES
Exporter FE	YES	YES	YES	YES	YES	YES
Importer FE	YES	YES	YES	YES	YES	YES
Country-pair FE	NO	NO	NO	NO	NO	NO
Exporter and importer time-varying effect	NO	NO	NO	NO	NO	NO

*Note. *Robust standard errors reported in parentheses. ***p<0.01, **p<0.05, *p<0.1.*

A closer look into the estimation shows that the GDP of the origin country is strongly related to IPM and OPX, while the elasticity is smaller when we look at ordinary trade. On the other hand, a higher GDP of the destination country leads to more trade in all trade regimes, apart from OPT. To see why this is so, notice that with OPT companies seek lower production costs and therefore move their production plants to the less developed counterparts. As the discussions of the previous estimations should have made clear, the distance negatively influences all the EU trade regimes. The PPML estimator, once again, confirms that a common official language is especially important if ordinary trade is the subject of the estimation. However, if we take a look at column (6) there is a strong link between OPM and the language, although just significant at 10 %. The effect of sharing a

common border is, once again, especially evident in the case of OPT, which, using equation 6, shows that adjacent countries trade under OPT regime about six times more(e^2- 1 = 6.389). This is a particularly important finding. The prevalence of regional supply chains is again clear-cut and strongly empirically confirmed.

The model greatly mismatches with the previous estimations when we gauge the influence of the colonial relationships. Noticeably lower coefficients for the variable *colony* indicate that OLS exaggerates the roles of the colonial ties, which is in accordance with the observations by Santos Silva and Tenreyro (2006). However, PPML shows a strong and statistically significant coefficient for *comcol*, except for OPT in columns (5) and (6). In the line with Model 2 and contrary to Model 1, the only statistically significant coefficient for outward FDI is the one for IPM (-0.014). All the models presented so far found a negative linkage between ordinary imports and inward FDI, and a positive link for all the other regimes. Thus, inward FDI presumably have positive effects on PT. The coefficient estimates for the RTA are different under the OLS model than under PPML; in particular, the impact of the agreements is not as clear and consistent as estimated with Models 1 and 2. Lastly, the role of GSP as a trade deterrent of flows is significantly larger under PPML for OPX (-15.603), which indicates that, most likely, the EU countries are not engaged in the OPT regime with the GSP beneficiaries, but however, they do import under the ordinary or IPM regime.

4.4.5 Model 5: OLS estimation with time – varying exporter and importer dummies

In our last model, a set of time-varying specific effects (dummies) for the importer and the exporter is included to control for the time-varying MRT. However, every model comes with advantages and disadvantages. One drawback is that this model implies high computational costs. Second, and probably a more severe drawback is the remark by Baccheta et al. (2012, p.124) that it is impossible to correctly estimate country specific variables, such as the GDP of the origin and the domestic countries, due to the perfect collinearity of time-varying fixed effects and time varying country-specific variables. Therefore, I can only identify the variables varying on *ijt* dimension.

Although Model 5 does not provide any relevant information about the GDP, we can infer some of the properties from the coefficients of other explanatory variables. Distance, for example, gives almost identical results to those generated by Model 2, namely higher elasticities for ordinary trade and IPT and lower elasticities for OPT. If we contrast this model to the previous results, we can draw a number of parallels. Having an RTA in force positively influences ordinary trade and it has a negative impact on OPT. Unlike in the rest of the models, the coefficient for IPM is high, positive and statistically significant. In the line with other results, the linkage with OPT is negative.

Table 10. Model 5 - OLS estimation with time varying exporter and importer dummies

VARIABLES	(1) lnexports	(2) lnimports	(2) lnIPX	(4) lnIPM	(5) lnOPX	(6) lnOPM
lndist	-1.423***	-1.307***	-1.433***	-0.899***	-0.418***	-0.472***
	[0.381]	[0.360]	[0.245]	[0.183]	[0.119]	[0.129]
rta_updatelag	1.253***	2.275***	0.326	1.971***	-1.170***	-0.718*
	[0.281]	[0.401]	[0.416]	[0.436]	[0.414]	[0.389]
comlang_off	0.623***	0.549***	0.416***	0.417***	0.024	-0.055
	[0.131]	[0.153]	[0.160]	[0.129]	[0.118]	[0.122]
contig	0.179	0.011	0.865*	1.737***	3.387***	1.988***
	[0.713]	[0.722]	[0.477]	[0.462]	[0.460]	[0.589]
colony	1.218***	1.178***	0.613***	0.537***	0.303	0.328
	[0.146]	[0.189]	[0.189]	[0.204]	[0.201]	[0.207]
comcol	1.901***	1.278***	0.930***	0.882***	0.339***	0.385***
	[0.200]	[0.200]	[0.221]	[0.181]	[0.113]	[0.111]
curcol	0.439	1.536	0.712	0.931	0.924	-0.659
	[1.769]	[1.645]	[1.826]	[1.783]	[1.187]	[0.584]
gatt_d	2.755***	4.843***	3.719***	2.235***	0.784	0.687**
	[0.948]	[0.515]	[0.710]	[0.422]	[0.477]	[0.317]
lnoutfdi_EUR_corrlag	0.001	0.005	0.071***	0.088***	0.158***	0.120***
	[0.005]	[0.006]	[0.007]	[0.008]	[0.009]	[0.010]
lninfdi_EUR_corrlag	-0.009	-0.015**	0.054***	0.074***	0.119***	0.098***
	[0.006]	[0.007]	[0.008]	[0.009]	[0.010]	[0.011]
GSP	/	1.002***	/	1.790***	/	1.237***
	/	[0.379]	/	[0.379]	/	[0.290]
Constant	22.139***	19.699***	18.792***	3.442*	6.608***	3.261***
	[2.724]	[2.414]	[1.797]	[1.353]	[1.088]	[1.103]
Observations	26,433	26,433	26,433	26,433	26,433	26,433
R-squared	0.826	0.796	0.717	0.692	0.626	0.556
Adj R-Squared	0.819	0.787	0.705	0.678	0.609	0.536
Time FE	NO	NO	NO	NO	NO	NO
Exporter FE	NO	NO	NO	NO	NO	NO
Importer FE	NO	NO	NO	NO	NO	NO
Country-pair FE	NO	NO	NO	NO	NO	NO
Exporter and importer time-varying effect	YES	YES	YES	YES	YES	YES

*Note: *Robust standard errors reported in parentheses. ***p<0.01, **p<0.05, *p<0.1.*

Furthermore, the indicators for common language, apart from OPT, are positive. Sharing a border is indeed the most important for OPT. Moreover, adjacency is found to be an important factor in receiving IPT, whilst for ordinary trade it seems to be of minor importance. Being a former or a present colony is primarily important when someone analyses ordinary trade. All the coefficients for FDI regarding PT are positive and statistically significant, although not very high, which fulfilled the expectations. According to the last model, FDI for PT is found to be more important than in the case of ordinary trade. This result suggests that multinational companies, with their investments, are the driving force of the vertical specialization in the EU. Being a member of the GATT/WTO is found to be strongly correlated with ordinary and IPT, which is at odds with other models. Under the assumption that the EU countries are developed, this is not surprising. The majority of the developed countries are part of the GATT/WTO and some of them are

likely to have similarities with the factor endowments of the EU. Intra- industry trade, according to Wang et al. (2010), is boosted if countries have similar technological capabilities. Also, if we confront the results with the other regressions, the results for GSP are significantly different, and in this case show a strong positive link. This might appear a little bit astonishing, especially in the case of IPT. The GSP beneficiaries are likely to be underdeveloped and one could expect that they do not produce highly sophisticated products, which is most often the case in IPT of the EU.

4.4.6 Overall interpretation of results

- **GDP of origin country**

The GDP of the origin country, which is used as an approximation of the country's size and development, seems to be positively related with all trade regimes, but it is most pronounced for IPM, which is another indicator that non-EU countries are using PT for assembling sophisticated products in the developed countries. Strong economic powers of the EU (Germany, United Kingdom and France) which are generally believed to produce high value-added products and to be positioned at the top of the global supply chains are the most frequent locations for PT. We apply the same logic to ordinary exports; in particular, more economically developed countries tend to export more. In contrast, the results for imports are not so straightforward. The positive signs for OPT indicate that more developed and larger countries also use OPT more frequently than the countries with a lower GDP.

- **GDP of destination country**

The GDP of the destination country has, as expected, a positive impact on ordinary trade and predominately on IPT, while the results are mostly insignificant for OPT. Recall that the goods under PT have to be used solely for export purposes, and are not allowed to be sold in the domestic market. Country size is more important in terms of ordinary trade, when companies go overseas to find or easier secure, obtain new buyers for their goods and services. The results may also indicate that the EU countries tend to exploit the international costs differences, and use OPT with countries with a lower GDP and lower labour costs, such as non-EU Balkan countries.

- **Distance**

The results strongly support the assumption that despite a widespread perception of "death of distance", the distance effect is still strongly present although transportation and communications costs are steadily decreasing. For all trade regimes the distance coefficient is found to be high, negative and statistically significant. Therefore, the interpretation can be clear – the further away trade partners are the lower trade intensity is and this holds true for all trade regimes. This finding supports the geographic dispersion of the production

stages within a given region (Rugman et al., 2009; WTO, 2012). By and large, distance is found to be an important determinant of the choice of the EU trade activities.

- **RTA**

Some interesting facts emerge when we look at the variable RTA. On one hand, the linkage is found to be positive when analysing ordinary trade. On the other hand, all statistically significant coefficients for all four types of PT are negative, except in the last model for IPM. This is not so surprising, when one considers that companies tend to avoid government-induced restrictions. If the EU will further reduce its trade barriers, the role of PT might steadily decrease. This also explains why, for example, China is conducting about half of its exports under PT. China indeed has much more trade barriers than the EU, but a very similar PT regime, under which goods shall be exempt from the tariffs. Following this explanation, in more open economies the role of PT is likely to be smaller. However, having an RTA in force is found to have just a minor importance when using the Poisson estimation technique (Model 4).

- **Common Language**

Estimation of the common language variable shows that having a common official language increases ordinary trade between countries. However, the link is, albeit mostly statistically significant, less clear in the case of PT. Although also for PT all statistically significant results are positive, the estimations suggest that common language is important to a lesser degree. This estimation has one important drawback. It is very plausible that some countries, which have a similar language, but not a common official language, trade more with each other. In particular, in Slovenia many people are quite proficient in the languages of the former Yugoslavian countries, which might lead to an enhanced trade. However, since those countries do not have a common official language, the estimation does not account for this at all.

- **Common Border**

Several important facts emerge when I analyse the effects of common border. In OPT the effect of common border has the biggest role. In IPT the numbers are smaller, but nevertheless, they still show strong elasticities. I observe some increased numbers in the relation to the adjacency of the developed countries, in particular, from Germany, France and Italy to Switzerland. Some more dynamic figures are also observed in relations between other adjacent countries, e.g. Slovenia – Croatia, Poland – Ukraine, Romania – Serbia etc. PT appears to be concentrated in nearby countries, thus supporting the recent findings about global supply chain regionalization and regional integration. This is unsurprising since under PT regimes goods have to be re-shipped back to the origin country. It makes sense that countries in geographical proximity, which are preferably neighbouring countries, have an advantage in comparison to more distant territories. It is

also very likely that sharing a common border is related to other factors that simplify business procedures, e.g. similar language, habits, political and economic dimensions.

- **Colonial relationship**

Coherent with the expectations, all the specifications suffice a positive relationship, which is most apparent in ordinary trade, less in IPT and the least in OPT. In particular, the data shows that France trades relatively a lot with not so very distant countries of the Francophone Africa (Morocco, Algeria). Also, the United Kingdom is very active in trade with its former colonies, especially India and Hong Kong under all trade regimes. On the other hand Spain has quite strong ties with its former colonies in ordinary trade, while it does not import and export much under PT regime. If we contrast the results obtained from different models, we find importantly different coefficient estimates in the OLS models in comparison to the PPML model. More precisely, the PPML method shows that having a colonial relationship has a much smaller role. In addition, most of the formerly significant explanatory variables turn into insignificant under the PPML estimator.

- **GATT/WTO membership**

If the destination country is a member of the GATT/WTO this is in most specifications found to be statistically insignificant, which prevents me to derive stable conclusions. However, the negative signs for ordinary exports and IPM are somehow surprising, despite the fact that some important partners (Russia in August, 2012) just recently joined the WTO. The last model has strongly rejected the findings of insignificant and negative relations between the membership and the value of trade flows. Rather than finding a negative relation, a strong positive link is empirically confirmed. It is generally believed that less discriminatory trade restrictions enhance international trade, but my estimate shows just an ambiguous impact. In some regressions, the indicators are positive in sign and statistically significant, while the opposite is true for other regressions. To see why this is so, let's recall that in intra- industry trade, the countries with similarities in factor endowments are likely to trade more with each other. On the other hand, goods under PT are not a subject to trade restrictions, and therefore enjoy a reduced or nil duty liability even in the case if the partner country is not a member of the GATT/WTO. This might discourage the GATT/WTO members to use PT. In sum, the evidence at this point is quite inconclusive.

- **Outward FDI and Inward FDI**

There are also some contrary but very important findings when I portray the results of FDI. All the specifications for outward FDI, apart from Model 1 in the case of ordinary exports, are statistically insignificant for ordinary trade. The linkages between PT and the outward FDI encouragement are found to be positive in most specifications with the sole exception of Model 3. The positive relation is the most significant in Model 5, which emphasizes a

positive impact of FDI on the activities under PT regimes. According to the Eurostat (2013), most of the EU outward FDI goes to the USA, Switzerland, Canada, Brazil, Singapore and Russia, respectively. The aforementioned countries are also important partners of the EU in PT and thus, someone would intuitively expect a positive linkage. Coherent to the outward FDI estimations, we observe differences if we contrast the results of different models for inward FDI. Except in Model 3, the relation between PT and inward FDI is found to be positive, with the most pronounced boosting effect in Model 5. The impact of inward FDI on ordinary exports is not significant, while for ordinary imports the negative signs suggest an adverse impact. However, I cannot provide stable empirical support for the view that FDI has an important negative effect on ordinary trade.

The discrepancies between the specifications indicate a complex relationship between trade and FDI. The impact can vary from one country-pair to another. Just a brief overview of the data is enough to see that FDI flows considerably vary across the years, which is likely to be the result of large mergers and acquisitions taking place in a particular year. FDI can also be seen as an alternative strategy to trade, and have a "substitution" effect. A company can decide to produce at home and export, or alternatively, invest in the production abroad. From this perspective, FDI is a substituting trade. In respect to this, there is just a weak evidence for the interlinkages between the EU trade and FDI. Given the weakness of the FDI statistical data, these results should be upgraded with some additional information. In sum, the specifications suggest an insignificant impact on ordinary trade, while an importantly positive impact on PT.

- **GSP beneficiaries**

The Models 4 and 5 imply that the EU countries tend to import more under ordinary trade and PT regime from countries, eligible for GSP privileges. In the case of IPM we can, inconsistently, explore high positive (Models 4 and 5) or high negative (Model 2) relationships. Also in the case of OPM the results are not identical. The specifications show either a strong negative (Model 4) or a strong positive (Model 5) linkage. In essence, the results clarify that the EU countries do not import much from the GSP beneficiaries under the OPM regime.

CONCLUSION

This thesis has dealt with analysing the determinants of the different EU trade regimes. On the theoretical level the thesis mostly relates to the available in the field of the international trade. In particular, I find that the nature of trade has changed over time. Nowadays, trading takes place between businesses (B2B) rather than in relation between a company and an end user (B2C). Vertical specialization is gaining relative importance, countries are specializing in specific tasks and the majority of trade is intra- industry trade. In addition, I also inform the reader about the increasing role of the global supply chains and the changing patterns of the global trade that we see emerging.

Contrary to ordinary trade, which has been well discussed in several papers, PT has received just a scant consideration. Much attention of the thesis is therefore focused on the PT regimes, analysing the important sectors and outlining the core countries. Looking at the bilateral figures of the EU trade regimes I observe that ordinary trade accounts for about 89 % of exports and 95 % of imports. The remaining 11 % of exports and 5 % of imports in the year 2012 were conducted under PT regime, predominantly under IPT, while the share of OPT is less significant.

The PT of the EU is found to be strongly concentrated around the USA, Switzerland, Russia and some Asian countries. The PT appears to be concentrated on a relatively small number of partner countries, and some territories remain largely isolated from the participation in this type of trade. A next important fact stemming from the results is that the countries of Western Europe with Germany at its heart have a highly prominent role in all PT regimes, while some peripheral countries are not engaged to any significant degree. By and large, the data indicates that sophisticated products, e.g. products of automobile industry, electrical machinery and aircrafts are the major products involved in PT. However, this is especially visible for goods under the IPT regime, while for OPT we also observe some less value added products, e.g. clothes and shoes. Importantly, in OPT an increased share of non-EU European countries is observed. A large share of PT is found to take place between relatively similar trading partners within a particular industry, for instance, the exchange of automobile goods between Germany and the USA. The use of the OPT regime enables the EU enterprises to obtain advantage from lower labour costs or to conduct processes that are not available within the EU. Looking from the perspective of non-EU countries, they are mostly using PT with the EU for assembling sophisticated products. Most likely, under the PT regime enterprises do not aim to decrease production costs, but they are rather seeking high quality production or knowledge, which is hard to provide in the home country. The available writings have almost nothing to say about the determinants of PT, and therefore, this is the next step done in my thesis. The immense popularity of the gravity model convinced me to use this method as a workhorse for estimating the impact of different factors. When using this approach, we have to note that the empirical specifications based on the gravity model are not without econometric flaws.

In respect to this, the augmented equation controls for multilateral resistance terms, heterogeneity and endogenity. For the sake of results robustness, five different methodologies are applied and compared.

In summary, based on the overall estimation results, the impact of the GDP of the origin country is found to be positively related with all the trade regimes. In the case of PT this particularly implies a wide range of operations with an aim to improve the products in the strongest EU economic powers. In the line with the position at the top of the global value chains, significant value is added through processing. Coherent with the widespread assumptions, the GDP of the destination country is positively related with ordinary trade and IPT. Distance shows a very negative linkage, while adjacency a very positive one, especially in the case of PT. Geographical proximity is strongly confirmed to increase the international volume of trade, much in the line with the observations about the regionalization of the supply chains. Geographic dispersion of the stages of production under PT is found to be concentrated within a region. Having an RTA in force has mostly negative signs for PT, which indicates that PT is likely to be used with the goal to bypass tariffs and other trade barriers. Common language and colonial relationship are more important factors when one is analysing ordinary trade. The impact of GATT/WTO and FDI seems not to be so clear. The impact of FDI is somehow puzzling due to the two opposing views on the relationship between FDI and trade – it can either have a complementary or a substitutional effect. In the first case, the volume of trade is strengthened, and in the second case, the volume of trade is eroded because of the higher FDI investments. However, FDI is found to have more impact on PT than on ordinary trade. In the case of PT it shows a complementary effect, and in the case of ordinary trade the effect seems to be slightly substitutional. Accordingly, FDI is found to encourage vertical trade through establishing production capacities under PT regimes.

I conclude by identifying three issues for future research. The first questions that deserves a further reflection is why the share of IPT is so much higher than the share of OPT? This discrepancy indicates that non-EU countries are actually using PT for assembly, while the EU countries just rarely use OPT as a way to produce goods abroad. A second pertinent question is how much PT contributes to value-added creation in Europe. Despite the fact that PT flows are precisely recorded, it is impossible to derive precise conclusions from the available data. The third issue is related to a proper specification of the gravity equation. The applied specification of the gravity model is by no means exhaustive. Future researches might use it as a baseline with plenty of room for enhancement. It would be interesting to see how adding different explanatory variables or applying other methodologies affects the empirical success of the gravity equation. A further progress in this area is a necessity to deepen the understanding of the determinants of the EU trade regimes. With this study I should contribute to the empirical literature about the EU trade patterns. It was an honest attempt of analysing the EU trade regimes but it should be improved and explored in future.

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APPENDIXES

TABLE OF APPENDIXES

Appendix A: Short summary of the master's thesis in Slovenian language

Naslov:

Navpična specializacija zunanje trgovine EU: Vzorci trgovinskih tokov EU na osnovi poslov oplemenitenja

Avtor: Dare Dolenc

Svetovalec: prof. dr. Katja Zajc Kejžar

- **Uvod**

Mednarodno trgovanje se danes močno razlikuje od trgovanja v preteklosti. V času globalizacije je vloga globalnih oskrbovalnih verig vse bolj pomembna. Stroški komunikacije in prevoza se znižujejo, poleg tega pa tehnološki napredek omogoča lažje komuniciranje in nadzorovanje aktivnosti, ki niso v geografski bližini podjetja. Narava trgovine se spreminja. Bolj pogosto kot specializacijo držav na posamezni izdelek opažamo specializacijo na posamezni proces. Zaradi geografske razpršenosti proizvodnih faz izdelki potujejo skozi več držav, preden dosežejo končnega kupca. Ta pojav imenujemo navpična specializacija (Hummels et al., 1998).

Podjetje se lahko odloči, da bo izvajalo del svojih aktivnosti v tujini. Te aktivnosti lahko izvaja preko tujega partnerja ali pa razširi svoje lastno podjetje izven domačih meja. V obeh primerih govorimo o »offshoringu« (Feenstra, 2011). V magistrski nalogi preučujem posebno podvrst offshoringa, natančneje posle oplemenitenja (v nadaljevanju PO), in se zaradi dostopnosti podatkov osredotočam na Evropsko unijo (v nadaljevanju EU). Glavna prednost tega režima je, da so podjetja opravičena plačila carinskih dajatev in ukrepov trgovinske politike, ki veljajo za blago, uvoženo in izvoženo pod običajnim režimom. Za koriščenje teh ugodnosti podjetja potrebujejo posebno carinsko dovoljenje. Režim ima eno pomembno omejitev – izdelki, ki so začasno uvoženi v EU za operacije oplemenitenja, morajo biti po izvedbi teh operacij izvoženi nazaj v državo, iz katere so prišli. Pravila so identična v primeru, da država iz EU izvaža preko tega režima. V tem primeru se morajo izdelki po procesih oplemenitenja izven skupnosti vrniti nazaj v isto državo v EU. Zaradi oprostitve carinskih dajatev EU razlikuje med različnimi izvoznimi in uvoznimi režimi, ti podatki pa so javno dostopni v Eurostat Comext podatkovni bazi (Eurostat Comext, 2013). PO v magistrski nalogi predstavljajo osnovo za analizo dejavnikov navpične specializacije in dobavnih verig v EU. V nasprotju z običajnimi trgovinskimi tokovi EU, ki so pogosto predmet raziskav, je člankov, ki analizirajo PO, zelo malo. PO predstavljajo nezanemarljiv del trgovanja, vendar so kljub temu še razmeroma neraziskani, kar je tudi glavni razlog, da se osredotočam na analizo teh tokov.

Magistrsko delo lahko v grobem razdelimo na dva dela – teoretični in analitični. Metodologija v prvem delu je opisni pristop. Za boljše razumevanje analitičnega dela v

začetku naloge povzemam pomembnejše ugotovitve o spreminjanju trgovinskih vzorcev, globalnih oskrbovalnih verigah, navpični specializaciji in dodani vrednosti. V drugem delu uporabljam analitični pristop. Pred analizo pomembnih faktorjev primerjam vrednost PO z vrednostjo običajne trgovine, izpostavim pomembne države, sektorje in opišem gibanje vrednosti mednarodnega trgovanja EU od leta 2000 do 2012.

Za konkretno analizo dejavnikov, ki vplivajo na trgovinske vzorce EU, uporabljam gravitacijski model. Podatki so pridobljeni iz številnih virov, analizirani pa so trgovinski režimi vsake članice EU z vsako posamezno partnerico. Poleg osnovnih spremenljivk (bruto domači proizvod in razdalja) vključujem še druge odvisne spremenljivke, ki so pogosto uporabljene v raziskavah (investicije, skupni jezik, skupna meja itd.) Vsi podatki so zbrani v bazi, enačba pa je ocenjena s programom STATA. Gravitacijska enačba je predmet številnih pomislekov iz ekonometričnega vidika, zato je potrebovala nekatere prilagoditve. Enačbo ocenjujem s petimi različnimi modeli. Rezultati so med sabo primerjani in ustrezno interpretirani.

- **Teoretično ozadje**

Mednarodno trgovanje zajema izmenjavo izdelkov, polizdelkov, storitev in kapitala med državami. Preko mednarodnega trgovanja država lahko izvaža izdelke, ki jih lahko relativno učinkovito proizvede znotraj domačih meja, in uvaža izdelke, ki jih relativno manj učinkovito proizvaja. Velik del mednarodne trgovine predstavlja trgovanje med podjetji (angl. *business to business* – B2B) s sestavnimi deli ali polizdelki. Tok blaga od dobavitelja preko proizvodnje in distribucijskih kanalov do končnega uporabnika poteka preko oskrbovalnih verig. Globalne oskrbovalne verige so niz treh ali več oseb (organizacij ali posameznikov), ki so neposredno vključeni v nabavnih in prodajnih tokovih izdelkov, storitev, financ in/ali informacij iz vira na stranko (Mentzer et al., 2001, str. 4). Več kot polovica svetovnega trgovanja je posledica izmenjave blaga znotraj globalnih oskrbovalni verig (OECD, 2012).

Podjetja iščejo optimalen način proizvajanja, zato je proizvodni proces pogosto internacionaliziran. Navpična specializacija je definirana kot proces, ko država uvozi izdelek iz druge države, uporabi ta izdelek kot input za proizvajanje svojega lastnega izdelka in potem ta izdelek izvozi v drugo državo (Hummels et al., 1998, str. 80). Proizvodni proces je torej velikokrat razdeljen med več držav ali teritorijev.

Iz teoretičnega vidika se različne države specializirajo na različne proizvodne procese. Koopman et al. (2010) trdi, da če država proizvaja inpute, se nahaja v zgornjem delu oskrbovalne verige, če pa uvaža inpute za proizvodnjo, se nahaja v spodnjem delu verige. Druga razlaga je, da se države z manjšo verjetnostjo napak specializirajo v kasnejše faze proizvodnje, kjer so napake dražje (Costinot et al., 2011). Omenjeni avtorji pojasnjujejo, da manj razvite države težijo k specializaciji v zgodnjih fazah proizvodnje, medtem ko se bolj razvite države nagibajo k proizvajanju najbolj kompleksnih delov z najvišjo dodano

vrednostjo. Görg (2000) trdi, da je država z nizkimi stroški dela verjetno pozicionirana na dnu oskrbovalne verige. Če povzamemo, se razvitejše države praviloma specializirajo na bolj kompleksne faze proizvodnje z visoko dodano vrednostjo, manj razvite države pa na bolj enostavne procese z nižjo dodano vrednostjo.

Pomembno je, da ločimo med pojmi navpična specializacija, navpična integracija, outsourcing in offshoring. Navpična specializacija po definiciji zajema aktivnosti držav, medtem ko ostali pojmi zajemajo aktivnosti organizacij. Za razliko od navpične specializacije navpična integracija in outsourcing nista nujno povezana s selitvijo aktivnosti podjetja v tujino. Navpična integracija je v svoji osnovi namreč le združitev več podjetij v eno samo podjetje. Če se med sabo povežejo domača podjetja, govorimo o domači navpični integraciji. Če se povežejo podjetja iz različnih držav, govorimo o multinacionalni navpični integraciji. Naslednja posebna sodelovalna strategija organizacije je outsourcing, pod čemer razumemo oddajo del zunanjemu izvajalcu, ki je lahko domač ali tuj. Na tej točki je smiselno, da predstavim izraz »offshoring«. Po novejših definicijah (Grossman in Rossi-Hansberg, 2008; Feenstra, 2011) je offshoring nujno povezan s selitvijo nekaterih aktivnosti v tujino, ne glede na lastnika aktivnosti. O offshoringu torej lahko govorimo v dveh primerih – če se podjetje navpično poveže s tujim podjetjem ali če zaupa nekatere dejavnosti preko outsourcinga zunanjim izvajalcem v tujini.

PO so podskupina offshoringa, preko katere proučujem determinante navpične specializacije EU. PO predstavljajo poslovno aktivnost uvažanja inputov, kot so deli in komponente, in po predelavi, preoblikovanju ali sestavljanju teh inputov ponoven izvoz blaga v državo izvora. Po informacijah Eurostata (2006) so ti izdelki upravičeni do oprostitve plačila dajatev, ki bi morale biti plačane v okviru trgovinske politike, ki običajno velja za uvoženo blago. PO so možni za vsak izdelek, aktivnosti pa lahko vključujejo širok spekter dejavnosti (spreminjanje, izdelava, sestavljanje, izboljšava, prenova) s ciljem, da se izdelek pomembno izboljša ali izdela nov izdelek, kar pa ne vključuje nujno spremembe pri klasifikaciji izdelka (Eurostat, 2007).

V magistrski nalogi so proučevani naslednji trgovinski režimi EU:

a) Običajni izvoz
b) Običajni uvoz
c) Aktivni PO izvoz (v nadaljevanju IPX – angl. *Inward processing exports*)
d) Aktivni PO uvoz (v nadaljevanju IPM – angl. *Inward processing imports*)
e) Pasivni PO izvoz (v nadaljevanju OPX – angl. *Outward processing exports*)
f) Pasivni PO uvoz (v nadaljevanju OPM – angl. *Outward processing imports*)

Običajni uvoz in izvoz (a in b) se nanašata na blago, ki je dokončno izvoženo ali uvoženo in se sprosti v prost promet v EU bodisi neposredno bodisi prek carinskega skladišča (Eurostat, 2006).

Postopek aktivnega oplemenitenja (c in d) omogoča, da se neskupnostno blago začasno uvozi v skupnost, v kateri se na njem izvedejo operacije oplemenitenja (CURS, 2013). Aktivni PO uvoz (IPM) je uvoz blaga iz tuje države v državo EU za nadaljnjo obdelavo. Ponovno izvoženo blago po izvedbi procesov oplemenitenja, ki je opravičeno plačila dajatev, se meri kot aktivni PO izvoz (IPX).

Postopek pasivnega oplemenitenja (e in f) omogoča, da se skupnostno blago začasno izvozi s carinskega območja skupnosti, da se na njem izvedejo operacije oplemenitenja oz. popravila (CURS, 2013). Oplemeniteno blago se ponovno uvozi in sprosti v prost promet s popolno ali delno oprostitvijo uvoznih dajatev (CURS, 2013). Pasivni PO izvoz (OPX) je izvoz blaga iz EU za nadaljnjo predelavo izven skupnosti. Ko se blago ponovno uvozi, se na podlagi tarifne oprostitve meri kot pasivni PO uvoz (OPM). Prav tarifne olajšave so razlog, da organi EU natančno beležijo omenjene trgovinske režime.

Wang et al. (2010) trdi, da se večina mednarodnega trgovanja odvija znotraj posamezne panoge (angl. *Intra-industry trade*) in med državami s podobnimi tehnološkimi kapacitetami. Iz značilnosti PO sklepam, da se večina trgovanja pod tem režimom izvaja znotraj posamezne panoge in med pari držav, ki imajo podobne tehnološke kapacitete. Čeprav ni veliko člankov povezanih s PO, je smiselno izpostaviti glavne ugotovitve. Egger in Egger (2005) sta ugotovila, da so aktivnosti aktivnega PO v EU zelo tehnološko intenzivne. Thorbecke (2010) je dodal, da v PO postajajo visokotehnološki izdelki, kot so stroji in električni proizvodi, vedno pomembnejši, tako na strani uvoza kot izvoza, medtem ko delovno intenzivne industrije, kot so tekstilni izdelki, občutno izgubljajo na pomembnosti. Skladno s temi ugotovitvami Cirrera et al. (2012) dokazuje, da minimizacija stroškov ni razlog za uporabo PO, ampak se ti postopki verjetneje uporabljajo za proizvodnjo kompleksnih izdelkov. Rezultati raziskave od Görga (2000) kažejo, da prisotnost ameriških tujih neposrednih naložb (v nadaljevanju TNI) v državi članici EU pozitivno vpliva na količino PO, zlasti v obrobnih državah EU. Ferrarini (2011) je določil tri glavna središča za PO. Kot prvo središče je izpostavil evropsko mrežo z Nemčijo v svojem centru, kot drugo države članice NAFTA in kot tretje središče je izpostavil Azijo, zlasti v zvezi s trgovino z deli in komponentami med Kitajsko in Japonsko. Cernat in Pajot (2012) navajata, da imajo nekateri sektorji veliko večjo vlogo od ostalih. Na izvozni strani sta izpostavila visok delež motornih vozil, zlasti v Nemčiji. Na uvozni strani pa sta izpostavila velik delež tobačnih in kemijskih surovin.

Rugman et al. (2009) je poudaril razloge, zakaj so oskrbovalne verige pravzaprav v večji meri regionalne in ne globalne. Kot razloge navaja porast regionalnih trgovinskih sporazumov (v nadaljevanju RTS), težave v koordiniranju na velike razdalje, izogibanje tveganju, kulturno raznolikost, krajše dobavne roke itd. Nenaklonjenost tveganju po krizi bi lahko spodbudilo podjetja, da opustijo globalne strategije in ohranjajo svoje dejavnosti bližje iz regionalne perspektive (WTO, 2012).

Posledice razvejanosti proizvodnje med državami so velike razlike med bruto trgovinskimi tokovi in dodano vrednostjo (Johnson & Noguera, 2012). Tradicionalna statistika vključuje končne izdelke in tudi polizdelke, zato je doprinos posameznih držav pogosto narobe ocenjen. Za ponazoritev problema merjenja izpostavimo, da ima Kitajska visok delež tuje dodane vrednosti in ob istem času visok trgovinski presežek z razvitimi gospodarstvi, na primer z ZDA, Japonsko in Južno Korejo. Koopman et al. (2010) je ugotovil, da je Kitajska končni proizvajalec v številnih svetovnih oskrbovalnih verigah, zato je njen presežek z ZDA in Zahodno Evropo v dodani vrednosti več kot 40 % manjši od tistega, merjenega v bruto trgovinskih tokovih. Kitajska v tem primeru doda le malo vrednosti, vendar je v bruto izvozu zabeleženo, kot da je celotna vrednost nastala na Kitajskem.

- **Novi trgovinski vzorci**

Širitev svetovne in regionalne trgovine poganjajo pomembni dejavniki, npr. liberalizacija, navpična specializacija, deregulacije z odprtjem nekaterih tradicionalno zaprtih trgov, dohodkovna konvergenca, nižanje komunikacijskih stroškov itd. Poleg rasti mednarodne trgovine se pomembno spreminjajo tudi razmerja moči med teritoriji. Gibanja v svetovni trgovini imajo pomembne učinke na spreminjajoče se vzorce globalne trgovine. Svetovna trgovina močno okreva po finančni krizi, vendar nekatera razvita gospodarstva okrevajo precej počasneje od gospodarstev v razvoju.

Pomembno je vedeti, da je delež razvitih držav v blagovnem izvozu padel s 65 % v letu 2000 na 50 % v letu 2012, medtem ko se je delež držav v razvoju povečal z 31 % na 44 % v istem obdobju. Rast je bila najopaznejša v Aziji in manj silovita v razvijajočih se gospodarstvih Afrike, Južne Amerike in Oceanije. Nekatera razvita gospodarstva se še vedno borijo za vrnitev k trajnostni rasti po krizi. Rast v razvitih gospodarstvih bo predvidoma še otežena zaradi fiskalnega zadolževanja, izplačevanja dolgov in staranja prebivalstva (Ernest & Young, 2011).

V Evropi ni prišlo do velikih sprememb v deležih mednarodnih tokov v Nemčiji, Švici in Avstriji. Podatki kažejo, da so štiri pomembne ekonomije (Velika Britanija, Italija, Francija in Španija) bistveno zmanjšale svoj delež. Obrobne države EU trpijo zaradi varčevalnih ukrepov, vendar okrevanje ključnih držav ne more izničiti splošnih težav skupnosti.

Delež izvoza Vzhodne Azije se je povečal z 12 % v letu 2000 na več kot 18 % v letu 2012, medtem ko deleža Jugovzhodne Azije (7 %) in Južne Azije (3 %) ostajata relativno manj pomembna. Kitajska in Indija sta skoraj potrojili svoj delež v izvozu in uvozu med letoma 2000 in 2012. Danes Kitajska ni le pomembno trgovinsko središče za delovno intenzivne izdelke, temveč tudi za visoko tehnološke. Kitajska se trenutno sooča s konkurenco še bolj izrazito nizkocenovnih držav, kot so nekatera področja Afrike, Vietnam in Bangladeš. Poleg rasti v Aziji opažamo tudi rast na Bližnjem vzhodu, predvsem v Saudski Arabiji, Združenih arabskih emiratih in Katarju. Kljub temu da smo priča vzponu razvijajočih se

držav, razvita gospodarstva tradicionalno ostajajo na vrhu oskrbovalnih verig in se osredotočajo na aktivnosti z najvišjo dodano vrednostjo.

- **Umestitev poslov oplemenitenja v celotno trgovino EU**

Vrednost običajnega uvoza in izvoza v EU je stalno naraščala od leta 2000 do začetka gospodarske krize leta 2008, vendar je mednarodno trgovanje hitro okrevalo in v letu 2012 že preseglo rekordno vrednost. Najpomembnejše zunanje partnerice EU so po sledečem vrstnem države BRIC, NAFTA, EFTA in razvite države Azije (Tabela 1). V okviru običajne trgovine EU največ uvaža iz Kitajske (17 %) in največ izvaža v ZDA (16 %).

Leta 2012 je bilo okoli 10 % (169 milijard €) od vsega izvoza EU del IPX. OPX je predstavljal le približno 0,8 % (13,4 milijard €) celotnega izvoza. Če se osredotočimo na celoten uvoz, opazimo da je bilo okoli 4 % (73 milijard €) uvoženega preko IPM in okoli 1 % (13,4 milijard €) preko OPM. Očitno je, da delež običajne trgovine predstavlja veliko večino vsega trgovanja in da ima aktivni PO precej večjo vlogo od pasivnega PO. Poleg tega v oči bode razlika med vrednostjo IPM in IPX (73 in 169 milijard €). Razkorak med IPX in IPM postaja vedno višji, kar kaže na vedno višjo dodano vrednost preko PO. Iz tega lahko sklepamo, da se države EU vedno bolj osredotočajo na tehnološko zahtevne procese z visoko dodano vrednostjo. Če primerjamo EU s Kitajsko, opazimo, da ima EU veliko manjši delež PO v svoji strukturi mednarodne trgovine.

Najpomembnejši zunanji partnerji v aktivnem PO so članice NAFTA in države BRIC. Kot je bilo že omenjeno, aktivni PO lahko razdelimo na IPX in IPM. Na strani uvoza so daleč najpomembnejši partner ZDA, ki predstavljajo kar 36 %. Sledita ji Rusija in Japonska s 7 % in Švica ter Kitajska s 6 % deležem. Zanimivo je, da ima Kitajska precej nižji delež kot v primeru običajnega uvoza. Na strani izvoza so spet najpomembnejše ZDA (29 %), sledijo ji Kitajska (15 %), Rusija (7 %) in Japonska (5 %). EU preko aktivnih PO uvaža relativno malo iz Kitajske, vendar nato izvaža vrednostno veliko več, kar namiguje, da imajo izdelki nizko vrednost, ko so uvoženi. Preko PO se njihova vrednost znatno poveča pred izvozom na Kitajsko.

Tudi pasivni PO lahko razdelimo na dva dela. Najpomembnejši partner v obeh primerih so spet ZDA. Na drugem mestu so evropske države, ki niso članice EU ali EFTA. V pasivnem PO imajo veliko večjo vlogo kot v aktivnem PO. To nakazuje, da države EU izkoriščajo nižje stroške dela v državah, ki so v geografski bližini, in izvajajo nekatere aktivnosti v državah, ki si delijo mejo z EU. Delež Kitajske in Rusije je v tem režimu presenetljivo nizek. Mogoč razlog je, da je PO Kitajske močno skoncentriran na področje Azije, predvsem na relaciji z Japonsko in Južno Korejo (Alyson et al., 2009).

Kljub temu da nekatere države v razvoju postajajo pomembne v mednarodni trgovini, je PO v EU močno skoncentriran le na nekatere partnerje. Bližnji vzhod in afriške države so skoraj popolnoma izključene iz tega režima. Njihov delež je precej manjši od deleža v

običajni trgovini. Velik del PO je posledica sodelovanja z najbolj razvitimi državami in Kitajsko, medtem ko so deleži nekaterih pomembnih držav, kot sta Indija in Turčija, izjemno nizki.

Aktivni PO v EU je močno skoncentriran le na nekaj držav. Nemčija predstavlja veliko večino z 32 %, sledijo ji Združeno kraljestvo z 22 %, Francija z 8 % Italija s 7 % in Belgija s 6 %. Deleži ostalih držav so krepko nižji od 3 %. Razmerja so podobna, če analiziramo pasivni PO, vendar ne moremo trditi, da so deleži vedno povezani. Združeno kraljestvo na primer predstavlja le 5 % pasivnega PO, v nasprotju s skoraj četrtinskim deležem aktivnega PO. Nasproten primer je Slovenija, ki ima zelo nizek delež aktivnega PO in večji delež pasivnega PO (Tabela 2). Prevlada držav Zahodne Evrope v PO je še bolj očitna kot v primeru običajnega trgovinskega režima.

Tehnološko zahtevne industrije prevladujejo v PO. Na strani vhodnega PO so najpomembnejša motorna vozila, jedrski reaktorji, stroji in mehanske naprave, letala in deli za vesoljska plovila. Kljub temu da na strani pasivnega PO opazimo nekoliko večje deleže manj tehnoloških intenzivnih sektorjev (tekstil, obutev), velika večina industrij sodi med tehnološko najzahtevnejše, kar je skladno s predhodnimi raziskavami (Görg, 2000; Egger in Egger, 2005; Thorbecke, 2010). Zanimiv podatek je tudi, da je le nekaj sektorjev v veliki meri vključenih v PO.

- **Gravitacijska enačba**

Številne empirične študije analizirajo mednarodne trgovinske tokove na podlagi gravitacije enačbe. Ta v svoji osnovni obliki predvideva, da so bilateralni trgovinski tokovi pozitivno odvisni od velikosti držav, ki je v večini primerov merjena z bruto domačim proizvodom (v nadaljevanju BDP), in negativno povezani z razdaljo med obravnavanim parom. Osnovno enačbo lahko zapišemo $F_{ij}=G\frac{M_i^{\alpha}M_j^{\beta}}{D_{ij}^{\theta}}$, kjer je F_{ij} trgovinski tok med lokacijama *i* in *j*, M_i^{α} in M_j^{β} predstavljata gospodarsko velikost držav (BDP), D_{ij}^{θ} pa predstavlja razdaljo med lokacijama *i* in *j* (Head, 2003). Ker je enačba multiplikativna, jo lahko logaritmiramo ter ocenjujemo linearno povezavo med logaritmi trgovskih tokov in ostalimi spremenljivkami. Osnovna gravitacijska enačba praviloma dobro pojasnjuje tokove, vendar obstaja še mnogo drugih dejavnikov, ki vplivajo na intenzivnost tokov. Za natančnejšo analizo moramo torej upoštevati še številne druge faktorje. V svoji gravitacijski enačbi vključujem odvisne spremenljivke in neprave spremenljivke (angl. *dummy variables*), ki lahko zavzamejo le vrednost 0 ali 1. Primer take spremenljivke je »skupen uradni jezik«. Če ima analiziran par držav isti uradni jezik, potem spremenljivka zavzame vrednost ena, v nasprotnem primeru pa vrednost nič. Moja razširjena enačba vključuje standardne kontrolne spremenljivke, ocenjene s koeficientom α (BDP, geografska razdalja, TNI), in neprave spremenljivke, ocenjene s koeficientom β (regionalni trgovinski sporazum, skupna meja, skupni jezik, skupno članstvo v Svetovni trgovinski organizaciji ali članstvo v Splošnem sporazumu o carinah in trgovini, kolonialni odnos, upravičenost do Splošnega

sistema preferencialov). Simbola δ_i in δ_j sta vektorja fiksnih učinkov za izvorno in ciljno državo. Končna gravitacijska enačba, ki je ocenjena s programom STATA, je zapisana:

$$\begin{aligned} ln\, F_{ijt} = {} & \alpha_0 + \alpha_1 lnBDP_{it} + \alpha_2 lnBDP_{jt} + \alpha_3 lnRAZ_{ij} + \alpha_4 lnIzhTNI_{ijt} + \alpha_5 lnVhoTNI_{ijt} \\ + {} & \left[\beta_1 skup\_jez_{Urad_{ij}} + \beta_2\, skupna\_meja_{ijt} + \beta_3 kolonija_{ij} + \beta_4\, skupna\_kol_{ij}\right. \\ + {} & \left. \beta_5 trenutna\_kol_{it} + \beta_6\, RTS_{ijt} + \beta_7 GATT/STO_{jt} + \beta_8 GSP\ PTS\ upra_{jt}\right] + \delta_i + \delta_j + \varepsilon_{ijt} \end{aligned} \quad (1)$$

Zaradi ekonometričnih težav je enačba potrebovala določene prilagoditve. Za lažje ocenjevanje enačbe so vse prave kontrolne spremenljivke transformirane v logaritme. Logaritmi niso definirani za negativna števila in število nič. Da ne bi izgubil velike večine vzorca, so v vseh modelih negativni podatki o TNI zamenjani z majhno pozitivno konstanto. Predmet opazovanja je določen par držav v določenem letu, zato so oblikovane vse možne kombinacije parov držav v določenem letu, v skupnem številu je 26,433 takih kombinacij. Empirično ocenjujem gravitacijsko enačbo pazljivo zaradi velikega števila mednarodnih tokov, ki zavzemajo vrednost nič in so tako izgubljeni z logaritemsko transformacijo ter zaradi endogenosti nekaterih spremenljivk. V obravnavani enačbi sta predvsem spremenljivki TNI in RTS v literaturi izpostavljeni kot endogeni (Baier & Bergstad, 2005; Shepherd, 2008; Wang et al., 2010; Baccheta et al., 2012). V tej raziskavi sledim rešitvi, predlagani s strani Shepherda (2008), ki trdi, da kljub temu da so trenutne vrednosti endogene, pretekle vrednosti najverjetneje niso bile predmet istega problema. Posledično sta spremenljivki TNI in RTS v modelu ocenjeni v zapozneli obliki. Poleg omenjenega so spremenljivke podane v različnih valutah, zato so prilagojene glede na ustrezne menjalne tečaje. Učinek večstranske odpornosti zajemam s serijo fiksnih učinkov za izvorno in ciljno državo s časovnimi fiksnimi učinki in fiksnimi učinki za pare držav.

Razširjeno enačbo ocenjujem s petimi različnimi modeli. V prvem modelu ocenjujem enačbo z metodo najmanjših kvadratov (angl. *ordinary least square*). Učinek večstranske odpornosti nadzorujem s časovnimi fiksnimi učinki in fiksnimi učinki za izvorno in ciljno državo. V tem modelu so vsi tokovi (F_{ijt}), ki zavzemajo vrednost nič, avtomatično izpuščeni iz ocenjevanja zaradi logaritemske transformacije. V drugem modelu prav tako uporabljam metodo najmanjših kvadratov, le da je vsem tokovom z ničelno vrednostjo dodana majhna pozitivna konstanta (1). S tem se izognem izpuščanju velikega deleža vzorca. V tretjem modelu uporabljam fiksne učinke trgovalnih parov namesto fiksnih učinkov za izvorno in ciljno državo. Največja pomanjkljivost tega modela je, da je nemogoče ocenjevati časovno nespremenljive spremenljivke, kot so razdalja, skupna meja in skupen jezik. Te kontrolne spremenljivke so izpuščene zaradi popolne kolinearičnosti s fiksnimi učinki. V četrtem modelu za ocenjevanje uporabljam Poisson model največje verjetnosti (v nadaljevanju PPML). Glavna prednost tega modela je, da se dobro obnese tudi v primeru velikega števila ničelnih vrednosti (Santos Silva & Tenreyro, 2006). V zadnjem modelu uporabljam časovno spreminjajoče specifične učinke za izvozno in uvozno državo. Pri tem modelu je nemogoče pravilno oceniti specifične spremenljivke

držav (npr. BDP) zaradi popolne kolinearičnosti časovno spreminjajočih fiksnih učinkov in časovno spreminjajočih specifičnih spremenljivk držav.

- **Rezultati in pomembne ugotovitve**

Rezultati uporabljenih modelov se med sabo razlikujejo, kljub temu pa jasno nakazujejo nekatere značilnosti vzorcev trgovinskih tokov v EU. BDP izvorne države je pozitivno povezan z vsemi režimi, najbolj pa je ta povezava močna v primeru uvoza preko aktivnih PO. Močne gospodarske sile EU (Nemčija, Velika Britanija in Francija), ki proizvajajo izdelke z visoko dodano vrednostjo in so pozicionirane na vrhu globalnih oskrbovalnih verig, so najpogostejša lokacija za procese aktivnega PO. Ta rezultat kaže, da države, ki niso članice EU, uporabljajo PO predvsem v navezi z visoko razvitimi članicami in v veliko primerih za oplemenitenje prefinjenih izdelkov. Pozitivni in statistično značilni koeficienti za pasivni PO nakazujejo, da države z najvišjim BDP najpogosteje outsourcajo procese oplemenitenja. Ta rezultat namiguje, da države z višjo ceno delovne sile izkoriščajo nižjo ceno delovne sile v državah izven EU. Koeficienti za BDP ciljne države so po pričakovanjih pozitivno povezani z običajnim režimom in aktivnim PO. Za pasivni PO so rezultati manj neposredni, kar še enkrat nakazuje, da se države članice EU nagibajo k izkoriščanju mednarodnih razlik pri stroških dela in uporabljajo PO za proizvodnjo v državah z nižjim BDP in nižjimi stroški dela. V primerjavi z običajno trgovino je zaradi značilnosti PO gospodarska velikost države manj pomembna, saj izdelke ni dovoljeno prodati na trgu ciljne države. Analiza spremenljivke »razdalja« nam poda najbolj nedvoumne rezultate. Kljub temu da se stroški prevoza in komunikacij znižujejo, so koeficienti za vse trgovinske režime negativni, statistično značilni in visoki. Ta ugotovitev podpira argumente o geografski razpršenosti proizvodnih faz znotraj posamezne regije (Rugman et al., 2009). Naslednja ugotovitev je, da aktiven RTS pozitivno vpliva na količino trgovanja v običajnem režimu. Zanimivo je, da je ta povezava obratna v primeru PO, saj so vsi statistično značilni koeficienti negativni, z izjemo IPM v zadnjem modelu. To ni presenetljivo, če poudarimo, da so izdelki pod režimom PO opravičeni plačila carinskih dajatev. Trgovinski sporazumi se oblikujejo z namenom zniževanja trgovinskih ovir, tako da PO v nekaterih primerih predstavlja sredstvo za izogibanje teh ovir med državami, ki nimajo aktivnega sporazuma. Za razliko od ostalih modelov po metodi PPML ocenjevanja regionalni trgovinski sporazum igra le majhno vlogo. Ocena skupnega jezika kaže, da le-ta poveča količino običajne trgovine med državami, vendar pa je povezava, čeprav večinoma statistično značilna, manj jasna v primeru PO. Zelo zanimiva dejstva razkrije analiza skupnih meja. Skupna meja zelo pomembno vpliva na vse štiri režime PO, predvsem na pasivnega, medtem ko ima veliko manjšo vlogo pri običajnem režimu. Opazimo nekaj večjih številk v odnosu med sosednjimi razvitimi državami, zlasti v PO iz Nemčije, Francije in Italije v Švico. Poleg tega opazimo nekatere bolj dinamične številke v odnosih med drugimi različno razvitimi sosednjimi državami (Slovenija – Hrvaška, Poljska – Ukrajina, Romunija – Srbija itd.). Izračunani koeficienti močno podpirajo nedavne ugotovitve o regionalizaciji globalne preskrbovalne verige in regionalnega povezovanja.

Nezanemarljivo je tudi dejstvo, da morajo biti izdelki po oplemenitenju v ciljni državi poslani nazaj v izvorno državo, torej opravijo isto pot najmanj dvakrat. Zato je smiselno, da imajo sosednje države prednost pred bolj geografsko oddaljenimi. Vse metodologije pokažejo pozitiven odnos v primeru, da je bil obravnavani par držav v preteklosti v kolonialnem odnosu. Najbolj je ta povezava očitna v primeru običajne trgovine, najmanj pa v primeru pasivnega PO, kar nakazuje, da je geografska razdalja v režimu oplemenitenja pomembnejša od kolonialnega odnosa.

Ocenjevanje dejstva, ali je ciljna država članica Splošnega sporazuma o carinah in trgovini (v nadaljevanju GATT) ali Svetovne trgovinske organizacije (v nadaljevanju STO), pokaže v večini primerov statistično neznačilne koeficiente, kar mi onemogoča natančne zaključke. Pričakoval sem, da manj diskriminatorne trgovinske politike krepijo mednarodno trgovino, toda rezultati kažejo dvoumen učinek. V nekaterih regresijah imajo kazalci pozitivni znak in so statistično značilni, medtem ko nasprotno velja za druge regresije. Izpostavil bi dva mogoča vidika za ta neskladja. Prvi je, da se velika večina trgovine odvija znotraj posamezne panoge in med državami s podobnimi tehnološkimi kapacitetami (Wang et al., 2010). Če upoštevamo predpostavki, da je večina EU držav zelo razvitih in da je večina zunanjih razvitih partneric članic GATT/STO, bi intuitivno pričakovali pozitivne kazalce. Gledano z drugega vidika je manj diskriminatorna trgovinska politika lahko razlog za zmanjšanje trgovanja pod PO režimom, saj je več izdelkov opravičenih carinskih dajatev tudi v primeru običajne trgovine.

Rezultati modelov so si neenotni tudi v primeru ocenjevanja spremenljivk o vhodnih in izhodnih TNI. Povezava med PO in izhodnim TNI je pozitivna za Modele 1, 2 in 5, medtem ko Model 3 izračuna negativno povezavo. Razlike med ocenami kažejo na zapleten odnos med trgovanjem in TNI. Učinki se lahko močno razlikujejo od enega para držav do drugega para v določenem letu. Prvi razlog je, da se tokovi TNI zelo razlikujejo med obdobji, kar je verjetno posledica velikih združitev in prevzemov, ki se odvijajo v posameznem letu. Drugi razlog je, da ima TNI dva možna učinka – substitucijski in komplementarni. Po prvem učinku večje naložbe zmanjšajo količino trgovanja, saj podjetje namesto domače proizvodnje in izvoza v tujino svoje proizvodne obrate preseli v tujino. S tem se zmanjša pretok blaga med dvema državama. Na drugi strani komplementaren učinek predlaga večjo intenzivnost trgovanja v primeru višjih TNI. V veliki večini rezultati za običajno trgovino nakazujejo substitucijski učinek, za PO pa komplementarni učinek. Pomembna ugotovitev je, da multinacionalna podjetja s svojimi investicijami spodbujajo PO v EU.

Zadnja ocenjena spremenljivka je »splošni sistem preferencialov« (v nadaljevanju GSP). To je instrument trgovinske politike, ki z raznimi olajšavami spodbuja uvoz iz držav v razvoju. Rezultati pojasnjujejo, da države EU ne uvažajo veliko od upravičencev GSP pod režimom pasivnega PO, ampak le pod aktivnim PO in običajnim režimom.

Nekaj vprašanj ostaja delno nerazrešenih, zato upam, da bomo odgovor nanje dobili s pomočjo prihodnjih raziskav. Prvo vprašanje, ki si zasluži nadaljnjo analizo, je, zakaj je v EU delež aktivnega PO toliko višji od deleža pasivnega PO. Drugo vprašanje je, koliko je dejanske dodane vrednosti v PO. Delno lahko to ocenimo na primerjavi vrednosti uvoza in izvoza posameznega režima, vendar to ne vključuje vrednosti sestavnih delov, ki so bili dodani med samim oplemenitenjem. Tretje vprašanje je povezano z ustrezno specifikacijo gravitacijske enačbe. Uporabljena specifikacija nikakor ni dokončna, vendar bi lahko bila v prihodnjih raziskavah uporabljena kot izhodišče z nekaj prostora za izboljšanje. Zanimivo bi bilo tudi videti, kako dodajanje različnih pojasnjevalnih spremenljivk vpliva na dobljene rezultate.

Appendix B: List of variables with sources

Table 11. Variables with sources

Abbreviation	Definition	Source of Data
Ordinary Imports	Imports to the EU countries	EUROSTAT - Comext
Ordinary Exports	Exports of the EU countries	EUROSTAT - Comext
IPT	Inward processing trade	EUROSTAT - Comext
OPT	Outward processing trade	EUROSTAT - Comext
IPX	Inward processing exports	EUROSTAT - Comext
IPM	Inward processing imports	EUROSTAT - Comext
OPX	Outward processing exports	EUROSTAT - Comext
OPM	Outward processing imports	EUROSTAT - Comext
GDP	Gross domestic product	THE WORLD BANK
DIST	Distance between two countries	Head, Mayer and Ries (2010)
RTA_UPDATE	Regional trade agreement	WTO
COMLANG_OFF	Common language	Head, Mayer and Ries (2010)
CONTIG	Common border	Head, Mayer and Ries (2010)
COLONY	Former colony	Head, Mayer and Ries (2010)
COMCOL	Common colonizer	Head, Mayer and Ries (2010)
CURCOL	Current colony	Head, Mayer and Ries (2010)
GATT_D	General Agreement on Tariffs and Trade	WTO
OutFDI	Outward Foreign Direct Investment	OECD
InwFDI	Inward Foreign Direct Investment	OECD
GSP	General System of Preferences	UNCTAD

Appendix C: Created groups

- **NAFTA:** the USA, Mexico, Canada.
- **BRIC:** Brazil, Russia, India, China.
- **DEVELOPED ASIA:** Japan, South Korea, Singapore, Hong Kong, Taiwan.
- **EFTA:** Switzerland, Norway, Iceland, Liechtenstein.
- **OTHER NON - EU EUROPEAN COUNTRIES**: San Marino, Bosnia and Herz., Serbia and Montenegro till 31/05/2005, Kosovo, For.JRep.Mac, Montenegro, Serbia, Croatia, Ukraine, Belarus, Albania, Moldova.
- **SOUTH AMERICA:** Argentina, Uruguay, Paraguay, Bolivia, Chile, Peru, Ecuador, Surinam, Peru, Guyana, Colombia, Venezuela, Falkland Is.
- **REST OF THE WORLD:** Faroe Isles, Andorra, Gibraltar, Malta, Turkey, Georgia, Armenia, Azerbaijan, Kazakhstan, Turkmenistan, Uzbekistan, Tadjikistan, Kyrghyzstan, Croatia, Morocco, Algeria, Tunisia, Libyan Arab Jamahiriya, Egypt, Sudan, South Sudan, Mauritania, Western Sahara, Mali, Burkina Faso, Niger, Chad, Cape Verde, Senegal, Gambia, Guinea, Biss.Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Togo, Benin, Nigeria, Cameroon, Centr.Africa, Equat.Guinea, S.Tome, PrincGabon, Congo, Congo (Dem. Rep.), Rwanda, Burundi, Saint Helena, Angola, Ethiopia, Eritrea, Djibouti, Somalia, Kenya, Uganda, Tanzania, Seychelles, B.I.O.T., Mozambique, Madagascar, Mauritius, Comoros, Mayotte, Zambia, Zimbabwe, Malawi, South Africa, Namibia, Botswana, Swaziland, Lesotho, Greenland, S.Pierre, MiqBermuda, Guatemala, Belize, Honduras, El Salvador Nicaragua, Costa Rica, Panama, Anguilla, Cuba, St.Ch.&Nevis, Haiti, Bahamas, Turks, Caicos, Dominican R., Virgin Isles, Antigua, Barb Dominica, Cayman Isles, Jamaica, St Lucia, Saint Barthelemy, St Vincent, Brit.Virg.Isl., Barbados, Montserrat, Trinidad&Tob, Grenada, Aruba, Curaçao Bonaire, Sint Eustatius and Saba, Nl Antilles, Sint Maarten (Dutch part), Lebanon, Syria, Iraq, Iran, Israel, Gaza + Jericho, Timor-Leste, Jordan, Saudi Arabia, Kuwait, Bahrain, Qatar, U.A.Emirates, Oman, Yemen, Afghanistan, Pakistan, Bangladesh, Maldives, Sri Lanka, Nepal, Bhutan, Myanmar, Thailand, Laos (People's Democratic Republic), Vietnam, Cambodia, Indonesia, Malaysia, Brunei, Philippines, Mongolia, North Korea, Macao, Australia, Papua N.G., Aust.Oceania, Nauru, New Zealand, Solomon Is., Tuvalu, N. Caledonia, Am. Oceania, Wallis, Kiribati, Pitcairn, N.Z Oceania, Fiji, Vanuatu, Tonga, West. Samoa, North.Mar.Is, Fr.Polynesia, Fed.Micron, Marshall Is., Palau, Américan Samoa, Guam, US Minor outlying Islands, Cocos Islands(or Keeling Isl.), Christmas Island, Heard Island & McDonald Islan., Norfolk Island, Cook Islands, NiueTokelau, Antarctica, Bouvet Island, South Georgia & S.Sandwich, Is.French Southern Territories, other countries and territories not determined.

Appendix D: List of GSP beneficiaries

Afghanistan, Algeria, Américan Samoa, Angola, Anguilla, Antarctica, Antigua, Argentina, Armenia, Aruba, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Benin, Bermuda, Bhutan, Bolivia, Botswana, Bouvet Island, Brazil, Brunei, Burkina Faso, Burundi, Cambodia, Cameroon,, Cape Verde, Cayman Isles, Centr.Africa, Chad, Chile, China, Christmas Island, Cocos Islands(or Keeling Isl.), Colombia, Comoros, Congo, Congo (Dem. Rep.), Cook Islands, Costa Rica, Cuba, Djibouti, Dominica, Dominican R., Ecuador, Egypt, El Salvador, Equat.Guinea, Eritrea, Ethiopia, Falkland Is., Fed.Micron., Fiji, Fr.Polynesia, French Southern Territories, Gabon, Gambia, Georgia, Ghana, Gibraltar, Greenland, Grenada, Guam, Guatemala, Guinea, Guinea Biss, Guyana, Haiti, Heard Island & McDonald Islan., Honduras, India, Indonesia, Iran, Iraq, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrghyzstan, Lao (People's Democratic Republic), Lebanon, Lesotho, Liberia, Libyan Arab Jamahiriya, Madagascar, Malawi, Malaysia, Maldives, Mali, Marshall Is., Mauritania, Mauritius, Mayotte, Mexico, Moldova, Mongolia, Montserrat, Morocco, Mozambique, MyanmarN., Caledonia, Namibia, Nauru, Nepal, Nicaragua, Niger, Nigeria, Niue, Nl Antilles, Norfolk Island, North.Mar.Is, Oman, Pakistan, Palau, Panama, Papua N.G., Paraguay, Peru, Philippines, Pitcairn, Qatar, Russia, Rwanda, S.Pierre., MiqS.Tome., Princ, Saint Helena, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Solomon Is., Somalia, South Africa, Sri LankaSt, St, Vincent, Sudan, Surinam, Swaziland, Syria, Tadjikistan, Tanzania, Thailand, Timor-Leste, Togo, Tokelau, Tonga, Trinidad.Tob, Tunisia, Turks.Caicos, Tuvalu, Uganda, Ukraine, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Virgin IslesWallis.Futun, Western Sahara, Yemen, Zambia, Zimbabwe.

Appendix E: Average annual exchange rates

Table 12. Average annual exchange rates 2000 - 2012

YEAR	EUR	USD
2000	1,00	0,92437
2001	1,00	0,89610
2002	1,00	0,94550
2003	1,00	1,13165
2004	1,00	1,24346
2005	1,00	1,24502
2006	1,00	1,25583
2007	1,00	1,37035
2008	1,00	1,47092
2009	1,00	1,39423
2010	1,00	1,32747
2011	1,00	1,39243
2012	1,00	1,28577

Source: *Olsen & Associates,* Average Exchange Rates, 2013.

Appendix F: Shares of merchandise exports and imports 2000 – 2012

Table 13. Shares of merchandise exports 2000 – 2012 by country groups

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ECONOMY	Shares as a percentage of total merchandise exports (%)												
Developing economies	**31,85**	**31,08**	**31,85**	**32,48**	**33,87**	**36,21**	**37,50**	**37,78**	**39,00**	**39,82**	**42,06**	**42,96**	**44,43**
Developing economies: Africa	2,29	2,24	2,23	2,36	2,60	2,96	3,06	3,12	3,48	3,14	3,34	3,27	3,42
Developing economies: Ame.	5,65	5,64	5,45	5,10	5,16	5,52	5,71	5,56	5,58	5,60	5,82	6,02	6,11
Central America	2,84	2,81	2,75	2,43	2,27	2,32	2,33	2,20	2,05	2,13	2,22	2,19	2,32
South America	2,55	2,57	2,48	2,46	2,70	2,99	3,14	3,14	3,31	3,29	3,42	3,65	3,61
Developing economies: Asia	23,83	23,12	24,10	24,94	26,04	27,66	28,67	29,04	29,87	31,04	32,85	33,60	34,85
Eastern Asia	12,09	11,91	12,76	13,38	14,10	14,69	15,24	15,66	15,40	16,76	17,83	17,64	18,55
Southern Asia	1,44	1,46	1,53	1,55	1,60	1,80	1,95	1,99	2,20	2,28	2,48	2,71	2,46
South-Eastern Asia	6,67	6,26	6,27	6,26	6,17	6,25	6,35	6,18	6,13	6,49	6,87	6,76	6,84
Western Asia	3,63	3,50	3,55	3,75	4,17	4,92	5,13	5,22	6,14	5,51	5,67	6,49	7,00
Developing economies: Ocean.	0,08	0,07	0,07	0,07	0,07	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,05
Developed economies	**65,76**	**66,44**	**65,65**	**64,80**	**63,08**	**60,33**	**58,74**	**58,29**	**56,43**	**56,37**	**53,87**	**52,52**	**50,99**
Developed economies: Ame.	16,43	15,98	14,56	13,15	12,28	12,02	11,67	11,20	10,81	10,94	10,90	10,57	10,93
Developed economies: Asia	7,92	6,99	6,87	6,64	6,56	6,08	5,72	5,48	5,22	5,01	5,42	4,87	4,70
Developed economies: Europe	40,20	42,24	43,00	43,86	43,08	41,01	40,15	40,40	39,05	38,99	35,96	35,40	33,75
Developed economies: Oceania	1,21	1,25	1,22	1,15	1,16	1,22	1,20	1,20	1,35	1,43	1,60	1,68	1,61
Transition economies	**2,39**	**2,48**	**2,51**	**2,72**	**3,05**	**3,46**	**3,75**	**3,93**	**4,58**	**3,80**	**4,06**	**4,52**	**4,58**

Source: *United Nations Conference on Trade and Development, Table: Values and shares of merchandise exports and imports, annual (1948-2012),* 2013.

Table 14. Shares of merchandise exports by individual countries, 2000 – 2012

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ECONOMY	Shares as a percentage of total merchandise exports (%)												
China	3,87	4,30	5,01	5,78	6,44	7,26	7,99	8,71	8,86	9,58	10,32	10,38	11,18
United States	12,13	11,78	10,67	9,55	8,84	8,59	8,46	8,19	7,98	8,42	8,36	8,09	8,44
Germany	8,54	9,23	9,48	9,91	9,87	9,25	9,14	9,43	8,96	8,93	8,23	8,06	7,68
Japan	7,43	6,52	6,41	6,22	6,14	5,67	5,34	5,10	4,84	4,63	5,04	4,50	4,36
France	5,07	5,22	5,11	5,17	4,90	4,42	4,09	3,99	3,82	3,86	3,42	3,26	3,11
Russia	1,63	1,65	1,65	1,79	1,99	2,32	2,50	2,53	2,92	2,42	2,62	2,85	2,89
Italy	3,73	3,95	3,92	3,95	3,84	3,56	3,44	3,57	3,36	3,24	2,93	2,86	2,73
Hong Kong	3,14	3,09	3,11	3,01	2,88	2,78	2,66	2,49	2,29	2,63	2,62	2,49	2,69
United Kingdom	4,42	4,40	4,31	4,03	3,77	3,66	3,70	3,13	2,85	2,83	2,72	2,75	2,56
Canada	4,29	4,20	3,89	3,60	3,44	3,43	3,20	3,00	2,83	2,52	2,53	2,47	2,48
Saudi Arabia	1,20	1,10	1,12	1,23	1,37	1,72	1,74	1,67	1,94	1,53	1,64	1,99	2,11
Mexico	2,58	2,56	2,47	2,18	2,04	2,04	2,06	1,94	1,80	1,83	1,95	1,91	2,02
Taiwan	2,35	2,03	2,08	1,98	1,98	1,89	1,85	1,76	1,58	1,62	1,80	1,69	1,64
UAE	0,77	0,78	0,80	0,88	0,99	1,12	1,20	1,27	1,48	1,47	1,44	1,56	1,64
India	0,66	0,70	0,76	0,78	0,83	0,95	1,00	1,07	1,21	1,31	1,48	1,66	1,60
Spain	1,78	1,88	1,93	2,06	1,98	1,84	1,76	1,81	1,74	1,81	1,66	1,68	1,59
Brazil	0,86	0,94	0,93	0,96	1,05	1,13	1,14	1,15	1,23	1,22	1,32	1,40	1,32
Switzerland	1,25	1,33	1,41	1,38	1,33	1,25	1,22	1,23	1,24	1,37	1,28	1,28	1,23
Poland	0,49	0,58	0,63	0,71	0,81	0,85	0,91	1,00	1,06	1,09	1,04	1,03	1,00
Austria	1,05	1,14	1,21	1,28	1,28	1,19	1,13	1,17	1,12	1,09	1,00	0,97	0,91
Qatar	0,18	0,18	0,17	0,18	0,20	0,25	0,28	0,30	0,42	0,38	0,49	0,62	0,70
Viet Nam	0,22	0,24	0,26	0,27	0,29	0,31	0,33	0,35	0,39	0,46	0,47	0,53	0,63
Bangladesh	0,10	0,10	0,09	0,09	0,09	0,09	0,10	0,09	0,10	0,12	0,13	0,13	0,14
ROW	31,92	31,77	32,26	32,70	33,27	34,02	34,23	34,55	35,56	35,18	35,04	35,38	34,92
TOTAL	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00

Source: *United Nations Conference on Trade and Development, Table: Values and shares of merchandise exports and imports, annual (1948-2012),* 2013.

Table 15. Shares of merchandise imports 2000 – 2012 by groups

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ECONOMY	Shares as a percentage of total merchandise imports (%)												
Developing economies	**28,76**	**28,54**	**28,92**	**29,18**	**30,58**	**31,75**	**32,35**	**33,15**	**34,91**	**36,62**	**39,03**	**39,85**	**41,42**
Developing economies: Africa	1,95	2,10	2,04	2,13	2,24	2,38	2,45	2,64	2,93	3,24	3,09	3,05	3,27
Developing economies: Ame.	5,82	5,91	5,32	4,73	4,71	4,96	5,14	5,31	5,60	5,46	5,81	5,93	6,14
Central America	3,09	3,11	3,04	2,66	2,52	2,55	2,56	2,47	2,37	2,34	2,44	2,41	2,53
South America	2,25	2,31	1,83	1,68	1,85	2,03	2,19	2,45	2,83	2,74	3,02	3,18	3,26
Developing economies: Asia	20,90	20,43	21,46	22,22	23,53	24,32	24,66	25,11	26,29	27,83	30,04	30,78	31,92
Eastern Asia	11,20	10,92	11,62	12,33	13,04	13,11	13,35	13,45	13,45	14,70	16,39	16,73	17,24
Southern Asia	1,42	1,50	1,61	1,70	1,85	2,20	2,28	2,42	2,84	3,00	3,29	3,49	3,57
South-Eastern Asia	5,72	5,41	5,51	5,30	5,42	5,60	5,57	5,45	5,71	5,73	6,18	6,26	6,62
Western Asia	2,56	2,60	2,72	2,89	3,23	3,41	3,46	3,79	4,30	4,39	4,18	4,29	4,50
Developing economies: Oceania	0,09	0,10	0,10	0,11	0,10	0,09	0,09	0,09	0,09	0,09	0,09	0,09	0,09
Developed economies	**69,67**	**69,68**	**69,15**	**68,72**	**67,18**	**65,85**	**64,98**	**63,72**	**61,55**	**60,30**	**57,90**	**56,84**	**55,16**
Developed economies: America	22,62	21,96	21,45	19,92	19,07	19,09	18,45	16,96	15,74	15,27	15,40	14,84	15,23
Developed economies: Asia	6,27	6,00	5,59	5,39	5,25	5,23	5,10	4,79	5,04	4,74	4,90	5,06	5,21
Developed economies: Europe	39,50	40,52	40,79	42,03	41,46	40,13	40,09	40,59	39,34	38,79	36,09	35,40	33,11
Developed economies: Oceania	1,29	1,20	1,32	1,38	1,40	1,41	1,34	1,38	1,43	1,51	1,51	1,53	1,62
Transition economies	**1,56**	**1,79**	**1,93**	**2,10**	**2,24**	**2,40**	**2,68**	**3,13**	**3,54**	**3,08**	**3,07**	**3,31**	**3,42**

Source: *United Nations Conference on Trade and Development, Table: Values and shares of merchandise exports and imports, annual (1948-2012),* 2013.

Table 16. Shares of merchandise imports by individual countries, 2000 – 2012

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
ECONOMY	Shares as a percentage of total merchandise exports (%)												
United States	18,92	18,39	18,02	16,75	16,10	16,08	15,53	14,20	13,18	12,65	12,77	12,31	12,64
China	3,38	3,80	4,43	5,31	5,92	6,13	6,41	6,72	6,88	7,93	9,06	9,48	9,84
Germany	7,45	7,58	7,36	7,77	7,55	7,21	7,34	7,42	7,20	7,30	6,84	6,82	6,32
Japan	5,70	5,45	5,06	4,92	4,80	4,79	4,69	4,37	4,63	4,35	4,50	4,65	4,80
United Kingdom	5,22	5,36	5,46	5,13	4,97	4,77	4,87	4,38	3,85	4,09	3,83	3,66	3,68
France	5,08	5,13	4,94	5,13	4,97	4,68	4,39	4,43	4,35	4,42	3,96	3,91	3,65
Hong Kong	3,22	3,15	3,12	3,00	2,88	2,79	2,72	2,60	2,39	2,78	2,86	2,78	3,00
India	0,77	0,79	0,85	0,93	1,05	1,33	1,44	1,61	1,95	2,03	2,27	2,52	2,65
Italy	3,59	3,68	3,71	3,82	3,75	3,57	3,58	3,60	3,41	3,27	3,16	3,04	2,63
Canada	3,68	3,55	3,41	3,15	2,95	2,99	2,91	2,74	2,55	2,60	2,61	2,52	2,57
Mexico	2,70	2,70	2,60	2,25	2,13	2,12	2,13	2,04	1,93	1,90	2,01	1,96	2,06
Russian Federation	0,74	0,84	0,92	0,98	1,03	1,16	1,33	1,57	1,77	1,51	1,61	1,76	1,82
Spain	2,34	2,41	2,48	2,68	2,73	2,68	2,66	2,74	2,56	2,31	2,12	2,05	1,80
Taiwan	2,11	1,68	1,70	1,65	1,79	1,69	1,64	1,54	1,46	1,37	1,63	1,53	1,46
Brazil	0,88	0,91	0,75	0,65	0,70	0,72	0,78	0,89	1,11	1,05	1,24	1,29	1,26
United Arab Emirates	0,53	0,58	0,64	0,67	0,76	0,79	0,81	-	1,22	1,18	1,07	1,11	1,19
Switzerland	1,24	1,31	1,31	1,29	1,22	1,17	1,14	1,13	1,12	1,22	1,14	1,13	1,07
Poland	0,74	0,78	0,83	0,88	0,95	0,94	1,03	1,16	1,27	1,18	1,16	1,14	1,06
Austria	1,09	1,16	1,18	1,28	1,27	1,18	1,11	1,15	1,12	1,13	1,03	1,04	0,97
Saudi Arabia	0,45	0,49	0,48	0,54	0,50	0,55	0,57	0,63	0,70	0,75	0,69	0,72	0,78
Viet Nam	0,23	0,25	0,30	0,32	0,34	0,34	0,36	0,44	0,49	0,55	0,55	0,58	0,62
Chile	0,28	0,27	0,26	0,25	0,26	0,30	0,31	0,33	0,38	0,34	0,39	0,41	0,43
Qatar	0,05	0,06	0,06	0,06	0,06	0,09	0,13	0,16	0,17	0,20	0,15	0,16	0,19
Bangladesh	0,13	0,14	0,13	0,13	0,13	0,13	0,13	0,13	0,14	0,17	0,18	0,20	0,18
ROW	29,44	29,48	29,97	30,41	31,15	31,74	31,95	33,95	34,14	33,67	33,11	33,19	33,27
TOTAL	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00	100,00

Source: *United Nations Conference on Trade and Development, Table: Values and shares of merchandise exports and imports, annual (1948-2012),* 2013.

Appendix G: Ordinary trade and PT, 2012

Table 17. Values in billion € - ordinary trade and processing trade in EU, 2012

DECLARANT	GRAND TOTAL	ORDINARY TRADE			INWARD PROCESS.			OUTWARD PROCESS.		
		TOTAL	EXPORTS	IMPORTS	IPT	IPX	IPM	OPT	OPX	OPI
Germany	682,87	596,45	342,67	253,77	75,76	64,64	11,13	10,66	4,94	5,72
U. Kingdom	413,35	359,43	141,48	217,94	52,48	31,15	21,34	1,44	0,61	0,83
Netherlands	343,62	327,94	99,29	228,65	14,25	11,01	3,24	1,42	0,98	0,44
France	321,10	299,01	155,99	143,03	19,25	8,81	10,44	2,84	1,97	0,87
Italy	306,09	288,80	147,55	141,24	15,56	7,70	7,86	1,73	0,78	0,95
Belgium	196,71	180,86	84,70	96,15	13,84	11,17	2,67	2,02	0,60	1,42
Spain	190,86	186,39	73,40	112,99	3,34	1,03	2,32	1,13	0,51	0,62
Poland	75,35	68,85	27,31	41,54	6,05	3,40	2,66	0,44	0,44	0,00
Sweden	71,68	64,62	36,01	28,61	6,74	5,93	0,81	0,32	0,10	0,23
Austria	57,25	52,69	28,94	23,75	3,57	2,83	0,74	0,99	0,86	0,13
Cz. Republic	47,80	45,68	19,42	26,26	1,84	1,29	0,55	0,28	0,14	0,14
Ireland	46,33	42,09	27,94	14,15	4,24	4,04	0,20	0,01	0,00	0,00
Finland	43,65	42,56	23,25	19,32	0,99	0,64	0,35	0,10	0,03	0,07
Greece	42,78	41,58	15,74	25,84	1,08	0,53	0,54	0,12	0,06	0,06
Hungary	39,42	36,04	15,89	20,15	2,66	1,86	0,80	0,71	0,35	0,36
Denmark	38,51	36,48	22,14	14,35	1,83	1,17	0,66	0,20	0,07	0,13
Portugal	28,18	27,58	12,55	15,02	0,58	0,31	0,27	0,03	0,02	0,01
Romania	26,72	25,59	12,19	13,40	0,58	0,34	0,25	0,55	0,27	0,27
Slovakia	24,89	20,05	5,90	14,15	4,65	3,29	1,36	0,18	0,05	0,14
Lithuania	19,24	18,80	8,31	10,50	0,40	0,24	0,15	0,04	0,02	0,02
Bulgaria	18,26	17,65	7,47	10,17	0,59	0,34	0,25	0,02	0,01	0,01
Slovenia	15,55	15,03	7,38	7,65	0,06	0,04	0,01	0,46	0,12	0,34
Luxembourg	7,15	7,12	2,55	4,57	0,02	0,00	0,02	0,01	0,00	0,01
Latvia	6,67	6,41	3,70	2,71	0,21	0,12	0,09	0,05	0,02	0,03
Estonia	6,37	5,11	3,25	1,85	1,24	0,63	0,61	0,02	0,00	0,02
Malta	3,11	2,14	1,15	0,99	0,97	0,90	0,07	0,00	0,00	0,00
Cyprus	2,35	2,30	0,62	1,68	0,05	0,03	0,02	0,00	0,00	0,00
Grand Total	**3386,54**	**3115,33**	**1459,79**	**1655,54**	**240,86**	**168,44**	**72,42**	**26,37**	**13,26**	**13,11**

Source: *Eurostat Comext, EU27 Trade Since 1999 by HS2, 4, 6 and CN8,* 2013.

Appendix H: List of abbreviations

Abbreviation	Explanation
ASEAN	Association of Southeast Asian Nations
B2B	Business-to-business
B2C	Business-to-consumer
BRIC	Grouping acronym that refers to the countries of Brazil, Russia, India and China
CEEC	Central and Eastern Europe
DVA	Domestic value added
EFTA	European Free Trade Association
EU	European Union
EUR	Euro (€)
FDI	Foreign direct investment
FVA	Foreign value added
GATT	General Agreement on Tariffs and Trade
GDP	Gross domestic product
GSP	Generalised scheme of preferences
H-O	Heckscher-Ohlin model
IMF	International Monetary Fund
IPT	Inward processing trade
IPM	Inward processing imports
IPX	Inward processing exports
IV	Instrumental variable

Abbreviation	Explanation
MRT	Multilateral trade-resistance terms
NAFTA	North American Free Trade Agreement
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary least square
OPT	Outward processing trade
OPM	Inward processing imports
OPX	Outward processing exports
PPML	Pseudo Poisson. Maximum Likelihood
PT	Processing trade
ROW	Rest of the world
RTA	Regional trade agreement
TiVA	Trade in Value-Added
TSLS	Two stage least square technique
UNCTAD	United Nations Conference on Trade and Development
USD	United States dollar ($)
VAX	Value added to gross exports
WTO	World Trade Organization