



Cooperation and trade

The impact of bi- and multinational transport-focussed cooperation agreements on trade

A practical analysis of the Benelux Union

Master Thesis Urban, Port & Transport Economics

August 2012

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Abstract

The importance of trade in the world economy is widely acknowledged. At the same time there exist many cooperation agreements on different levels and subjects, which in many cases focus on stimulating the economy. The Benelux Union is a strong example where both trade and cooperation play a major part. However, the link between the presence of cooperation agreements and trade is not straightforward, as both contain many different factors. This research will take a specific focus by analysing cooperation agreements within the Benelux region that involve the enhancement of transport, by e.g. the creation of infrastructure. In turn the impact of such agreements on the trade flows between two countries will be estimated where the hypothesis presumes a positive significant effect of cooperation on trade. The information that eventually will be assembled, will make it possible to analyse this question.

Keywords: Benelux; Union; Trade; Cooperation; Agreements; Bilateral; Transport

Preface

The research problem for this study has been formulated together with the Secretariat General of the Benelux Union in Brussels. The initial request from the Secretariat General was to analyse the logistical streams and flows within the Benelux and its surrounding areas, and the significance of cooperation on such streams. Mrs Karin Jacobs and Mrs Mariëlla Smids of the Team Sustainability of the Secretariat have especially put in major effort, for which I would specifically like to thank them.

Defining concepts as logistical streams and cooperation, both in terms of absolute definitions as in terms of data analysis has been a process eased by interviews with many specialists from both academic, governmental, and business levels. Special thanks goes to Mrs Verena Balz from the Delft University, Mr Peter Brulmans of the Dutch Embassy in Brussels, Mr Chris Coeck from the Port of Antwerp, Mr André van der Niet from the Secretariat General of the Benelux Union, Mr Peran van Reeven of the Erasmus University Rotterdam, Mr Thierry Vanelslander from the University of Antwerp, Mr Aernout Willeumier from the Port of Rotterdam, and Mrs Pauline Wortelboer and Mr Joost Kolkman from the Kennis Instituut Mobiliteit (KiM). Through short interviews and brainstorm sessions with these persons the research question and area has been taking more and more shape.

Finally, I would like to thank Mr Bart Kuipers from the Erasmus University Rotterdam for its supervision and guidance of this thesis and the process around it, and for his willingness to travel back and forth between Brussels and Rotterdam.

Linde Korstjens

Rotterdam, August 2012

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1 Introduction

Trade determines a major part of the economic activity of the world. In the current composition of EU27, the European Union accounts for approximately 15.1 percent of export of goods worldwide¹. In this view, multilateral cooperation is increasingly important. For one to facilitate trade, as trade can only occur between at least two parties, i.e. countries. Moreover, several multilateral connections are being established to foster economic development. However, trade is very important for economic prosperity and is hence a prime reason for countries to engage in cooperation. Another topic heavily discussed in connection with economic fortune is logistics. Logistics services and proper infrastructure smoothen the transport of goods. At the same time, the presence of infrastructure and transport modalities forms the core of any trade network. Nowadays, such networks get more and more integrated, which is an absolute necessity to restrain trade flows from obstruction.

A prime cooperation agreement which integrates the topics of trade and logistics – amongst several other topics – is the Benelux Union. The Benelux Union is the official framework for political cooperation between the three countries Belgium, the Netherlands and Luxembourg (Wouters & Vidal, 2008). The Union was established in the 1950s and has evolved into a tight partnership of the three member states. Fostering trade was one of the aims resulting in the creation of the Benelux Union. Enabling logistics is a topic which has gained importance and recognition over the years. The importance of discussing logistics and infrastructure in a cooperation structure, even as relatively small as the Benelux Union, is also confirmed by several economists. “Even today, when important responsibilities are transferred to the European Union (EU) level, cross-border cooperation between the Benelux countries remains essential in order to jointly apply supra-national legislation, to manage ever-growing traffic flows with their related congestion problems, and to develop and finance joint transport-related policies” (Witlox *et al.*, 2007, p.326).

Nevertheless, the link between trade and logistics by means of cooperation is not self-evident. This thesis will examine to what extent the development of logistics within the framework of a cooperation agreement can affect trade. Since the Benelux Union is a prime example of a cooperation framework which incorporates the topics of trade and logistics, the research area of this study will focus at the Benelux countries. At the same time has the Benelux cooperation extended its focus over the past years to consider partnership with (the Western part of) Germany and (the Northern part of) France as direct adjacent areas to the Benelux Union. That region of the Benelux and the surrounding areas is nowadays known as the Benelux-plus. This will be the focus area of this research.

1.1 Research background

This research started as a request from the Secretariat General of the Benelux Union to analyse the logistical streams and flows within the Benelux and its surrounding areas, and the significance of cooperation on such streams. This request finds its foundation in the revised Benelux Treaty in 2008 and the designed joint work programme 2009-2012 which stresses the focus of the Benelux Union on

¹ EU, 2011-1, http://trade.ec.europa.eu/doclib/docs/2006/september/tradoc_122531.pdf, 21 september 2011

“sustainable and efficient transport and (...) the development of integrated logistics”² (Benelux Treaty 2008, art.3).

After careful consideration of available data and measurements the decision was made to study the link between cooperation agreements and trade. The cooperation agreements would in this sense have to take at the political level between Benelux countries, and have a primary focus on enhancing transportation and trade. Trade would in this view be considered as the trade in goods, i.e. the absolute transportation of a commodity from one country to another. Recalling the initial request from the Secretariat General of the Benelux Union for this study to look at the logistical streams within the Benelux-plus area and the impact of possible present cooperation agreements on these streams, the specification of the research answers to this proposal.

1.2 Outline

This thesis is divided in two sections; a theoretical and an empirical part. In chapter 2 the problem analysis and research scope will first be presented, followed by the research questions. Section I will then comprehend the chapters 3, 4 and 5. Chapter 3 will discuss the theoretical background of the topics of this research, i.e. trade, cooperation, and logistics. In chapter 4 the research area of the Benelux will be analysed and the cooperation agreements on logistics present in the Benelux-plus area will be elaborated on. The link between chapters 3 and 4 will be described in the final chapter of section I, chapter 5. Section II will contain the empirical analysis of this thesis. Chapter 6 will first discuss the methodology of this research. The empirical results will be presented and examined in chapter 7. The final chapter of the section will again combine and summarise the discussions of chapter 6 and 7. Then the limitations to this research will be listed in chapter 9. The conclusion will be displayed in chapter 10.

² http://benelux.int/nl/bnl/bnl_nieuwVerdrag.asp, 29 September 2011

2 Problem analysis and research scope

As discussed above, this research will apply to the region of the Benelux Union. Reason for this is that the Union itself has existed already for many years, but has not been the subject of many studies. Nevertheless, the area seems very much applicable for this study since issues as trade, cooperation, and transport play a major role in the Benelux Union.

Within the Benelux Union the aim is to create and guard a solid exchange of information via stable communication streams, and to develop concrete policy coordination among its member states *and* with the areas surrounding the Benelux (Benelux Treaty 2008, article 2 and 3). The importance of networks and partnerships is widely confirmed on every governmental level and every industry (see e.g. Hofstede et al., 2010; Child & Faulkner, 1998). Within the Benelux this idea is taken one step further by stressing the significance of looking outside the traditional national borders (Benelux Treaty 1958; 2008).

However, as Wortelboer and Kolkman (2008, p.11; 2010, p.271) highlight, cooperation is not an end in itself but a mean to achieve, develop and retain the greater good (see paragraph 3.2). Engaging in cooperation agreements of all types serves the purpose of creating benefit for the parties involved. In most cases such benefit involves economic gain. However, to what extent does interaction between parties as a result of cooperation really facilitate any benefit? Might it not be possible that certain advantages could have been established without the extra 'pressure' of a partnership agreement? Perhaps the economic environment in place was already stimulating growth in a specific sector. The presence of an agreement might perhaps not add to this, except for potentially confirm the importance of the development. For political action to be implemented and accepted efficiently, "it is important that policy initiatives are based on a sound knowledge of market processes" (Notteboom, 2009, p.4). If this is not the case, the possibility exists that progress can be restricted by the presence of certain policies, e.g. cooperation policies.

The direction of any effects from cooperation agreements is hence, unclear. Nevertheless, in the overall political climate some benefits from cooperation are assumed, otherwise there would have been no reason to engage in any agreement in the first place. The important question is then, what benefits are involved; Is it direct or indirect benefits. Agreements between countries often involve the removal of trade barriers, which is one of the easiest ways to free up trade.

As engaging in trade is rather difficult when no decent infrastructure is in place, one could argue that developing such infrastructure could enhance trade and ease logistics. If demand for trade increases, for instance due to the removal of trade barriers, and the infrastructure capacity cannot handle this increase, a positive impact from an increase in trade volume could be restrained. If such an infrastructural development would be performed by mutual effort of adjacent countries, this would be beneficial for trade and hence for the local economy. Nevertheless, such bi- or multilateral infrastructure development does not stand on its own. Decent roads and passageways can be built, but if they are not used for trade, the initial intention of investing in these trade catalyser is obsolete. Infrastructure used for tourism is certainly a positive factor; tourism does influence a local economy. Nevertheless, the focus of this thesis is on trade of goods, i.c. industrial trade. Hence, analysing the impact of infrastructure on tourism goes beyond the scope of this thesis and is therefore not considered. Hence, it is argued that the presence of good infrastructure enables trade. Agreement on and execution of infrastructure development between countries within a political environment with

a broad perspective on trade would, therefore, enhance the trade flows between these countries. This is the optimum result for which the countries have signed up for. Hence, this study will apply the theory of international policies, infrastructure and trade on an applicable area in analysing the effect of infrastructural policies on trade volumes.³

The most *applicable* area to cover this analysis is the Benelux-plus region. Belgium, the Netherlands and Luxembourg have been cooperating on many fields for over more than 60 years in the Benelux Union. Trade is high on the mutual agenda and infrastructure has gained more and more importance and acknowledgement over the years. The areas of (the Western part of) Germany and (the Northern part of) France have also gained significance to the Benelux countries. Therefore, this area is very suitable for this specific research.

2.1 Research questions

The introduction above has drafted the foundations for this research. This study focuses on the link between infrastructure and logistics developing agreements and trade.

The composed research framework and problem analysis lead accordingly to the following *general research question*:

To what extent do cooperation agreements on the field of logistics between the governments of countries have a significant impact on the volume of trade?

The ultimate aim is here to identify a possible link between cooperation and trade, within the respective boundaries of the cooperation agreements, *and* within the respective boundaries of the area of analysis. The analysis will concentrate on the member states of the Benelux and its surrounding countries – i.e. the ‘specific area of analysis’ –, and will be further specified in chapter 4.

The following *specific research questions* will need to be answered before answering the general research question:

1. *Which different countries, regions, districts can be identified within the Benelux and adjacent areas, and hence make up the area of analysis?*
2. *What is the link between cooperation and trade?*
3. *Which cooperation agreements on the field of logistics can be identified over the past 15 years within the specific area of analysis?*
4. *What is the significance of the presence of cooperation agreements on the field of logistics with respect to the trade volumes within the specific area of analysis?*

³ This research focuses on the possible effect of cooperations on the *logistical* part of the economy, i.e. physical trade flows. In this sense logistics involves the presence of infrastructure, the trade of goods between countries and the respective volumes. The presence of cooperation agreements therefore includes the implication that the cooperation partners *communicate* with each other on the desired and actual outcome of their policy agreements.

SECTION I. THEORETICAL ANALYSIS

3 Theoretical background

As this research focuses on the link between cooperation agreements and trade, understanding what these concepts actually entail is important for interpretation of this study. This chapter will therefore discuss the common interpretations and perceptions concerning trade and cooperation. Both concepts appear in many forms and for various reasons. The forms and reasons will be reviewed in more detail in paragraph 3.2. Trade and cooperation will be considered from a general point of view, while it will be applied to logistics and infrastructural matters in paragraph 3.3 and 3.4, to see the relevance for this research.

Furthermore, this chapter will provide an overview of the general characteristics and aspects with respect to logistics and trade of the countries analysed within this thesis. This analysis will provide the reader with a better understanding of the underlying thoughts and flows concerning European integration, policies, cooperation agreements, and trade on a governmental basis. The focus will be directed towards the Benelux-area and its surroundings as this is the research scope of this study indicated above.

3.1 Trade theory

Adam Smith was an important contributor to nowadays' views on trade, nationally and internationally. In his book 'An inquiry into the nature and causes of the wealth of nations' from 1776 he elaborated on the rise of trade and power of the merchants in daily life in the British society of his time. Merchants, nobles and countrymen in these centuries, Smith states, were not (yet) thinking of international trade as a matter to enrich the country, but "when they had occasion to apply to their country for some change in the laws relating to foreign trade, (...) [i]t then became necessary to say something about the beneficial effects of foreign trade, and the manner in which those effects were obstructed by the laws as they then stood" (Smith, 2005, p.346). Upon the presence of war and the import on gold and silver from the colonies, international trade became a more and more accepted, important feature and fact in everyday economy. Smith pleads that nations are all trying to negotiate the best prices to buy and sell but the best prices are negotiated in a perfectly free market where trade can flow in each direction. In a free open trade market all products are assembled and sold based on the system of supply and demand (Smith, 2005). From the time of Adam Smith onward several models have been established and published as to analyse economic interaction and the impact of trade. "The traditional Ricardian model emphasizes technological differences as the cause of trade; the Heckscher-Ohlin-Samuelson [HOS] model emphasizes differences in factor endowments" (Krugman, 1987, p.132). The HOS model has for a rather long time period often been labelled as "*the* modern theory of trade" and hence "dominated work in the pure theory of international trade" (Ethier, 1982, p.389). Other models have been drawn but were in many cases based on these two models mentioned along with some other researches. Nonetheless, all these models had such overlap and common ground that until the end of the 20th century "international trade theory was one of the most unified fields in economics" with a strong focus on comparative advantage (Krugman, 1987, p.132; Dornbusch et al., 1977). Trade should only be engaged in, if it can result in benefits for all involving parties, by exploiting your best resource comparatively to your trade partner. The development of trade theory past this point will now be assessed further.

Trade appears in many forms and consists of many variable factors. Trade can be defined rather straightforward as the Oxford Advanced Learner's Dictionary states:

“the activity of buying and selling or of exchanging goods or services between people or countries”.

International trade involves trade between two or more countries. If only two countries are engaging in trade, we speak of bilateral trade, while multilateral trade occurs when more than two countries engage in trade with each other. Nations engage in trade with other nations to foster economic gains for themselves. Such bilateral – the same accounts respectively for multilateral – trade contributes substantially to the GDP in a country and is, therefore very important for economic development.

In general, most researchers are convinced of the benefits of free trade and its distribution function for gains from trade. Non-economists are more sceptical on this matter (Anderson, 2008). One of the common reasons for economists to confirm the desirability of trade is the concept of comparative advantage, first identified by David Ricardo in 1817. The theory of comparative advantage goes back to the basics of trade and explains why two countries would engage in trade in the first place, when all necessary commodities *could* just be produced domestically. However, producing everything at home requires a lot of labour and different endowments. Applying this labour and endowments for the production of all commodities means the factors of production need to be shared. Specialisation on certain commodities is in this case difficult as other commodities might then become subordinate. Engaging in trade though, creates the possibility to produce locally, only the commodities at which you are the best, *relative* to the other demanded commodities and involved countries of trade. This basic example assumes the production of two commodities in total. It is then possible that one country can produce both commodities faster and cheaper than the other country, when considering the commodities separately. When producing both commodities at the same time, you cannot use the same man power and endowments, so there will be trade-offs. As countries want to follow the economic rule of high profit, for the goods they sell, but at the same time, wish to pay the lowest price for imported commodities, the commodity in which the country has the comparative advantage will be exported. Hence, the comparative advantage notion means “that countries trade to take advantage of their differences” (Krugman, 1987, p.132). However, even though both countries focus on the commodity in which they have a comparative advantage, the gains (commercial and not commercial) from trade are not – necessarily – evenly distributed. In the international context gains are often shared between countries (Anderson, 2008). How equally the benefits are divided, is different per country and per case. “Each nation can act through trade policy to take more of the gain, however, leading to destructive trade wars with mutual losses” (Anderson, 2008, p.3). Usually, gains from trade are nationally distributed by the government which sometimes results in an even distribution, but most often that is not the case.

After David Ricardo many other economists have challenged the comparative advantage theory and expanded it. Many variations have been applied. Ricardo looks at labour productivity, while for instance the Heckscher-Ohlin model considers the availability of resources and factors, and Dornbusch, Fischer and Samuelson took a continuum of goods (Dornbusch et al., 1977). Trade provides the opportunity to go around the immovable aspects of most factors by integrating the market. Krugman (1987) stresses though that newer models start to question the ability of the model of comparative advantage to explain trade. Increasing returns to scale and imperfect competition take over the wheel from constant returns to scale and perfect competition. The comparative advantage doctrine turns out to be incomplete according to several economists as factor endowment is no longer considered the pivot to a nation while focus shifts towards industrial efficiency (Porter, 1990). This means that in the final part of the 20th century more interest appeared for governmental

interaction in trade. Krugman (1987) in turn questions whether this might mean the end of the era of free trade, but he refutes this by stating that the free market has just become more reasonable and practical. Letting go of the pure comparative advantage theory was the beginning of the so called 'new trade theory'. The new trade theory has been acknowledged widely as an important contributor to understand the connection between trade and growth (Yannikaya, 2003).

As mentioned above, until the 1980s, the theory of international trade was dominated heavily by the comparative advantage notion. Trade should only be engaged in, if it can result in benefits on the participating sides, by exploiting one's best resource comparatively to the trade partner's. Many researchers and writers have not even mentioned that there was the probability that trade could also occur "for other reasons than exogenous differences in tastes, technology, and factor endowments" (Krugman, 1987, p.133). Beyond this time and thinking, a new theory was designed. A theory where the conventional ideas of perfect competition and constant returns to scale were swept away, making place for a model with imperfect competition and increasing returns to scale. Not that the idea of increasing returns was not considered before, but it was never officially included in the theory of international economics. This new trade theory was however not embraced by all economists. Not all scholars agreed that the theory was really *new*, as many ideas had already been proposed *to some extent* throughout history. For instance, suggesting that not only comparative advantage was a reason for international trade, but that economies of scale could also contribute to the urge for countries to trade across their borders; this was partly already mentioned by Bertil Ohlin in 1933. Krugman (1992) identifies three innovative aspects which were very important for the discussion that led to the new trade theory. These aspects concern the introduction of the theory industrial organisation, dissociation from the traditional two-goods model, and the elimination of the mental separation of technological and commercial external economies. The integration of industrial organisation into trade theory has made it possible to put imperfect competition and scale economies in a model, which could then be applied not only for trade, but also for growth or other concepts. The elimination of the two-goods model meant that both comparative advantage *and* increasing returns to scale could now be considered together. Economists could be a proponent of both instead of 'either-or'.

One of the contributions of the new trade theory is that puts an end to the idea that national prosperity can only be inherited. Instead national growth is to be created (Porter, 1990). Moreover, national benefits start first with a healthy home market before international interference can be efficiently engaged in and gained from. This also confirms the statement that countries do not solely engage in trade to profit from each other's differences, but also to realise increasing returns to scale and stimulate specialisation (Krugman, 1992). In turn imperfect competition is prompted, which again gives room to market size effects to be considered. Under perfect competition models – with constant or diminishing returns to scale –, such size effects of the market were "simply ruled out by assumption" (Krugman, 1992, p.427). In practise though, the effect of the market size should not be underestimated, especially since the new trade theory stressed the importance of externalities. Externalities might in the first place be apparent to industries separately and not to countries, but it should be considered that a country in itself cannot take a position in the market. National industries together create the strength a country can expose to the world. This strength and hence competitiveness of industries individually and a nation as a whole depends on how well and fast they can respond to changes or even lead them via changes and innovations (Porter, 1990). Such innovations should all be focussed at increasing productivity of the respective industry as

productivity is one of the primary factors serving an industry's and nation's competitive position in the market. At the same time international trade can also challenge a national industry's productivity when faced with international standards of industrial productivity. In the end no country can be a key player in every industry but can only focus on a few highly competitive industries. Specific industries can be nationally supported through institutions and a stimulating environment. Establishing a free market can add to the creation of the stimulating environment.

On the other hand a country could be tempted to establish barriers to trade in order to protect national industries that are not (yet) eligible to compete in the international market. Nevertheless, regulated market forces do not trigger an industry to efficiency. While trade raises competitiveness, and hence diminishes monopolistic powers, coordinated trade through a large amount of rules and regulations induces market imperfections (Porter, 1990; Krugman, 1992). Porter (1990) also stresses that barriers should be actively removed instead of counterbalanced by other countries with means of import and other export regulations as an answer. This is however very difficult to establish as this would mean that these actions should be coordinated between countries. Krugman (1992) puts this problem in a prisoners' dilemma stating that "individually, countries have an incentive to be protectionist, yet collectively they benefit from free trade" (p.429). However, collective action requires a basis of trust that one country might not default from the free trade market and impose national regulations to protect its domestic industries. Such collective action in practise was the basis of the current European Union (EU), where a number of countries have agreed to limit boundaries to trade. Over the years, this agreement has evolved into a large institution of international cooperation, discussion and agreement. For an analysis of the – development of the – EU, see Chapter 4. The EU is, of course, not the only institution built on the foundations of cooperative approaches. Other examples are the League of Nations, United Nations, WTO, and – smaller (in size) but not less significant – the Benelux Union. The significance of the Benelux cooperation will be stressed and specified in paragraph 4.1 of this study but it is important to note that the Benelux Union, which was established in 1958, has served as an example for many later cooperative agreements and bonds (Janssens, 2009).

Nevertheless, barriers to trade do not only come from political interference. Internal characteristics and logistics to an industry can also limit trade, but a more general aspect which is applicable to all trade is the cost of trade. The trade model is partly shaped by the expenses necessary to execute trade (Anderson, 2008). Such costs can be very diverse and can possibly be lowered by for example the development of proper infrastructure and infrastructural services (WTO, 2004). Infrastructure holds a crucial position in the continuity of international trade as defined in paragraph 3.3. Limited developed transport lines can restrain – demand for – trade. Boosting the infrastructural quality via governmental support could foster trade.

The new trade theory did also acknowledge a few arguments *against* free trade. Note though that 'arguments' do not imply the advocates of the new trade theory will put these statements forward in a debate on trade barriers. Externalities were already mentioned briefly as an important aspect recognised by the new trade theory. Some industries yield more externalities than others, and these industries should – as history already suggests – be favoured by government policies to overcome the external economies. Another argument supporting trade regulations is based on the idea that governmental intervention can alter the situation to generate excess returns to national industries

instead of the international market players (Krugman, 1987). Nevertheless, free trade is still considered the focal point.

Free trade can though be defined from different angles. And so can various other trade related topics. Issues such as trade liberalisation, openness, and free trade, are heavily subject to interpretation and the inclusion of selected variables. For instance trade openness is a term for which many definitions appear in research. Many different measures have been used throughout history to analyse it in empirical research; often with the aim of estimating the effect on and linkage to economic growth. Considering the different approaches to measure trade openness is important in the sense that different measures result in various outcomes, which could result in diverted implications and linkages to economic growth. Over the time, the concept of openness has been interpreted in many variations; and still, there is no agreement on an exact general description (Yannikaya, 2003, p.59). Krueger (1978) for instance claims that it is possible to have a very open economy with respect to export, while trade protection measures are being used on the import side. Yet, defining openness is more and more aligning with defining 'free trade', i.e. a market without interference from any trade barriers (Yannikaya, 2003, p.60). To incorporate all these different aspects of openness into a measure an index could be created containing all possible distortions and barriers to trade (Yannikaya, 2003, p.60). Although some researchers designed such indices, it is not available for a large sample of countries. Nevertheless, a significant number of researchers have used cross-country regressions on growth to estimate endogenous growth theory and to analyse the importance and the impact of trade policies (Edwards, 1993; Rodriguez and Rodrik, 2000; Yannikaya, 2003). Additionally, as so many perceptions on openness exists, a more general interpretation in which openness can be defined as an act of trade liberalisation by which policies are employed that lower the biases against the export sector (Yannikaya, 2003, p.59; Krueger, 1978), will be used in this study. Complete openness would eventually lead to free trade.

Benefits of openness to trade for the countries could involve the exploitation of economies of scale. When barriers to trade are eliminated the market becomes bigger, stimulating scale economies. For small countries this can be a huge effect, but also larger countries can gain heavily from an extended market.

Focusing on trade liberalisation, where policies are written on governmental level to influence the incoming and outgoing flow of goods and services in a country, there is a clear link between trade and the governmental sector. As Krugman (1987) states "the strategic trade policy argument (..) shows that at least under some circumstances a government, by supporting its firms in international competition, can raise national welfare at another country's expense" (p.136). Interfering with national welfare is one of the reasons why politicians try to involve in trade, by changing the distribution of gains (Anderson, 2008). Implementing trade barriers is one way of interfering as we have seen already. Governmental intervention is difficult to design effectively (Krugman, 1987). Nevertheless, governments heavily try to influence trade. Industrial protection by means of imposing obstructions to free trade is mainly a national dealing. However, often trade policies are also established in an international context. For instance, in the European Union many issues are discussed among the member states and in the end rectified by each member. In essence, the existence of the European Union, and hence the Benelux Union respectively, is also a result of international negotiations and policies. By means of agreement on a certain cooperation structure and commitment, agreements are created, which heavily shape today's economic playing field. Many

countries have close connections with their neighbouring countries, the importance of which they will take into account when considering engaging in new connections and agreements; the European Union being the prime example. Many of such agreements involve trade issues, although not all of them. The appearance of such – tight – cooperation will be analysed in depth in the following paragraph.

Considering trade and economic development in general the presence of linkages between both features is in many cases assumed. Adam Smith (1776) already pointed this out in the late eighteenth century. First only static effects were assumed from the link between both features. Baldwin (1984), however, – amongst many others later on – claimed that the static effects only had a minor impact on economic development. Several authors and researchers have been examining the subject but no clear-cut answer is available. Nevertheless, the influence of dynamic effects is nowadays, more and more acknowledged, and research moves in the direction of an integrated analysis of – transnational – trade and economic development (Afonso, 2001, p.2). This process is *inter alia* identified by institutions mentioned before, institutions such as the World Trade Organisation, the World Bank, and the United Nations. “As a result, many countries began to reduce commercial barriers and other controls of economic activity and obtained a significant (and lasting) increase in the rate of (...) [economic growth], which suggests that extroversion has a dynamic effect on the economy, helping to speed up the rate of [economic growth]. Moreover, the processes of economic integration intensified” (Afonso, 2001, p.3). This analysis makes clear that it is generally accepted that there is a connection between economic development and trade. The remainder of this study will further analyse the extent of this connection.

3.2 Cooperation

Cooperations are widely present whether it is on business level, governmental level or any other level. Many definitions of these concepts can be found, but Luggens and Ziggers (2004) provide a fairly general and broad definition for cooperation stating that

“cooperation is a relation between two or more parties with compatible or additional interests or aims where the relationship is foreseen to be of reciprocal advantage”

(Wortelboer & Kolkman, 2010, p.271).

This definition immediately stresses the importance of the presence of some kind of mutual benefit for all parties involved, when engaging in any form of cooperation. Such a relation can be of formal nature – written down in a signed agreement –, or of more informal nature. Informal relationships are in most cases not binding or at least not defined as such. Formal relationships are frequently shaped into an agreement of which the drafting is often done via regimes. A regime concerns the regulations, procedures and limits of behaviour on the scope of agreement (Keohane & Nye, 1985). The scope, commitment, and members of regimes can vary heavily. Some regimes are freely accessible by each state willing to sign, while others are restricted by area, country characteristic, or different identifiers. One important aspect is though that regimes can in no case impose anything more on their member countries, than what these members have signed for themselves. Regimes state the objectives of the individual and consolidated members, although some restraints on national and international acts need to be accepted in some cases, in order for the member states to reap the regime’s benefits. Hence, “regimes facilitate the cooperative pursuit of governments’ objectives. They do not substitute abstract, common interests for national interests” (Keohane & Nye, 1985, p.151). It is important to note here, that cooperation is not an end in itself but a *mean* to reach an objective concerning, for instance, economic, societal or ecological gain (Wortelboer & Kolkman, 2008, p.14).

There are various motives for countries to engage in such regimes. In earlier times cooperation in times of war and common enemies was as primary one and it still is. Small states especially try to engage in cooperations internationally to arm themselves against potential arbitrary abuse of power by large nations (Keohane & Nye, 1985; Yun & Park, 2012). Nevertheless, large countries can value regimes the same as smaller ones.

In general, different reasons for engaging in and complying with regimes exist. However, there are a few functions which fairly all – successful – regimes fulfil irrespective of the scope of the regime (Keohane & Nye, 1985). The first issue is sharing the burden. Standards can be set, applicable for all parties to the agreement, which means that not one single country has to reach a certain objective on its own but is supported by the others. A second function of regimes is that it provides information to its members. As more information is shared an intensified cooperation could be encouraged. If common interests had not been defined through information sharing, countries might have pursued these interests on their own, without any additional knowledge from the side of other parties. An important feature of the creation and existence of regimes is that it shapes policies to be more predictable and hence more reliable. Common interests keep the parties on track and focussed. Moreover, countries experience that reciprocal agreements with one country may harm the relationship with other countries. Especially, large nations notice the benefits of engaging in

various regimes on different topics which keeps the rules clear, aligns policy making processes, and prevents varied interests from intertwining.

Information sharing processes are not only performed formally, but also via personal relations for instance through discussions and meetings, where building trust can be a vital point for continuing the current and possibly developing future conformity. Continuing the status quo and agreements of a cooperation can be an important aspect when administrations change. New governmental compositions might have drastic plans for changing the status quo. Signing a regime commits a government – irrespective of its composition – to comply with the regime. This does not mean nothing can change in the relationship between the parties to the agreement, but sudden default would authorise the other countries – based on the agreement – to force the defaulting country to compliance, with the means agreed on in the signed regime. Hence, international regulations assist to reinforce conformity upon governmental changes.

On the one hand, a country might not want to sign such multilateral agreements, due to the fact that it might face punishment upon defaulting. On the other hand, when another country would neglect the agreement, that nation will be demanded to comply through the same means. This way of working is based on the assumption that an agreement can only exist when there is some kind of mutual benefit to all parties involved for signing of and complying with the regime. Such agreements are generally self-enforcing. If this is not the case the presence of international organisations can help (Keohane & Nye, 1985). Such organisations cannot enforce regulations themselves but can monitor analyse discrepancies in compliance and engage in preparations as to assist nations to deal with unexpected happenings in the future. Examples of such international organisations are the IMF, GATT, WTO, ILO, FAO, and more as already introduced in paragraph 3.1; these are all NGOs, nongovernmental organisations.

However, the effect of international organisations to create stimuli to government to live up to the expectations of an agreement can differ per situation. Sometimes it might even be more efficient for an NGO to direct governments towards more market operation instead of controlling everything via bureaucracy. An example is the GATT regime which strives for free markets and the abandonment of barriers to trade. NGOs do hence not work out of self interest but are there to smoothen bargaining among the members to the organisation aiming to result in a situation of “mutually beneficial cooperation” (Keohane & Nye, 1985). The situation can only be beneficial to all parties if the scope of the agreement is in line with the governmental goals of each member state. Therefore, it is important for regimes that they are built on a basis of common interest. If this is not the case countries will have to make difficult choices – which might lead to a default of the regime – or the regime will not be enforced at all.

Nevertheless, when regimes are signed and come into force, they generally have been drafted to resolve mutual problems. As there has to be a basis of common interest, regimes are not – per se – created to be universally applicable. Regimes apply to a selective group of countries which all seek cooperation on a specific field. Regimes can expand though when cooperation can become tighter and more topics of mutual concern are added. The creation and growth of the European Union and the Benelux Union over the years is a good example of developing cooperation. Still, universal appliance of regimes should be the ultimate goal and therefore, should be pursued, as done in the GATT trade regime (Keohane & Nye, 1985; Yun & Park, 2012).

The extent to which any gain through cooperation can occur depends not only on the parties involved and their willingness to cooperate, whether formally or informally. The – external – environment in which the alliance operates is of the utmost importance for sketching the possibilities and the band width for cooperation. Rules and regulations are a central part of this environment, since it can both limit and enrich cooperative programmes. Moreover, the role of the government in the economy can have substantial impact on the creation and maintenance of regimes. In this context, the differences in governmental position between countries and regions are also an influential aspect that must be taken into account. Former Dutch minister of Foreign Affairs Bernard Bot also confirms the significance of such regimes, but at the same time warns for “pure multilateralism” and stresses that similar ‘pure’ cooperations should be carefully balanced with some emphasis on national features and requests (Bot, 2006). Nevertheless, strong multilateral and regional relationships are – becoming – more important than ever (Bot, 2006).

Several researches, among who are Keohane (1990) and Caporaso (1993), consider international politics to be a “theoretical response to liberalism” (Yun & Park, 2012). Regimes are not just a measure for the countries involved. Regimes in place tend to alter the current international system and relations. Multilateralism is the concept around regimes which refers to market liberalism across borders based on the countries individual, common behaviour. Multilateralism adjusts the connection between countries, by identifying common grounds that might result in regimes. Multilateralism is often divided in two approaches, i.e nominal and practical. Nominal multilateralism focuses on the control of national policies among a group of countries, while practical multilateralism concerns adjustment of national policies in correspondence with the creation of certain norms, standards and principals (Caporaso, 2012; Keohane, 1990; Yun & Park, 2012). Regimes are often a combination of both. Not two countries think exactly the same on a specific topic, so after signing some adjustments might still be necessary. Important is then that the countries all agree to adjust their policies to comply with each other. At the same time control is a vital part of regimes as there is no point in signing an agreement if no one abides by it. Multilateralism goes further though, as it also involves informal relationships and general connections. Such relations increase the transparency through information sharing and dialogues. Regimes officially agree upon providing information where multilateralism assumes it to happen already naturally.

The used literature and definitions might not be the most modern. Nevertheless, cooperation and regimes have been a part of society for very long and the reasoning for engaging in such agreements has always been important.

In this research we will examine the impact of cooperation on trade. For this study the focus will lie on regimes as described above, since this involves signed agreements, which eases the matter of data analysis. The formal cooperations used will concern agreements between Benelux member states among each other, and with the surrounding countries. These cooperation agreements will be defined in Chapter 4. By analysing a diverse scope of cooperation agreements the aim is to provide an overview of the – possible – impact of cooperation agreements between two (or more) countries on the respective trade between these players. The broad scope enables to put the outcomes into perspective with respect to the countries themselves, the Benelux Union, and possibly the European Union. This will eventually result in an estimation of the link between cooperation agreements with respect to transport issues, and trade.

3.3 Logistics and infrastructure

In order to execute trade and the transport of goods, routing options with different means of transportation, on different kinds of infrastructure are indispensable. A strong infrastructural network with various intermodal hubs enhances the mobility of logistics and economic interaction (Notteboom, 2009). Every year the WTO publishes a so called World Trade Report to examine trends in trade, trade policies and multilateralism, each year with a different focus. The 2004 Report highlights the growing importance of infrastructure and its related services for international trade. Enhancing efficiency of these transport related applications and services might require political interference to be applied effectively. Such political interference would be complementary to existing policies to trade as “gains from trade often depend on the quality of infrastructure and related services” (WTO, 2004, §IIB). Effective infrastructure and services could lead to lower transport costs. These costs vary by region and commodity handled, which is partly due to local infrastructure, policies, geography and some other variable factors. For a country that is for instance landlocked, such as Luxembourg, transport costs are about 50 percent higher averagely, than countries with direct access to the sea (Limao and Venables, 2001). Other factors that influence the costs of transportation are *inter alia* the commodity type, traffic, the quality of infrastructure (as mentioned) and of support activities and services. The higher the transport costs the higher the barrier to trade and to benefits from free trade. Differences in the level of payment to transport between countries can result in comparative – as well as absolute – advantages for better accessible countries which in turn might influence the trade volumes to this/these country/-ies. See for example Figure 16 on the difference transport modes used between the United States and Japan in the appendix. The fact that trade over land is zero for Japan is explained by the fact that Japan is an island. Hence geographical characteristics and infrastructure to cope with any shortcomings are fundamental to trade.

Infrastructure quality does not just have a one-way effect on trade (WTO, 2004). Proper infrastructure increases the ability to deliver the goods via direct roads and in time. This lowers transport costs and has hence a positive effect on trade. Moreover, multiple research has showed that public infrastructure can “affect trade through its effect on a country’s comparative advantage” (WTO, 2004). This includes transport related to infrastructure (Yeaple & Golub, 2002). It turns out that better infrastructure is correlated to higher trade volumes, which counts for all transport modes. Transport modes used are water, air, and land. Sea freight rates tend to differ greatly among routes and regions (WTO, 2004). This difference is caused by the same factors as transport costs in general but also by aspects as port congestion and efficiency. This is again related to the infrastructure in place. Concerning our area of analysis, there are 2 major ports in the Benelux area, i.e. Rotterdam and Antwerp in order of tonnes handled. Moreover, in the Hamburg-Le Havre range there are even 5 deep sea ports, i.e. Rotterdam, Antwerp, Hamburg, Le Havre, and Bremerhaven. These 5 ports all belong to the top 50 of ports all over the world in terms of tonnes *and* TEUs handled per year⁴. Figure 23 shows the ranking of world ports up until 2010 in terms of TEU handled, where Hamburg and Antwerp switch places compared to tonnes handled, but Rotterdam is the only European port still in the top 10 in 2010. This shows that these ports are rather efficient as there would otherwise not be a chance to compete with the world’s largest port, that nowadays are all on the Asian continent. Efficiency is on the one hand boosted by proper infrastructure. On the other hand, tactful regulation concerning competition and liberalisation can foster port efficiency (WTO, 2004). Port quality is

⁴ <http://aapa.files.cms-plus.com>, 21 July 2012

estimated by research to have the largest positive effect on trade, compared to the other transport modes, although all modes contribute positively to trade flows. It is even stated that “efficient ports explain bilateral trade pattern better than preferential margins” (WTO, 2004, p126). See also Figure 1 for a map of the Hamburg-La Havre range and Table 1 for specific turnover of the 10 largest ports in this area.



Figure 1: Hamburg-Le Havre range. Source: Notteboom, 2003.

Port	Tonnes	Market share
Amsterdam	65.4	5.9%
Antwerp	182.9	16.6%
Bremerhaven	69.2	6.3%
Dunkirk	57.1	5.2%
Ghent	25.1	2.3%
Hamburg	140.4	12.8%
Le Havre	78.9	7.2%
Rotterdam	407.0	37.0%
Vlissingen	33.0	3.0%
Zeebrugge	42.1	3.8%
Total	1101.1	100%

Table 1: Market shares and tonnes handled by deep-sea ports in the HLH-range (2007). Source: Wiegmans et al., 2010, p.4

Transport over land does not only apply to roads, but also to rail transport and pipelines. Costs of moving goods from point A to point B over land depend heavily on the regions between which the transport takes place, just as with sea freight rates. However, transport over sea is estimated to be cheaper than inland transport on average. This does not change the fact that the demand for land transport is growing. Just-in-time delivery becomes more and more important and land transport is the most time-certain transport mode (WTO, 2004). Timeless has been an increasingly important

issue over the past years which also increases the demand for air transport, especially for the transport of perishable products. However, not only the freight rates differ highly across areas – as with all mentioned transport modes– also the quality of the infrastructure is not equal in different regions. This causes the same trouble and possible absolute and comparative advantages as with the other transport modes discussed.

To optimise transport costs “integrated transport and communication links are essential” (WTO, 2004, p.120). In case of international transport, cooperation on government level could foster such integration and communication, resulting in for instance less custom dealings at the borders, or coordination of transport internationally across countries; hence, decreasing transport cost. However, not only transport costs are lowered by efficient logistic solutions. Also the production costs of industries can be lowered as just-in-time delivery can be applied with greater certainty of ongoing production. This can add again to the comparative advantage of a certain region and increase trade flows. Moreover, in their research, the WTO found that there are more trade flows between neighbouring countries than two different countries, due to distance that need to be dealt with (2004)⁵. Distance is an important influence on transport, not only in terms of time, but also in terms of cost of time. Multimodal transport networks are progressively important to cope with distances and time. If, additionally, two adjacent countries would also engage in cooperation to enhance their shared logistics, trade could be stimulated even further.

Applying the above theory to the Benelux area and the Benelux Union – before analysing it fully in the following chapters –, trade among these countries would be there by theory already due to the fact that they are adjacent. The cooperation of the Benelux Union with integrated policy on several fields, adds to the theoretical phase with an increasing stimulus towards integrated logistics and free market. This effect will be considered in detail in the remainder of this thesis.

It is important to note that “transportation infrastructure has both spatial and economic properties” (Thomas *et al.*, 2003, p.424). Besides facilitating volumes to be moved from one point to another, infrastructure has the general characteristic and ability to unlock certain enclosed areas and hence “acts as a facilitator to increase the participation of land-locked and peripheral regions in global production and logistics networks” (Notteboom, 2009, p.48). Consider for example Luxembourg which is a land locked country. Unlocking regions can add to existing networks in place in terms of range and feasible capacity; it can possibly alter the size of specific regions and agglomerations. Additionally, it can have its effect on “transport costs within and between regions” (Evers *et al.*, 2009, p.30). In total, both economic and spatial factors – separately and together – can contribute to the competitiveness of areas and regions.

Not only sound infrastructure but also support activities and services are an eminent part of regional development. The impact it can have, however, depends on multiple factors where territorial differences play a prominent role, geographically, politically and socially. “Whereas some regions have access to good infrastructure networks and services, others are in a less favourable position or might be negatively affected by current policies and development trends” (ESPON, 2006, p.54). Hence, conversion of policies could indicate the potential synergies or fields of cooperation in terms of the transport and infrastructural network, by means of possibly decreasing territorial differences.

⁵ The statement that adjacent neighbouring countries have higher trade flows among them and any two other countries, is the result of empirical analysis *after* controlling for the distance between countries (WTO, 2004).

In this sense it is essential that any political aspirations are funded with a solid understanding of market operations (Notteboom, 2009, p.4).

However, cooperation has a far wider range of importance than only on policy issues. Cooperation can be established on any field of interest of at least two parties, any topic on which communication is desired, as shown in paragraph 3.2. With respect to transport cooperation is very valuable. For example, when considering hinterland connections from logistical nodes, cooperation agreements are more and more eminent. There is an increasingly recognised importance of hinterland connections and the growing creation and presence of hub-and-spoke networks is only one example of this feature. The intermodal aspect of efficient transport flows is ideally integrated in hub-and-spoke networks (Crainic & Kim, 2007, p.428; Meng & Wang, 2011, p.724). Such networks offer multimodal services to benefit from economies of scale and scope and lower transportation costs (Meng & Wang, 2011). Multimodal transport is becoming increasingly important and is in Europe primarily developing at the crossing of Eastern and Western Europe, where for example Germany with a fairly advanced road and rail infrastructure acts as a significant pivot (Notteboom, 2009, p.58). In the Benelux area within the Hamburg-Le Havre range, multimodal transport is also very significant, especially with respect to barge operations from the major deep-sea ports – *inter alia* Rotterdam, Antwerp, and Hamburg (see Table 1 for an overview of the main deep-sea ports in the Hamburg-Le Havre range (Wiegmans et al., 2010)) – to the respective hinterlands in Germany, France and further (Notteboom, 2009, p.27-28). The development of such networks can only occur when different parties cooperate, at least to a certain extent.

3.4 Theory in perspective

Trade has been defined above as “the activity of buying and selling or of exchanging goods or services between people or countries” (Oxford Advanced Learner’s Dictionary). Moreover, cooperation agreements are in this research negotiated on governmental level and are often part of trade policies established in the form of regimes. However, recall that in this study the focus lies on whether cooperation agreements, by means of policies for logistics and infrastructure development, have an impact on the intensity of trade, i.e. the trade volume. In this paragraph we will try to combine the most important aspects of the three paragraphs above to see the link between trade, cooperation, and logistics. As trade is commonly considered to have a positive effect on GDP and trade is supposed to be fostered by trade policies, first the connection between trade by means of composed policies, trade volume, and economic growth will be analysed, although a lot of research has been focusing on the relationships between trade policies and economic growth, instead of trade volumes per se. Then the link with cooperation and logistics will be considered. The analysed interlinkages are visualised in Figure 2 below.

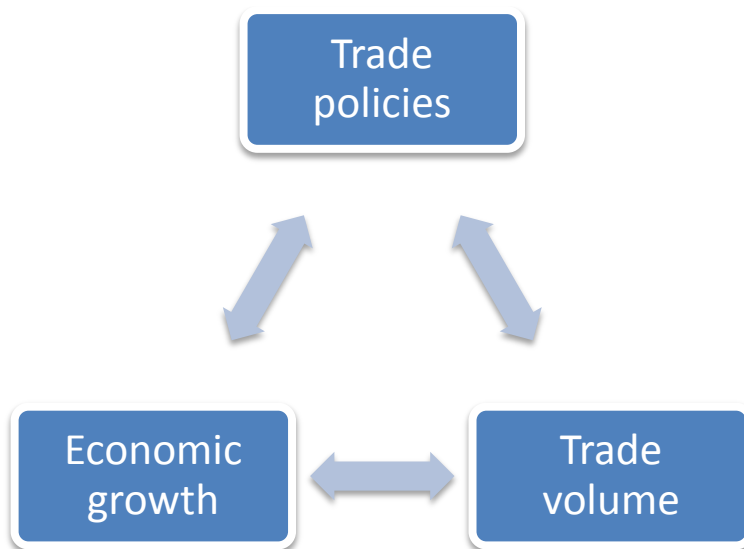


Figure 2: Connection between trade policies, trade volume, and economic growth.

Outward-oriented economies are widely considered to experience higher growth compared to inward-oriented economies (Yannikaya, 2003, p.57). However, at the same time a broad range of studies on the connection between trade liberalisation and economic growth exist, but no straightforward clear answer can be given in the direction and/or strength of the relationship. Nevertheless, “there is a near consensus about the positive association between trade flows and growth (...) [although] these effects are very complicated in the most general case and the results are mixed as to how trade policies play a special role in economic growth” (Yannikaya, 2003, p.58). In general political discussions “today the benefits of openness are oversold routinely in the policy-relevant literature and in the publications of the World Bank and the IMF” (Rodrik, 1999, p.25). Hence, one must be careful what to believe and how to approach certain sources. This does not mean that specific sources should not be used, but they should at all times, be placed in perspective.

However, even though openness might be overstated according to Rodrik (1999), the link between trade policies on *inter alia* openness and trade volume cannot be denied. Yannikaya (2003) takes trade volumes as a measure and finds “that there is a positive and significant association between

trade openness and growth (...) [which is] also consistent with the conclusion of empirical and theoretical growth studies” (p.58). Policies lifting trade barriers foster trade and hence increase trade volume. Increased demand for trade (volume) in turn stimulates the economy and industrial output, which consequently has a positive effect on GDP, i.e. economic growth. This analysis also works the other way around in many cases. An increase in trade volume and, hence, an increased demand for the supply of goods and services, stimulates governments to set up (more) trade policies to smoothen and support this trade process.

The link between trade policies and cooperation agreements is especially clearer when trade barriers initially existed. By lifting such barriers with respect to some countries, but not to others, an advantage for both sides can be created which then can be shaped into an agreement of cooperation. Yannikaya (2003) uses trade volumes as a measure for openness. Here we will however separate that analysis as to see to what extent changes in trade volumes are not per se a response on trade policies established or in place. There is a clear logic of thinking that trade policies are in essence established to enhance trade, i.e. increasing trade volumes. Increasing (decreasing respectively) trade volumes can have in turn an impact on the economy and economic growth, as already indicated. At the same time, trade policies, can, beside enhancing trade, have side effects which also impact economic growth, not via trade volumes per definition. At the same time, all three aspects are subject to external influences as well, which are not incorporated in either of their ‘enablers’ in Figure 2 above.

Another ‘enabler’ can be added for cooperation, as Figure 3 shows. Cooperation is linked to trade by means of collective action to create a free market. Examples of real time application of this feature are of course the Benelux Union and the European Union, in order of appearance. Also by means of cooperation comparative advantage can be exploited and economies of scale can be realised. This in turn impacts economic growth. Moreover, cooperation is generally established on some basis of trust. If such a foundation exists between countries, trade is not only fostered through policies. Additionally, reasons to engage in cooperation, as discussed in paragraph 3.2, are issued as burden and information sharing, stabilising policies, and resolving mutual problems, creating a beneficial external environment to industries and economies. Cooperation does hence not only involve trade, but can impact the economy – and hence economic growth – also in different ways. When cooperation does involve trade policies, it is often concerned with lifting trade barriers and soothing other – possible – obstructions to trade.

One possible obstruction to trade is insufficient logistics services and infrastructure. Developing infrastructure lowers transport costs, raises transport efficiency, and in turn fosters trade. Quality infrastructure and logistics services enable an increase in demand for industrial output. Stimulated demand for products also triggers trade in terms of volumes. Infrastructure can be developed nationally, but also across borders, which requires international cooperation. This short analysis shows the possible effect of infrastructure on the four definitions in Figure 3. Recalling the aim of this study to examine the connection between cooperation agreements on logistics development and trade volumes, the above analysis shows the theoretical links between these factors. It also puts the research in the framework of policies and economic tendencies, which at all times impact the internal and external environment that industries and countries experience. Moreover, the above paragraphs creates the theoretical framework for the empirical analysis in section II.

In the next chapter the research area of the Benelux countries will be presented in the context of the institution of the Benelux Union. Furthermore, the applicable cooperation agreements for the remainder of this study will be displayed in paragraph 4.3.

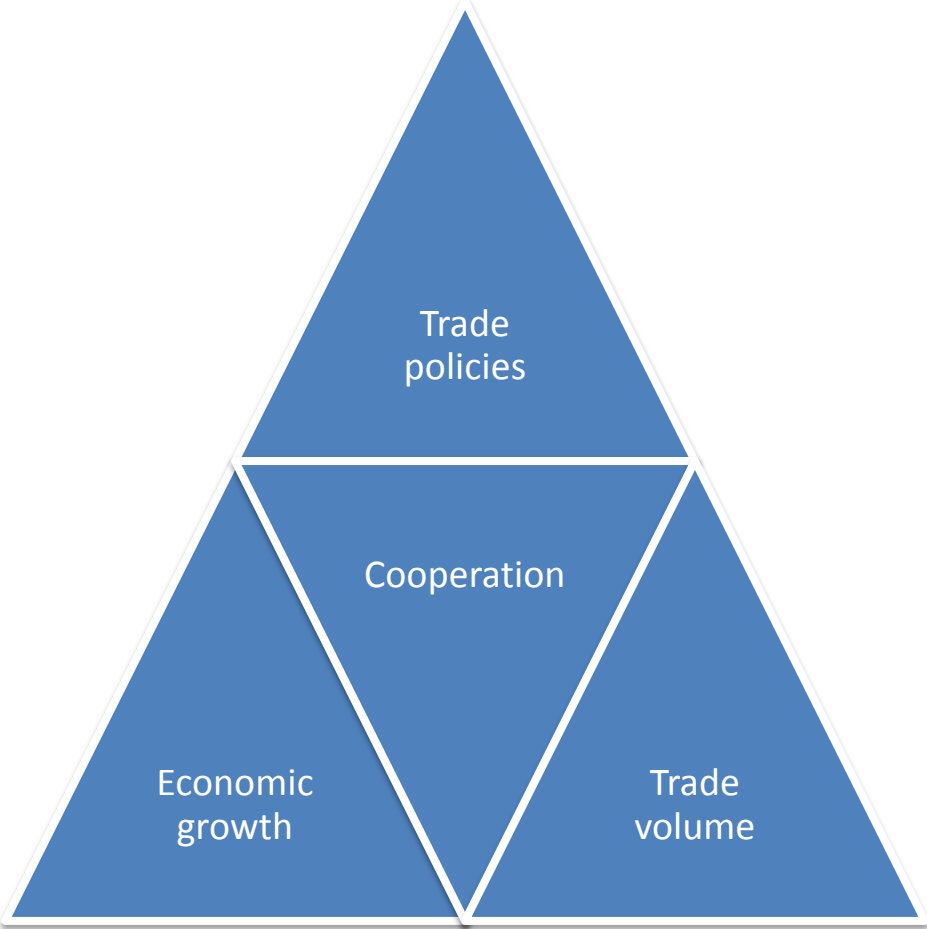


Figure 3: Connection between trade policies, trade volume, economic growth, and cooperation.

4 Europe and the Benelux

Europe is one of the seven continents in the world. This continent ranges from Iceland in the west to past Moscow in the east, and is bordered in the north and south by the Arctic and Mediterranean Sea respectively. However, in everyday conversation ‘Europe’ usually refers to the countries combined within the European Union (EU) and the European Free Trade Agreement (EFTA). The countries involved in these agreements have been playing a dominant role in the development of the position of Europe in the world, predominantly in terms of trade as this is one of the keystones of the Union⁶. It started in 1951 with the establishment of the European Coal and Steel Community (ECSC) at the signing of the Treaty of Paris. Very soon already the initial parties to the ECSC agreed on extending their common market which made them sign the Treaty of Rome which created the European Economic Community (EEC). In 1960 the earlier mentioned EFTA was established by seven European countries to provide a counterbalance to the EEC. Nowadays the EFTA consists of four countries, i.e. Iceland, Liechtenstein, Norway, and Switzerland, of which the latter two were also among its founding members. Over the years six more countries joined the EEC, which together formed the twelve countries that signed the Maastricht Treaty that established the European Union in 1993, which we now know as the EU. From then on, more countries joined shortly afterwards which has resulted in the EU-27 at present. Table 2 below provides a summarised overview of the developments in Europe throughout the years. Figure 4 shows the expansions of the EU in a map.

Name	Countries	Founding year
ECSC	Belgium, the Federal Republic of Germany, France, Italy, Luxembourg, the Netherlands	1951
EEC-6	Same six countries that founded the ECSC	1957
EEC-9	EEC-6 plus Denmark, Ireland, and United Kingdom	1973
EEC-10	EEC-9 plus Greece	1981
EEC-12	EEC-10 plus Spain, and Portugal	1986
EU-12	Same twelve countries as EEC-12	1993
EU-15	EU-12 plus Austria, Finland, and Sweden	1995
EU-25	EU-15 plus Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia	2004
EU-27	EU-25 plus Bulgaria, and Romania	2007

Table 2: History of the EU. Source: composite table from <http://europa.eu/>.

Cooperation between two countries or other parties can foster (bilateral) trade that then stimulates the economic situation of both sides as acknowledged by various scholars. Already in the 1950s the partnership of the Benelux Economical Union was signed, between the governments of the three neighbouring countries Belgium, the Netherlands and Luxembourg. At first it was purely an economical agreement captured in the Customs Convention of 1944 but soon they broadened their scope of cooperation. A common market was realised, and *inter alia* the free movement of persons was later agreed upon⁷ (for further details see paragraph 4.2 on the Benelux Union). As three relatively small countries in Western Europe, “the economic and urban nerve centre of Europe”⁸, the Benelux countries support each other in presenting themselves to Europe and the rest of the world. This bond has tightened over the years. Such type of cooperation has in turn been used as an

⁶ <http://ec.europa.eu/trade/about/eu-trade-profile/>, 29 September 2011

⁷ http://benelux.int/nl/bnl/bnl_geschiedenis.asp, 21 september 2011

⁸ http://www.belgium.be/en/about_belgium/country/geography/, 29 September 2011

example for the creation of the European Union. Since then the intergovernmental organisation of the Benelux has performed a pioneering role with respect to further development of European integration and the European Union (Postma & Busschaert, 1994).



Figure 4: European Union - member states in phases⁹

⁹ <http://www.nationsonline.org>, 27 July 2012

4.1 Benelux area

The Benelux countries together form the gateway to Western Europe, which implies a prominent position for these countries in international trade. Figure 5 shows the designated area¹⁰. This gateway is supported by an intense network of infrastructure of all kind. Figures 20, 21 and 22 show the main rail- water- and pipeline connections for the Benelux and Europe. It shows that the Benelux area has a rather dense network, also when compared to other European areas. This dense infrastructure network is for a large part the result of cooperation agreements on the development of the transport chain. Three European cooperation programmes stand out concerning projects on infrastructure development, being TEN-T programmes, Operational programmes, and Marco Polo programmes. Specifications on these programmes will be presented in paragraph 4.3.

As we have seen in paragraph 3.3 on logistics and infrastructure a proper transport network is of the utmost importance for fast, cheap and efficient performance. This in turn has a positive effect on trade flows. Throughout history trade has been important for the three Benelux countries individually and combined. In the 1950s, when the Benelux Union started to flourish the import and export of the Belgium-Luxembourg Economic Union (BLEU) determined 77 percent of GDP in 1956. For the Netherlands accounted for almost 99 percent of GDP (Albregts, 1958). Figure 6 shows a few countries and their respective trade balance in 1956. As individual countries the Benelux countries were not so prominently present at the time, but combined in the Benelux structure they accounted for 5.8 percent of world trade in 1958 as Figure 7 shows.



Figure 5: Benelux area

¹⁰ <http://mapsof.net/map/benelux-map>, 27 July 2012

During the 1940s and 1950s the Netherlands exported goods to the other Benelux countries worth around 100 million Euros to 1 billion Euros. Nowadays, this export value is almost 600 times higher, with an import value of more than 250 times higher than in the 1940s¹¹. Both import and export streams have increased throughout the past century, with a slight stabilisation in the beginning of the 1990s but a strong rise as of 1995. Per 2008 the data show again a sharp downturn in total trade, which could be a response to the 2007-financial crisis. One year later there is again though some stabilisation visible when both import and exports grow in the direction of the trade volume before 2008. See Figure 8 and Figure 9 for a graphical representation. After Germany, which is the largest trading partner for all three Benelux countries¹², Belgium is the most important trading partner of the Netherlands, and the other way around. Figure 10 indicates by means of pie charts the significance of Germany and Belgium as trade partners for the Netherlands.

Nowadays, the trade balance of the Benelux countries is still higher than the European average. Figure 11 illustrates this balance. In the European context the Benelux GDP is also higher than the EU average in 2009 although there was a general slight decrease between 2008 and 2009. This is graphically shown in Figure 17 and Figure 18 in the appendix. One of the important sectors for the economies of the Benelux countries is transport. Most transport is operated on road, but for instance barge transport is very important for the Netherlands especially. The modal split of transport modes used in the Benelux is shown in Figure 12. It is no surprise that barge ('binnenvaart') or rail ('spoorweg') are not popular modes in Luxembourg as the country is completely landlocked and the rail network is not very developed. Yet, in total, the Benelux countries accounted for 8 percent of all goods transported by the EU-27. See Figure 19. In the other figures in the appendix, figures 13 and 14, the share of transport by rail and by water is shown, respectively the latter is illustrated by means of the port throughput in the Benelux. Figure 22 finally indicates that the transport flow internationally, originating from the Benelux, is larger than national transport. For the neighbouring nations to the Benelux this is the other way around, stressing the importance of international trade for the Benelux countries.

The research frame of this thesis will focus on Western Europe with the Benelux at the centre in combination with the surrounding countries – i.e. Germany, and France –, to cover the area known as the Benelux-plus. For further details on the data selection, see chapter 6).

¹¹ www.cbs.nl, 14 August 2012

¹² Ibid.

Internationale handel in 1956 in procenten van het nationale inkomen.			
	uitvoer	invoer	totaal
Nederland	43	56	99
B.L.E.U.	38	39	77
Frankrijk	11	14	25
Italië	12	17	29
West-Duitsland	21	19	40
Verenigd Koninkrijk	19	24	43
Verenigde Staten	6	4	10

Figure 6: International trade in 1956. Source: Albrechts, 1958.

Het aandeel van Benelux en enige andere landen in de wereldhandel (1956).		
	mln dlr.	in perc.
Verenigde Staten	31466	17.5
Verenigd Koninkrijk	19366	10.4
West-Duitsland	13968	7.5
Benelux (excl. intra-verkeer)	10779	5.8
Frankrijk	10092	5.4

Figure 7: Share of Benelux in world trade (1956). Source: Albrechts, 1958.

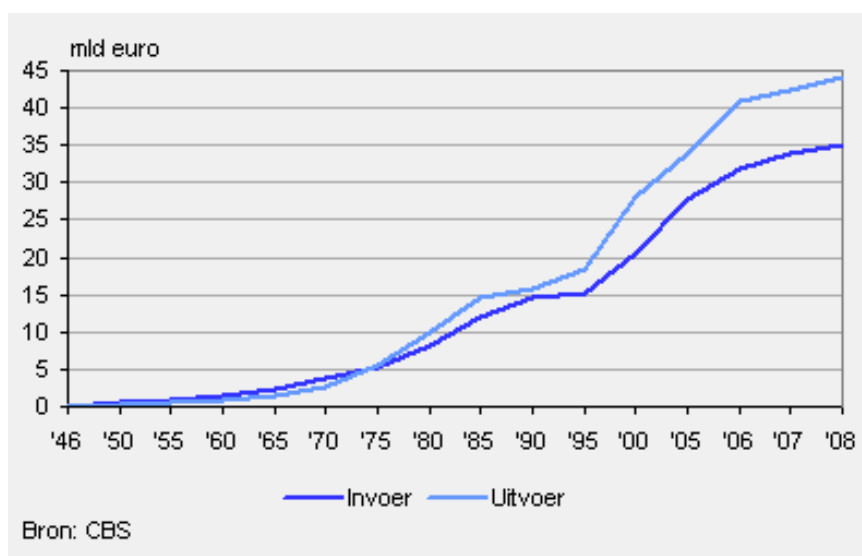


Figure 8: Trade flows of the Netherlands with Belgium and Luxembourg from 1946 to 2008. Source: cbs.nl

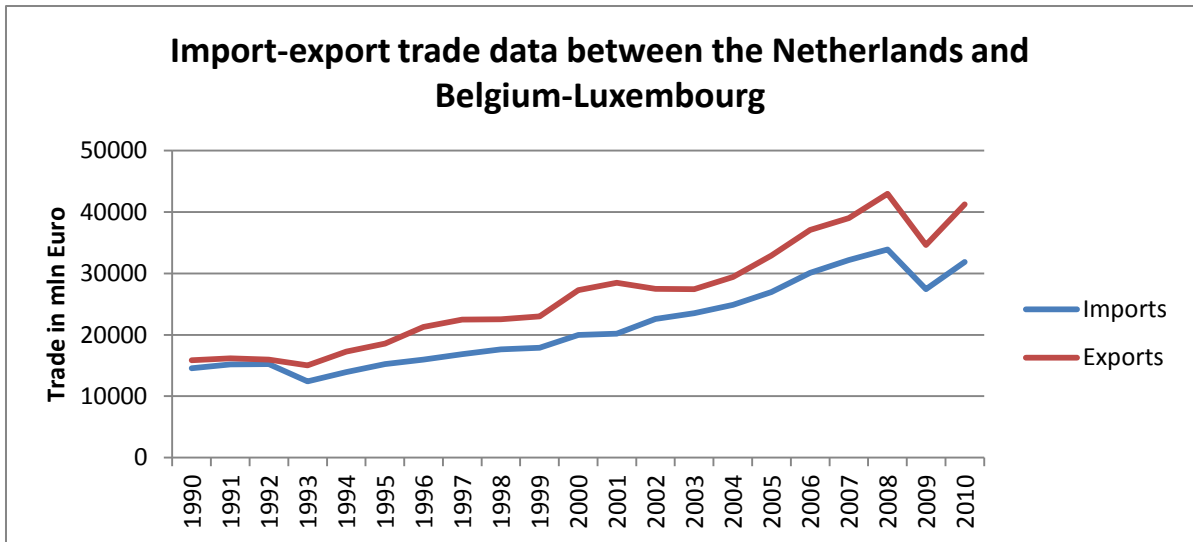
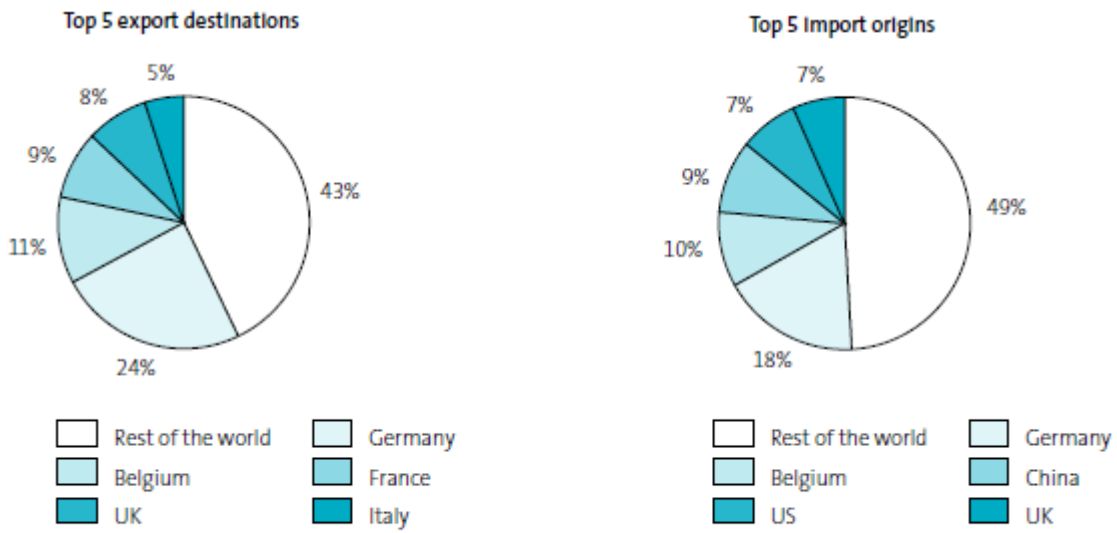


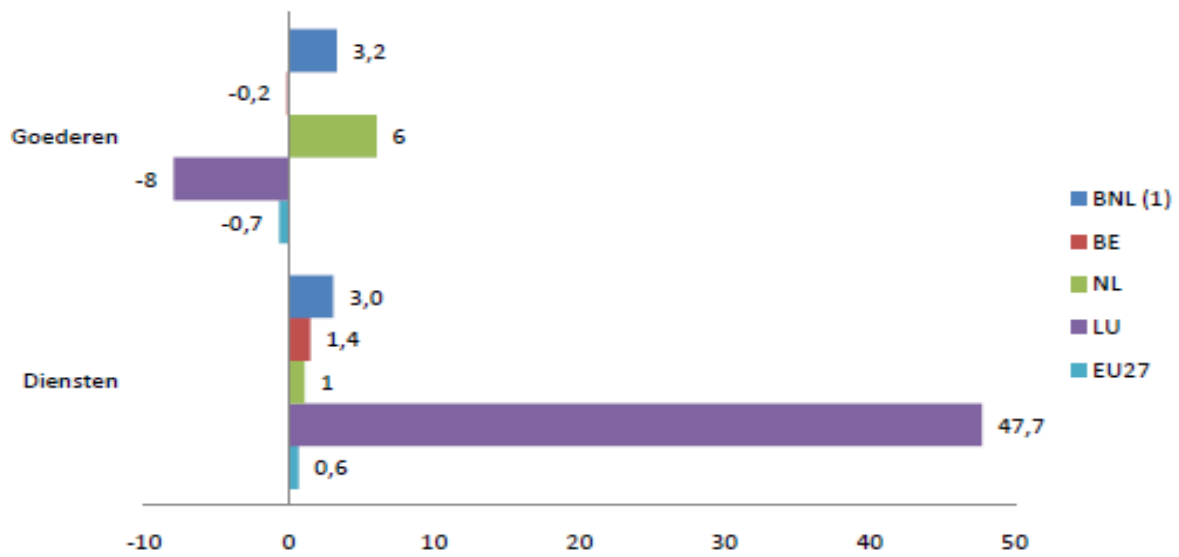
Figure 9: Import-export trade data between the Netherlands and Belgium-Luxembourg 1990-2010.



Source: CBS, Statline, International trade in goods (extracted: 24-8-2011)

Figure 10: Netherlands' top trading partners 2010. Source: Statistics Netherlands, 2011

Korte beschrijving: The balance of payments is a record of a country's international transactions with the rest of the world. It is composed of the current account and the capital and financial account. The current account is itself subdivided into goods, services, income and current transfers; it registers the value of exports (credits) and imports (debits). The difference between these two values is the "balance".



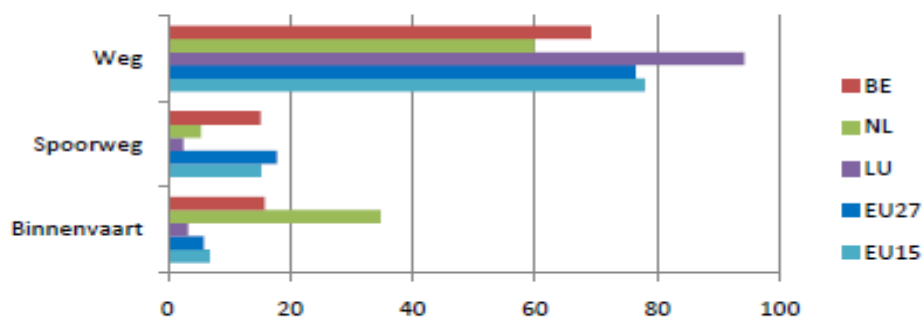
(1) Calculated as the GDP-weighted average of BE, NL and LU

Note: Euro-zone data does not include transactions between Member States, whereas individual Member States' data do.

Source: Eurostat (tec00044, tec00045)

Figure 11: Balance of trade in goods and services, 2009 (% of GDP). Source: Bergers, 2010.

Korte beschrijving: This indicator is defined as the percentage share of each mode of transport in total inland transport expressed in tonne-kilometres (tkm). It includes transport by road, rail and inland waterways. Road transport is based on all movements of vehicles registered in the reporting country. Rail and Inland waterways transport is generally based on movements on national territory, regardless of the nationality of the vehicle or vessel, but there are some variations in definitions from country to country.



Source: Eurostat (tsdtr210)

Figure 12: Modal split of goods transport, 2008. Source: Bergers, 2010.

4.2 Benelux Union

The Benelux Union is the “framework for official and political cooperation between Belgium, the Netherlands, and Luxembourg” (Wouters & Vidal, 2008, p.2). The current institution of the Benelux Union has a history of over 60 years. The first steps towards the creation of the Benelux Economic Union were made in London in September 1944 when the governments of the three countries of Belgium, the Netherlands, and Luxembourg signed the Customs Convention. This Convention was in turn to a certain extent preceded by the Belgium-Luxembourg Economic Union (BLEU) signed in 1921. At the time cooperation with the three countries together was not yet possible due to damaged relationships after World War I (Postma & Busschaert, 1994, p.9). Fortunately, such cooperation proved to be possible with the establishment of the Customs Convention in 1944, which was further elaborated on in the Protocol signed at in March 1947 in The Hague (Benelux Treaty 1958, preamble). With the signing of the Treaty establishing the Benelux Economic Union in 1958 a new era of cooperation began which extended the aims of the Customs Union by stating the ambition “to strengthen the economic ties between their countries by means of free movement of persons, goods, capital and services” (Benelux Treaty 1958, preamble). Moreover, the aligning of policies concerning economic, financial and social issues, and a joint trade policy with the “freest possible trade” (Benelux Treaty 1958, preamble) with respect to third countries was to be pursued. Overall the general aim of the Benelux Economic Union was to foster economic progress through cooperation, trade, and alignment of policies.

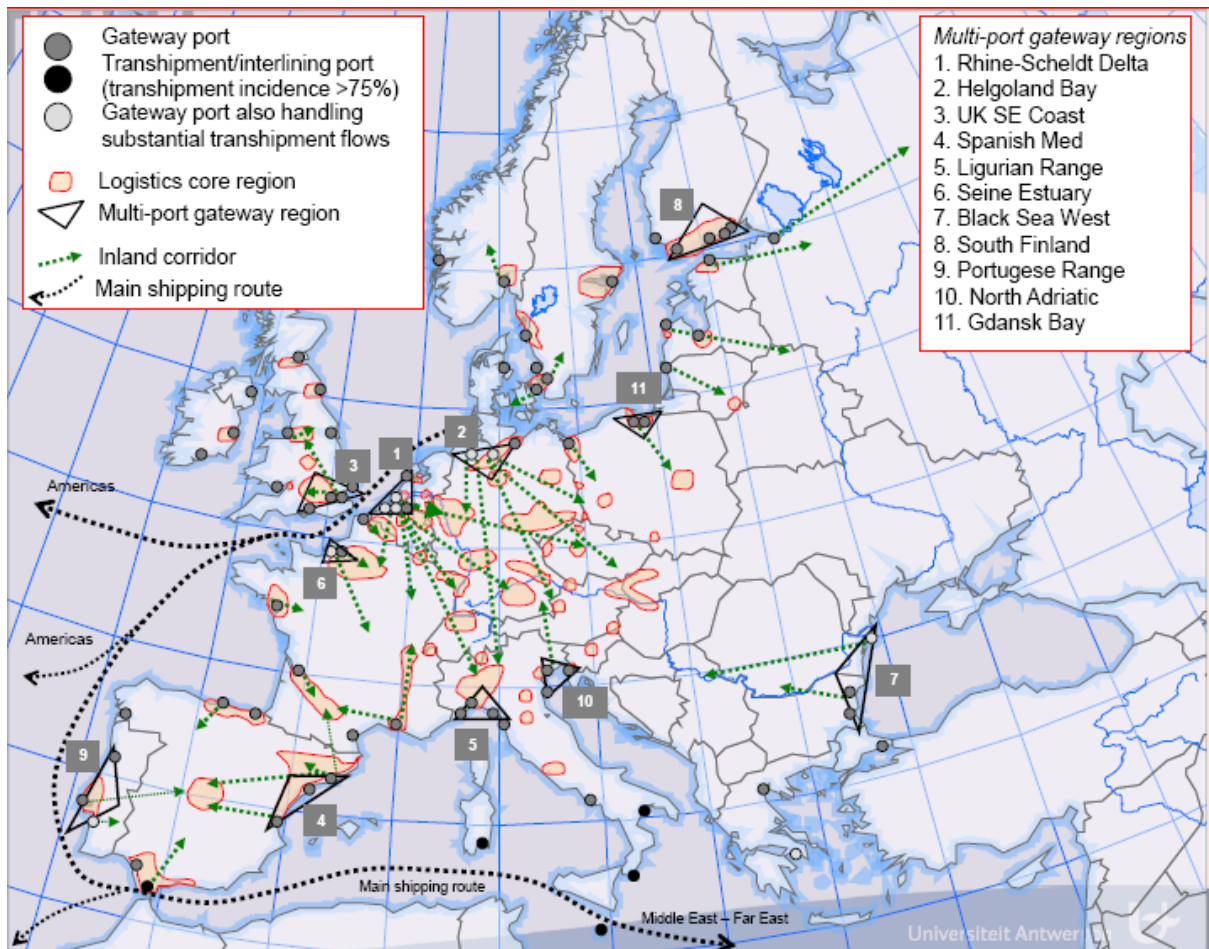
Among the governments of the three countries there was a strong common understanding on international politics, which mainly came down to more intense European integration (Janssens, 2009). The Benelux Union has considered by several authors to be “a laboratory for further European integration” (Janssens, 2009, p.116; Wouters & Vidal, 2008; Albregts, 1958). In this laboratory the purpose was to constitute an economic union with a free market. Moreover, financial and social policies were also aimed to be set up in correspondence with the other member states, next to the economic policies establishing the economic union. Additionally, an ‘external’ – to the Benelux – cooperative approach was added to the objectives with respect to ‘third’ countries. Such joint external policy was, however, already realised with the establishment of the European Community, before the Benelux countries really took action. Nevertheless, the concept of the Benelux is widely known, mainly from its collective positioning towards ‘third’ parties, “both within and outside the European Union” (Wouters & Vidal, 2008, p.23). The Benelux countries are perceived to be very alike and with rather similar problems, which stimulates a solid basis for cooperation, that any other combination of three nations might not have. In the EU format and in other international gatherings the governments of the three countries come together for breakfast to go over their common point of few before expressing their position during general deliberations (Janssens, 2009; Wouters & Vidal, 2008).

The Treaty establishing the Benelux Economic Union of 1958 was signed for a period of 50 years (Benelux Treaty 1958, art.99). During this time, many decisions and resolutions have been drafted and applied on the different issues the Union is concerned with. An example of a decision concerning facilitating the free trade of goods and services is the decision of December 16, 1991 on the determination of the conditions under which an entrepreneur located in a Benelux country will be admitted to road haulage, which eases the procedure for transport operators to do business across the border (Ministerial Decision, M (91) 20). Figuur 13: North West European Gateway Area. Source:

OECD, 2010 shows the interconnectivity of the Benelux region, but also the small size of the three countries individually. The relative small size gives an extra stimulus towards cooperation.

Moreover, the Benelux cooperation is honoured by initially the Rome Treaty and nowadays the EC Treaty by means of article 306 of the EC Treaty which states that “the provisions of this Treaty shall not preclude the existence or completion of regional unions between Belgium and Luxembourg, or between Belgium, Luxembourg and the Netherlands, to the extent that the objectives of these regional unions are not attained by application of this Treaty” (EC Treaty; Wouters & Vidal 2008, p.5; Albrechts, 1958). This means that next to the integration of national dealing among the governments of the Benelux countries, regional collaboration is also possible and not restricted by European laws to the extent defined in the article. Such regional collaboration is in some cases fostered by the presence of the Benelux Union. In that case the Union stimulates partial cooperation within the framework of the Benelux. Examples are the well-known deepening of Scheldt or the less well known MAHHL cooperation (Maastricht, Aachen, Heerlen, Hasselt en Luik). These are only two of a large number of small cooperation agreements – some more prominent than others – within the Benelux framework (Wouters & Vidal, 2008). Especially partial cooperation agreements between the Netherlands and Flanders are actively present in intra-Benelux cooperation. Next to easing the regulations for cross border transport business as we have seen above by means of a Ministerial Decision, Belgium and the Netherlands have been negotiating on several transport issues such as infrastructure development through a high-speed train connection between Amsterdam and Brussels, the Iron Rhine railway between the port of Antwerp and the German hinterland, and the deepening of the Scheldt (Wouters & Vidal, 2008). As mentioned before, the involvement of the Benelux Union is not prominent in *all* intra-Benelux cooperations. With the three transport related examples here, the Benelux Union has mainly played a role in the discussion about the Scheldt.

However, even though these cooperation activities might be backed by the Benelux Union, the Union does not play a major role – if any – in the execution of *every* cooperation programme (Janssens, 2009). This feature sometimes raises questions about the added value of the Benelux Union, but one must not forget that it was the environment created through the Benelux that encouraged further regional cooperation. So, even though the direct role of the Benelux Union might not always be visible in first instance, the Union plays an important role under the surface. These cooperational sub regions are very important in their own sense but also as they share many perceptions with the Benelux Union as a whole and hence, carry out the Benelux-ideas when acting in small groups as well, establishing an increasingly more wide spread understanding of the common goals.



Figuur 13: North West European Gateway Area. Source: OECD, 2010

The general cooperation and collectively drafting regulations have been considered to be beneficial to the parties involved. This has also been noted when the new Treaty was constructed, stating “that, basing themselves on their cooperation, they have been able to successfully implement initiatives which had a favourable impact on international developments, particularly within the European Union” (Benelux Treaty 2008, preamble). These developments within the EU are an important mirror for the Benelux as the Union sees itself as a pioneer with respect to cross border cooperation. For instance the Schengen Agreement of 1985 has its roots in the Benelux¹³. With the construction of a renewed Treaty the Benelux hopes to secure its pioneering activities and its own progress (Benelux Treaty, 2008).

Nevertheless, upon the drafting of the new Treaty some doubts were raised on whether the extension of the cooperation would indeed be worthwhile. One of the reasons to consider this was the fact that European integration, nowadays, is rather well established within the European Union. When the treaty on the Benelux Economical Union was first signed, one of the prime issues was more intense integration, as the EEC apparently was not enough for the Benelux countries. A lot of issues the Benelux agreement first aimed at the European Union is dealing with today. Looking, for instance, at the free market and custom arrangements among the EU member states. With the 1992 Treaty of Maastricht many pillars of the Benelux Union have been incorporated into the EU.

¹³ http://benelux.int/nl/bnl/bnl_nieuwVerdrag.asp, 29 September 2011

Even though all of this might be true, the governments of Belgium, the Netherlands and Luxembourg agree that the added value of the Union is not gone, as long as they were willing to amend the original agreement to the extent that it would fit in current time and situation (Janssens, 2009). First customs was a prominent issue; now environment, crime, sustainability, immigration and logistics are just a few of the pressing topics in national and international politics. With the renewing of the Treaty the Benelux countries have that chance to amend the original agreement to be in line with today's issues and concerns of the three countries which they want to address together (Wouters & Vidal, 2008).

From this point of view, for the EU added value of the Benelux only remains if the Union is able to continue their work on the promotion and stimulation of the regional integration, and ultimately European integration (Wouter & Vidal, 2008). However, one of the reasons why the contribution of the Benelux Union is sometimes questioned is the issue that the Benelux cooperation did not use its opportunities to the fullest extent over the years; this now results in the diminished perceived value of the Union. Nevertheless, this does not mean that no added value is considered to be present. In negotiating bilateral agreements the Benelux Union is very experienced and valuable. Therefore, the Union needs to hold on to its purpose while amending its focus and fields of expertise.

It can be stated that the "role of the Secretariat-General of the Benelux Union is mainly a facilitating one" (Wouters & Vidal, p.9) in the sense that it stimulates communication, coordinating inter-Benelux streams of workers and playing the neutral link between the parties at meetings and conferences. This all happens with the focus to reach general consensus among the member states and nowadays sub-regions and adjacent areas such as North Rhine Westphalia and Nord Pas de Calais. The Benelux Union is no supranational organisation but more an inter-national organisation, meaning that no sovereign powers have been transferred from the national governments to the Union. Rules and regulations are imposed on the population of all three countries either by means of treaties or of uniform laws, transposed in national legislation. To some this structure might make the Benelux Union obsolete but that is not the case. The Benelux Union via the Secretariat-General oversees the implementation of treaties and regulations to ensure a "better embedment of Benelux regulation in the three national legal orders" (Wouters & Vidal, p.10), while the national governments retain control.

Additionally the Benelux countries considered the option of extending the Union by adding other territorial regions such as the border areas of Germany and France. Irrespective of any official agreements with these regions, the area of Belgium, the Netherlands, Luxembourg, North of France and Western part of Germany is known as the 'Benelux-plus' region (Janssens, 2009). As this cooperation would not only involve countries in themselves but also sub-states, integrating these parts into the Benelux Union did not seem possible; yet association is possible. This fact is stand-alone from the question whether these areas really would *want* to enter the Union. Associating parts of Germany and France to the Benelux would, though, be an addition to the strength of the Benelux Union and to its position in Europe. Over the past years the governments of the Benelux countries have all advocated the case of increased cooperation with North Rhine Westphalia. Transport development to and from the Ruhr area in Germany is for instance very important for the development and competitiveness of the Benelux area, especially the port areas of Antwerp and Rotterdam. Therefore it was suggested not just to add North Rhine Westphalia to the Benelux area as a sub-region, but as a full cooperative partner to the Benelux Union. This partnership was

effectuated in 2009 and aims at specific issues for cooperation as agreed on by the Benelux Union with an affiliated German minister¹⁴. Such a partnership stimulates the development of possible closer cooperation in the future.

A side note needs to be made that if none of the parties to the Benelux Union had acted in such a way as to indicate that cooperation is no longer desired, the original Treaty contains a self-enforcing clause which states an automatic extension of the cooperation treaty for another ten years. So, if the time had just slipped by and none of the countries had said anything explicitly, the original treaty had just been extended automatically (Wouters & Vidal, 2008). However, the Benelux countries did not let this moment pass by unnoticed, but took the opportunity to modernise their agreement to their common wishes.

In 2008 the new Benelux Treaty, i.e. Treaty revising the treaty establishing the Benelux Economic Union, was signed and was enforced as of January 2012. This renewed Treaty will replace the Benelux Treaty of 1958 and identifies three pillars or core issues of cooperation, i.e. internal market & economical union, sustainable development, and justice & home affairs ('home' i.c. being the whole Benelux-area). Since these topics concern a wider context than the former economic focus the name of the Union has hence been changed into Benelux Union (Benelux Treaty 2008, preamble). Moreover, the new agreement stresses the importance of looking outside the absolute borders of the Benelux partners and also engaging adjacent countries and/or areas in analyses on the different subjects of the newly defined pillars of the Benelux Union. This wider focus has in turn also been applied on a European level and is stressed in different EU documents *inter alia* by the Territorial Agenda of the European Union 2020 (TA2020).

However, the Benelux member states are not all alike, as has been discussed above. There are also many differences which are sometimes difficult to overcome. This explains why the activities of the Benelux Union have differed in intensity over the years, and perhaps also will differ per year in the future. Nevertheless, overall the Benelux Union has served its position as pioneer and laboratory well by means of *inter alia* the free internal market and the diminished and smoothed customs regulations at the border.

¹⁴ www.benelux.int, 28 July 2012

4.3 Cooperation agreements on logistics in practice

As we have seen cooperation can take many forms. This paragraph will elaborate on the cooperation agreements on transport between the countries of the above defined area of the Benelux-plus. These cooperations will cover a broad scale of cooperation agreements. An overview of different agreements in place will make it possible to put this study into perspective. The focus will furthermore lie on cooperations concerning transport enhancement as has been discussed above. It must be noted though, that not every different kind of cooperation can be mentioned. Hence, a selection of the largest and/or most prominent ones will be discussed.

The Benelux Union is of course the ultimate example of a cooperation agreement. This cooperation agreement also formed one of the stimuli for the creation of the European Union (EU), and has proven its value to the parties involved, which resulted in the new Treaty in 2008 (see also paragraph 4.2). Another large cooperation is the EU. This is a typical formal cooperation which resulted from an already existing informal basis in combination with several small(er) formal cooperations. However, within these cooperation structures, programmes and other smaller cooperations have been entered in to. Based within the framework of the European Union the aim to create European cohesion evoked the creation of several financing organs such as the European Social Fund (ESF), the European Regional Development Fund (ERDF), and the Cohesion Fund¹⁵, in order to support certain development programmes. Among these development programmes are three programmes that will be considered here as those that are the most intensive European programmes with some specific cooperations between selected countries on the development of infrastructure and logistics.

One of the programmes receiving monetary assistance is the Operational Programmes (OP) of the EU. The Operational Programmes of the EU fall under the regional policy pursued by the member states of the European Union. The importance of regional policy and development is widely recognised within the EU. "European regional policy is designed to bring about concrete results, furthering economic and social cohesion to reduce the gap between the development levels of the various regions"¹⁶. The OPs last for six years (except for the first programme which ranged from 1994 till 1999) in which the establishment of certain activities is addressed. The OP-projects are funded by the European Regional Development Fund (ERDF) and/or the Cohesion Fund¹⁷. Some of these programmes started in the last decade of the past century and have already ended. In some cases, these programmes get a follow-up in a new programme which adds to the developments created in the first programme. However, not all programmes last longer than one programme-period.. Sometimes the project is just finished and a new programme could probably not add anything significantly to the already generated benefits. In other cases the programmes might have turned out to be a failure or did just not induce the expected effects or progress. The OPs are completely dependent on the willingness of countries to cooperate on a political level with respect to regional policy, as with every kind of cooperation. Such a type of – formal – partnership could have many reasons not to push the right buttons to mobilise all forces to a successful result, but the fact that an initial agreement was signed on some kind of mutual action does imply some form of compliance between the parties. This compliance is a first step towards more integrated cooperation and more

¹⁵ http://europa.eu/legislation_summaries/agriculture/general_framework/g24231_en.htm, 13 October 2011

¹⁶ http://ec.europa.eu/regional_policy/policy/why/index_en.htm, 29 September 2011

¹⁷ http://ec.europa.eu/regional_policy/country/prordn/index_en.cfm, 13 October, 2011

significant results. Whether this however adds to trade will have to be deliberated on, later in this study.

The OPs contain many different programmes of diverse focus. Here the ones on transport development within the Benelux-plus area have been selected, leaving the other programmes out. Table 3 first shows *all* the OPs that have been worked on by the Benelux-plus countries in the past 15 years are presented. In **bold** are the Benelux countries; in *italic* are the ‘plus’ countries; the red-labelled countries are countries that were not (yet) part of the EU in 1995¹⁸. These are all cross-border, transnational and interregional cooperation programmes, not only the transport related ones. The table shows that all Benelux-plus countries are involved in the programmes and with each other over the years. However, if we select the OPs that have a primary focus on enhancing transport only 6 OPs remain, i.e. the numbers 1, 2, 5, 6, 11, and 20, where not all Benelux-plus countries are represented in every time-period of the OPs, and certainly not all countries work together on a programme over all the years. This does however not mean that the countries do not cooperate at all, or do not address any topic related to transport. The selected OPs have a *primary* focus on transport enhancement which means that e.g. the creation of physical infrastructure is included in the list of priorities on the programme. Other OPs might work as a catalyst and have an indirect effect on transport efficiency, but these programmes are not selected here due to the uncertainty of the strength of the indirect effects. An example is the OP of the Grande Région which is an OP between Belgium, France, Germany and Luxembourg (number 18 in Table 3). This cooperation is a perfect example of the willingness of certain areas to work together to achieve more coherence, cohesion and interaction between each other. The direct aim of the cooperation is to “make the Grande Région more attractive, encourage innovation and economic development (...), [and] improve the range and potential of training structures”¹⁹. In this case there is a large probability that such an approach will also foster trade between the regions involved. However, the purpose of this study is to analyse the effect of transport related cooperation agreements on trade.

Noteworthy on the selected programmes with a transport focus and the countries involved, is that Luxembourg is no longer part of any of these programmes after the first shift between 1997 and 1999. The Netherlands and Belgium continue cooperation under the OP between 2000 and 2006, while the Netherlands at the same time holds an interest in a cooperation with Germany. In the final OP-period only the Netherlands in connection with Germany remain. Reasons for this change might be that the importance of a pure transport connection might not be as pressing as before. Communications have gained an increasing share in trade, transport, and of course cooperations. This might *inter alia* have its effects on the priorities defined for each OP and hence, our selection. Nevertheless, the fact that Belgium, the Netherlands, and Germany have cooperated via the OPs on these topics over the past decade, while other countries have either eliminated the subject or have altered their perception and viewpoint, might have a relative effect on their common trade flows.

Another cooperation programme supported by European funds is the creation of the TEN-T network. Trans European Transport Networks (TEN-T) are completely different projects than the OPs. In total, there are nowadays 30 TEN-T projects for priority axes, and generally concern the development of

¹⁸ For the empirical analysis in Section II data and cooperation programmes from 1995 until 2009 have been used.

¹⁹ http://ec.europa.eu/regional_policy/country/prordn/details_new.cfm?gv_PAY=BE&gv_reg=ALL&gv_PGM=1280&LAN=7&gv_per=2&gv_defL=7, 14 October 2011

infrastructure. The network to be created “is a key element in the relaunched Lisbon strategy for competitiveness and employment in Europe for that reason alone: to unblock major transport routes and ensure sustainable transport, including through major technological projects” (CEC, 2005, p.3). The development of the TEN-T programmes has the aim to generate an efficient flow of passengers and good via a densely connected and integrated intermodal network.

The TEN-T projects have been agreed upon in two phases, one in 1994 (although it only really started in 1996) and one in 2004. The problem with measuring the effect of such cooperative actions is that only the finished created infrastructure can be used, so the impact of the new connections can only be estimated after the project has been finished. Although most of these projects have not been finalised yet, several sections of the respective projects are already completed and applied for use. The completed TEN-T project sections located in our scope of analysis will hence be added to the research. Moreover, these sections should have to be fulfilled by 2009 to be of any value to this research since the available bilateral trade data only ranges from 1995 to 2009. Within the area of analysis and concerning cross border activity between two Benelux-plus countries the only finished project is number 5 on the Betuwe Line. However, even though this project has been finalised, there are a lot of problems with it (e.g. Nu.nl²⁰ and Trouw.nl²¹), especially with the connection of the rail track on the German side. These problems will be kept in mind when discussing the Betuwe Line under the heading of the TEN-T programmes in the remainder of this study. Moreover, some projects are solely focussed on passenger transport, e.g. priority axis number 2 on the high-speed railway axis Paris–Brussels–Cologne–Amsterdam–London. Since we focus on trade in goods such finished sections will however be excluded from the analysis.

Not all cooperation agreements are purely between countries. The Marco Polo (MP) programmes are a good example. These are programmes primarily focused at enhancing transport and easing road congestion²². The Marco Polo fund, as part of EU policy, provides funding for companies with constructive plans and programmes to tackle the current road and transport situations. Every year companies can apply for MP funding, among which a selection is made based on certain criteria. These programmes are as mentioned in principal cooperations between *businesses*. Nevertheless, “Member States benefit directly if companies (subsidy) and/or the route (saving external costs) is situated on their territories”²³. Hence, the analysis of these programmes can also be applied to the area of analysis of this research. The Marco Polo funding for the selected programmes has been initiated in 2 phases, in 2003 and 2006, and they last, generally, for three years. The idea behind the funding of the programmes is that the selected parties are provided with capital to set up their business plan or project. After three years, when the subsidy stops, the project should be able to continue operation by drawing from other sources. However, in many cases the project is not viable (enough) and unfortunately dies a slow death as soon as the funding stops.

Combining the selection of the applicable cooperation agreements and the trade flows seen in paragraph 4.1 the following graph appears, shown Figure 14. Note that the TENT programme is excluded in this case as it only – purely – concerns the Netherlands, as one of the Benelux countries

²⁰ <http://www.nu.nl/economie/2621722/problemen-haven-betuwelijn.html>, 13 October 2011

²¹ <http://www.trouw.nl/tr/nl/4504/Economie/article/detail/2434194/2011/05/19/Duitse-verbinding-Betuwelijn-vertraagd.dhtml>, 13 October 2011

²² http://ec.europa.eu/transport/marcopolo/about/index_en.htm, 14 October 2011

²³ http://ec.europa.eu/transport/marcopolo/files/calls/call03_projects_en.pdf, 14 October 2011

and Germany as a Benelux-plus country. The steady increase of imports and exports between the Netherlands and the other Benelux countries is visible, with a sharp decrease between 2008 and 2009, as discussed above. There is no direct indication of a possible effect from the presence of the CAs but one needs to keep in mind that the years the CAs last are the years in which infrastructure and logistics services are being established and developed. It is hence possible that real effects from the programmes only appear (a few) years after the official ending of the programme. Nevertheless, the below figure is illustrative for the range of the CAs and the trade flows over the past two decades.

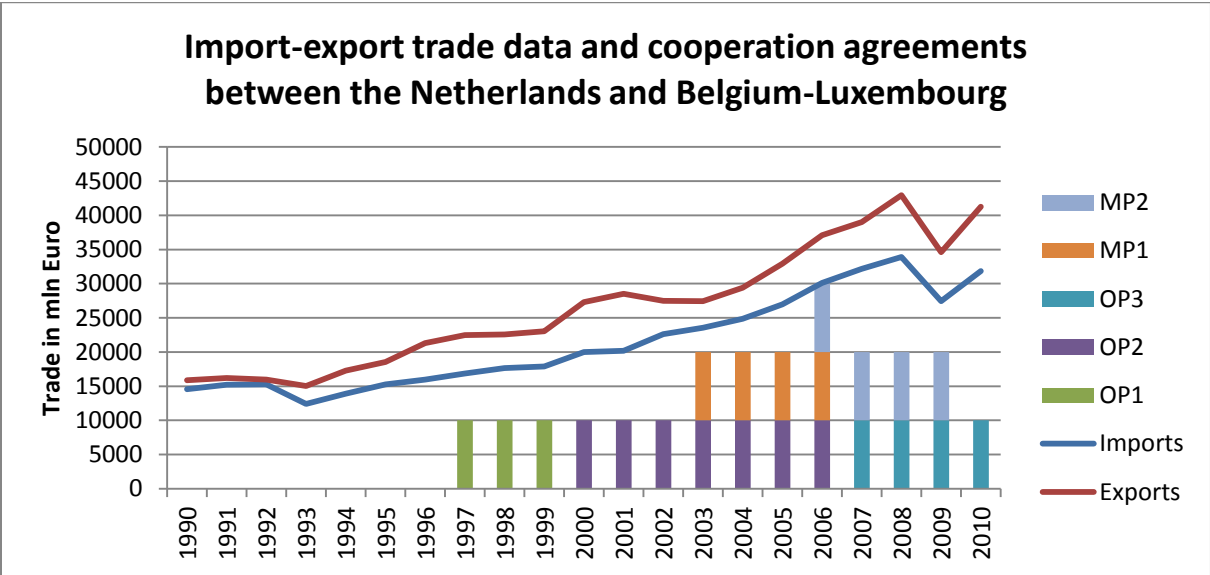


Figure 14: Import-export trade data and cooperation agreements between the Netherlands and Belgium-Luxembourg.

Nevertheless, not all cooperation agreements are the result of stimuli from larger cooperations like the EU or the Benelux. Sometimes such stimuli might give the final push into cooperation but the foundations are in many cases already created by areas themselves that feel that tighter connections with the neighbouring regions might be beneficial (for both). Examples within the Benelux(-plus) region are the Rhine-Scheldt Delta (RSD) cooperation or the MAHHL, which promotes the connection between the cities Maastricht, Aachen, Heerlen, Hasselt and Liege. RSD aims to create opportunities with respect to economics, mobility, ecology, culture, tourism and recreation²⁴ in the respective area. The MAHHL region and cooperation used to hold a large mining industry, but nowadays the area mainly benefits from its location at the economic heart of Europe with a majority of the inhabitants employed in service industry jobs²⁵. These are just two cooperation agreements, which are formal but not to the extent of the European Union for instance. There are many more like these, with a more or lesser formal form, where smaller regions try to benefit from each other’s strengths. Nevertheless, similar cooperations are difficult to identify both in terms of formal relationship and in terms of the focus of the partnership. In the rest of this study they will hence not be taken into account when performing a data analysis, notwithstanding that the presence and interaction of suchlike cooperation must not be underestimated.

²⁴ <http://www.rsdelta.eu/en/UserFiles/File/publicaties/Brochure.pdf>, 14 October 2011

²⁵ http://www.espaces-transfrontaliers.org/en/conurbations/terri_doc_ag_mahhl_en.html, 14 October 2011

In Appendix in Table 11 the list of selected OP, TEN-T, and MP programmes for the rest of this study can be found. How these programmes will be applied in the empirical analysis will be elaborated on in section II.

Operational Programme	Start	Finish	Countries involved
1. INTERREG IIC - North Western Metropolitan Area (NWMA)	1997	1999	Belgium, France, Germany, Ireland, Luxembourg, the Netherlands, UK
2. INTERREG IIC – North Sea region	1997	1999	Denmark, Germany, the Netherlands , Sweden, UK, Norway
3. INTERREG IIC – Rhine Meuse Activities 'IRMA'	1997	1999	Belgium, France, Germany, Luxembourg, the Netherlands
4. INTERREG IIIB – North West Europe	2000	2006	Belgium, France, Germany, Ireland, Luxembourg, the Netherlands, UK, Switzerland
5. INTERREG IIIA – Belgium / the Netherlands	2000	2006	Belgium, the Netherlands
6. INTERREG IIIA – Euregio Meuse-Rhine	2000	2006	Belgium, Germany, the Netherlands
7. INTERREG IIIC – West Zone	2000	2006	Belgium, France, Germany, Ireland, Luxembourg, the Netherlands, UK
8. INTERREG III A - Germany - Luxembourg - German-speaking Community of Belgium	2000	2006	Belgium, Germany, Luxembourg
9. INTERREG IIIA – Belgium / France / Luxembourg	2000	2006	Belgium, France, Luxembourg
10. INTERREG IIIA – France / Wallonia / Flanders	2000	2006	Belgium, France
11. INTERREG IIIA – Ems-Dollart region	2000	2006	<i>Germany, the Netherlands</i>
12. INTERREG IIIB – North Sea Region	2000	2006	Belgium, Denmark, Germany, the Netherlands, Sweden, UK, Norway
13. OP North West Europe (NWE)	2007	2013	Belgium, France, Germany, Ireland, Luxembourg, the Netherlands, UK, Switzerland
14. OP Belgium – Netherlands	2007	2013	Belgium, the Netherlands
15. OP North Sea Region	2007	2013	Belgium, Denmark, Germany, the Netherlands, Sweden, UK
16. OP INTERREG IV-A – Euregio Maas-Rhein	2007	2013	Belgium, Germany, the Netherlands
17. OP Two Seas	2007	2013	Belgium, France, the Netherlands, UK
18. OP Grande Région	2007	2013	Belgium, France, Germany, Luxembourg
19. INTERREG IVA – France-Wallonie-Vlaanderen	2007	2013	Belgium, France
20. OP Netherlands – Germany	2007	2013	<i>Germany, the Netherlands</i>

Table 3: Operational Programmes of the EU from 1997 until 2013, concerning Benelux-plus countries

5 Summary Section I

To summarise the theoretical part of this thesis, it can be stated that trade has initially been conceptualised by Adam Smith in 1776. After the 'Wealth of Nations' of Smith many other economists have tried to model trade. Ricardo introduced the theory of comparative advantage as one of the reasons for countries to engage in trade. More different additions to this theory have been made over the years, resulting eventually in the 'new trade theory'. The new trade theory has been acknowledged as an important contributor to understanding the connection between trade and growth (Yannikaya, 2003). This theory also made clear that national growth is to be created and not inherited by the country.

Supporting trade (and economic growth) can be manifested in different ways of which transport quality and development is of growing importance. Boosting the infrastructural quality via governmental support could foster trade through *inter alia* consequent decreased transport costs and increased transport efficiency. Infrastructure can be developed nationally, but also across borders, which requires international cooperation, as goods flow in and out of the countries.

International trade though, is a matter that involves more countries and a certain basis of trust needs to be present in order to create a basis for free market. As elaborated in this thesis the Benelux Union is a primary example of a situation in which existing trade flows lead to cooperation. The Benelux cooperation, fully established in 1958, was at first mainly focussed on enhancing trade via a customs union and free market agreements. Later on, more fields of cooperation were added to fully exploit the benefits of engaging in regimes. Reasons to engage in cooperation and put in the format of regimes, as discussed in paragraph 3.2. Examples of such reasons are burden and information sharing, stabilising policies, resolving mutual problems, creating a beneficial external environment to industries and economies. Cooperation does hence not only involve trade, but can impact the economy in many different ways. The role of the government in the economy can have substantial impact on the creation and maintenance of regimes. Meaning, strong multilateral and regional relationships are – becoming – more important than ever as multilateralism adjusts the connection between countries, by identifying common grounds that might result in regimes. This is a step further than initial regimes as this alteration also involves informal relationships and general connections. Such informal and/or general relations increase the transparency through information sharing and dialogues. Regimes officially agree upon providing information where multilateralism assumes it to happen already naturally.

Policies to lift trade barriers – as the Benelux Union did – foster trade and hence, increase trade volume. Increased demand for trade (in volume), in turn stimulates the economy and industrial output, which consequently has a positive effect on GDP, i.e. economic growth. This analysis of the direction of linkages also works the other way around in many cases. An increase in trade volume and hence an increased demand for the supply of goods and services, stimulates governments to set up (more) trade policies to smoothen and support the trade process.

In section I we link the theoretical research to the area of analysis of the Benelux Union, as defined in Chapter 4. Recalling Figure 3 from paragraph 3.4 here below, the Benelux Union has nested itself in the middle of the pyramid in the cooperation-area. The Benelux cooperation has evolved over the years since the establishment in the 1950s, to not only focus on trade policies per se, but also other fields of cooperation such as justice, home affairs and sustainable development. The Benelux Treaty

has been renewed in 2008 and was an updated version of the original Treaty from 1958 with an amended scope to fit the Benelux, Europe and the changing world. Additionally, connections with neighbouring territories such as the Western part of Germany and the Northern part of France were intensified and perceived to be further stabilised in the near future.

Although the official update of the cooperation was only established by the renewed Treaty in 2008, which came into force in 2012, the actual cooperation already started to add new topics before the official amendments were made. One of those topics is the collective development of infrastructure and logistics services to indirectly promote trade between the Benelux countries. In a European wide context many smaller cooperation programmes with diverse applications and topics are designed to benefit all the countries involved. Several of these programmes are involved in transport enhancement. Paragraph 3.4 identified three programmes as possible stimuli for trade promotion. In regard this study and the fact that the Benelux is in close connection to the Western part of Germany of North Rhine Westphalia and the Northern part of France of Nord Pas de Calais, these additional areas have also been considered when looking at the transport enhancing cooperation programmes.

The Benelux Union is therefore considered an important institution and has served as a ‘laboratory’ for other cooperations . As elicited, trade – enhancement – is an important reason for parties to engage in cooperation. The extent to which trade is in turn actually influenced by the presence of cooperation agreements is the primary focus of the study, as already stressed, with the aim at facilitating transport. This part of this thesis has discussed the theoretical framework of the study and the theoretical links between the prime issues of this study. The next section will concern the empirical examination and try to put the theoretical links into mathematical representation, in order to estimate the effect of cooperation on trade.

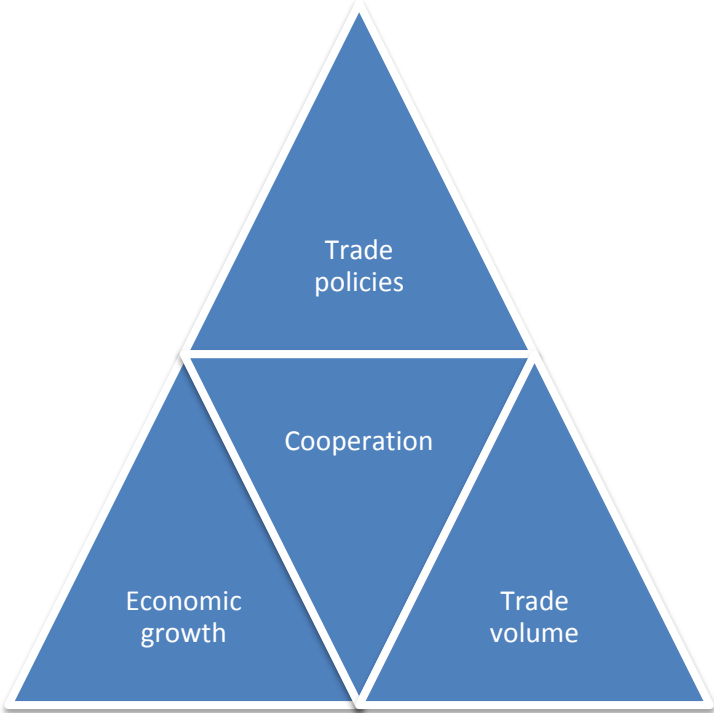


Figure 15: Figure 3 – Connection between trade policies, trade volume, economic growth, and cooperation.

SECTION II. EMPIRICAL ANALYSIS

6 Methods and data

As section I set out the theoretical background and framework of this analysis, now we will design the empirical framework to eventually answer the research questions. First the hypotheses will be presented which will lead to the specified model. The variables of the model are in turn defined in paragraph 6.3 and will be followed by the description of the data collection and the model specification, before moving to the next chapter for the application of the models in the empirical framework.

6.1 Hypothesis

To recall the general research question of this study, the aim is to analyse to what extent the presence of cooperation agreements focussed on transport enhancement between countries does have an impact on the bilateral trade volume. Remembering the fact that cooperation can only sustain when there is mutual benefit to the parties involved, one could assume a positive correlation between cooperation and trade in general, since parties would otherwise not engage in such agreements. However, here we look at transport related cooperation agreements which are rather specific. Moreover, the topic of any cooperation does not necessarily involve trade and any effects could therefore possibly not be related to any trade *flows*. Hence, the outcome of this analysis is not straightforward. Even cooperation not directed to trade can still foster the creation or increase of a common market. Through possible positive experiences from working together in other kinds of cooperation agreements, e.g. via indirect effects, or any impulse to continue cooperation but then on a transport base, could increase trust in a common market. Nevertheless, in this research we focus solely on cooperations directed at the enhancement of trade and transport and a positive relationship between the presence of such cooperations and trade is expected. Hence, the hypothesis can be formulated as follows, which will eventually provide an answer to the research question of this study:

Hypotheses:

H0: The presence of cooperation agreements on transport enhancement between governments has no impact on the volume of trade

H1: The presence of cooperation agreements on transport enhancement between governments has a positive impact on the volume of trade

The model designed in the following paragraph will aim at estimating the hypotheses. In case not sufficient evidence is found to confirm H1, we will fail to reject H0 based on empirical analysis. However, before making any statements, first the model will be presented and the variables will be defined in detail.

6.2 Model specification

In the model all variables will be combined and added to the formula together with their respective coefficient. The general formula is:

$$Y_{ij} = \beta_0 + \beta_1 * X_{1ij} + \dots + \beta_k * X_{k,ij} + \epsilon_{ij}$$

where

Y_{ij} is the dependent variable (DV) for the net trade between country i and country j ;

$X_{k,ij}$ are the independent and control variables (IVs & CVs);
 β_k is the coefficient for the IVs and CVs;
 ϵ_{ij} is the error term.

However, in this research we focus on trade which has many components and is hence difficult to estimate. Nevertheless, in recent literature a gravity equation is used in many studies to estimate “the influence of regional agreements on trade patterns” (Cipollina & Salvatici, 2010, p.64). Gravity is considered to explain trade among countries and obtain important details on trade connections (Anderson, 2008; WTO, 2004). “The standard formulation of the gravity equation expresses bilateral trade between country i and country j as:

$$\ln T_{ij} = \beta_0 + \beta_1 * \ln(Y_i) + \beta_2 * \ln(Y_j) + \beta_3 * \ln(\text{Dist}_{ij}) + \beta_4 * \text{Adj}_{ij} + \beta_5 * \text{Lang}_{ij} + \gamma * \text{RTA}_{ij} + \epsilon_{ij}$$

where

T_{ij} is the country pair’s trade flow;
 $Y_{i(j)}$ indicates GDP or GNP of i and j;
 Dist_{ij} is the distance between i and j;
 Adj_{ij} , Lang_{ij} and RTA_{ij} are binary variable for common land border, language and reciprocal trade agreements, respectively; and ϵ_{ij} is the error term” (Cipollina & Salvatici, 2010, p.64).

For this research the gravity equation has been adapted by means of other variable names and another composition of trade agreements, next to the variable on Gross Domestic Product (GDP). The essence is however the same. In the model that will be used in this study the left-hand side variable is trade and will be composed of composite bilateral trade data, i.e. export plus import of the trade in goods between country i and country j. On the right-hand side the other variables discussed below will appear.

This results in the following model:

$$\text{Trade}_{ij} = \beta_0 + \beta_1 * \text{GDP}_i + \beta_2 * \text{GDP}_j + \beta_3 * \text{Distance}_{ij} + \beta_4 * \text{Common border}_{ij} + \beta_5 * \text{Common language}_{ij} + \beta_6 * \text{Cooperation agreements}_{ij} + \epsilon_i$$

To correct for possible non-normally distributed data, and for the ease of calculation and interpretation the non-binary variables are transposed in to logarithms leading to the adapted model:

$$\ln(\text{Trade}_{ij}) = \beta_0 + \beta_1 * \ln(\text{GDP}_i) + \beta_2 * \ln(\text{GDP}_j) + \beta_3 * \ln(\text{Distance}_{ij}) + \beta_4 * \text{Common border}_{ij} + \beta_5 * \text{Common language}_{ij} + \beta_6 * \text{Cooperation agreements}_{ij} + \epsilon_i$$

The different measures for all variables are listed in the table below.

Concept	Measure	k	Abbreviation
Trade	Bilateral import plus export data		Trade
Economic Development	Gross Domestic Product (GDP)	1, 2	GDP
Distance	Distance between country I and j (weighted)	3	Dist
Common border	Dummy	4	Adj
Common language	Dummy	5	Lang

Cooperation agreements	Multiple dummy variables	6	CA: Campall Caopall Catent
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Table 4: Concepts and measures

6.3 Terminology and measurement

The concepts specified in Table 4 will be defined here in order of appearance in the model. Theoretical definitions for most notions can be found in section I of this thesis. Now measurements will be linked to the concepts.

6.3.1 Trade

Trade is the dependent variable of this study. It is a very brought concept but the Oxford Advanced Learner's Dictionary²⁶ defines it as "the activity of buying and selling or of exchanging goods or services between people or countries". As an example the dictionary mentions international or foreign trade, which identifies the issue that is at stake in this research. Nations engage in trade with other nations to foster economic gains for themselves. Such bilateral – and sometimes even multilateral – trade can make up for a substantial part of GDP in a country and is hence very important for economic development. To integrate the concept of trade into a variable, national bilateral trade data will be used on import and export, so the composite bilateral trade volume between country i and country j can be calculated (exports plus imports). In this study we will focus on the trade in goods and not on the trade in services for the following reason. First of all, we want to examine the link between cooperation agreements (CAs) and trade, where the CAs have to be related to transport issues. Goods need to be transported while services can possibly be traded without moving actual objects. Secondly, trade data on goods can be measured more accurately than trade in services, hence the data of trade of goods is more reliable in terms of measurement. A third reason concerns the availability of data, since data on goods transported is more readily available than for services. Moreover, the composite trade data will be determined between each country with all other parties separately so it will be possible to distinguish the possible link between trade flows and cooperation agreements between two selected countries, if present.

6.3.2 Economic development

The GDP variable in the model used has to represent the size of the respective economies. Therefore the decision has been made to take GDP data on current prices. However, we do not look at per capita data for the reason that this could result in wrongly skewed data. Luxembourg is for instance a very small country with a small population. Their overall GDP is hence smaller than the GDP of large countries like Germany or France, but the GDP *per capita* for Luxembourg is in turn very large due to a *relatively* large overall GDP. Nevertheless, since we want to look at the *size of the economy* overall GDP data will be used. Gross Domestic Product as a measure for the economic position and development of a country is also considered in this analysis. Economic development is by definition composed of many factors, which makes it rather difficult to measure. However, GDP is a common measure estimate economic development or growth (EU, 2011, p.18). There are of course some drawbacks to it like the fact that the value of GDP depends on its composition and distribution, or that it might underestimate economic development. Nevertheless, *inter alia* for the reason that GDP

²⁶ <http://oald8.oxfordlearnersdictionaries.com>, 11 September 2011

is a rather accepted measure for economic development gross domestic product will be used as a measure for economic development.

6.3.3 Distance

Distance is one of the variables added to the model. With distance the pure aim is to analyse how far each country in the area of analysis is actually from the other. There are two measures for distance, being the distance between countries based on the absolute distance between one city in country A and one city in country B, or the weighted distance which incorporates the presence of principal cities in each country of analysis. As industrial activity, which stimulates GDP and trade (as we have seen in the theoretical analysis), is not just centred around the capitals of countries, a weighted measure is much more appropriate in this study. Hence we use CEPII data on the distance between two countries, calculated by means of the inter-city distances of principal regions, which is again weighted by the city's population to the national population. For ease of calculation and regression distance is kept constant over time. As a weighted measure is used the weight of certain cities might change over time, altering the weighted distance. Nevertheless, gravity variables from Mayer and Zignago (2005) were used, assembled by CEPII, and applied over a period of 15 years – i.e. the lengths of the analysis.

6.3.4 Common land border and common language

Variables for common border and common language are added to the model in the form of dummy variables. Common border includes both land and sea borders. The latter because of the presence of the North Sea between the UK and continental Europe. This variable will purely look at whether two countries are adjacent or not. The variable on common language will focus at the generally spoken languages. Note that these are not necessarily all the official languages. For instance, in Belgium Dutch, French and German are recognised as official languages. However, German is basically only really spoken in practice in the border area with Belgium and Germany. Adding German as a language here to the analysis would imply that German is generally used in the country and can really contribute to business operations and cooperations between Germany and Belgium. The same could then be discussed for the Netherlands where the population at the border speaks some form of German which might be used to set up cooperations. However, German is not an official language in the Netherlands. Another example is the French-German border where the population also speaks some kind of dialect which could be used here specifically to get to an agreement. However, the extent to which such use of any language among such a small population (relatively) compared to the rest of the country can attribute to any cooperation is probably rather limited. Hence, the choice has been made to select the practically overall spoken languages of the respective countries. This means that for every country we will only look at their actual national language, except for Belgium where the combination between French and Dutch will be made.

6.3.5 Cooperation

Defining cooperation is not an easy assignment as we have seen in paragraph 3.2. Cooperation can be fully established and based in a regime, but it can also be an oral agreement, a short contact, or a simple link for example between two or more parties. One of the few things that can be stated about cooperations and partnerships is that at all times at least two parties are involved. There is a minimum requirement of two actors in the field to establish an alliance. Another statement that can be made about cooperations is the fact that there must always be some kind of mutual benefit for the parties involved. Otherwise there is no solid foundation and support for the cooperation.

Nevertheless, even though it is hard to define a concept like cooperation, it will form one of the primary variables of this study, in order to estimate the impact of certain cooperations on bilateral trade flows. Quite some compromises have been made in order to find proper sources for cooperation agreements, but a selection has been made to focus on 3 types of programmes and their corresponding projects with respect to trade, logistics and infrastructure as defined in chapter 4. These programmes are the Operational Programmes of the European Union, the Trans-European Transport Networks in Europe, and the Marco Polo programmes I and II of the EU. This will be represented in several dummies matching the projects to the countries involved and the respective years and project duration. The cooperations will be considered over the period between 1995 and 2009.

6.4 Data collection

Finding accurate data eligible for this study has proven to be very difficult. This has also been recognised by several scholars. First of all there is an enormous lack of data availability on regional events. Second, there are many different definitions to the same concept, and third, if you do find data, it can be a problem to match the years of observation. Databases from Eurostat, OECD, WTO, and IMF have been used to gather the necessary data on trade and GDP. National bilateral trade data on imports and exports were available from 1995 through 2009. However for Luxembourg there is a gap and trade data are only available from 1999 onwards, except for its connection with the Netherlands for which data are only presented from 2000 onwards. There are older trade data available from diverse sources, but the decision has been made to focus on the databases mentioned as to secure equal measurements. Hence, a time span of 15 years, from 1995 to 2009 has been picked, for which has been tried to match the other data. GDP has hence been collected from the 1995 onward, as has been done for the cooperation agreements. Distance is i.c. constant over time, as is adjacency and languages spoken. Data on weighted distance were gained via CEPIL.

Details on cooperation agreements were somewhat troublesome. Eventually three types of cooperation programmes have been selected with their corresponding time spans:

Programme	Start
Operational Programmes of the European Union, for regional development	1997-1999 2000-2006 2007-2013
Trans-European Transport Networks in Europe	1996
Marco Polo programmes I and II	2003-2010 2007-2013

Table 5: Cooperation programmes

In paragraph 4.3 these programmes have already been analysed in detail. Here just some notes on the time periods of the different programmes need to be made. The OPs have been activated in three phases: 1997-1999, 2000-2006 and 2007-2013. Moreover, the first TEN-T project started already in 1996. However, it must be noted though that of the TEN-T programmes only one cooperation agreement remained after secure selection. Only the cooperation on the development of the Betuwe railway has been included for the analysis, based on its scope, time frame, and countries involved. The Betuwe line has only been in practice from 2007 onwards. Recall that Table 11 shows all the CAs included here. However, the fact that only one cooperation agreement

represents a whole cooperation programme can result in a misinterpretation of the data. This will be considered when analysing the data in the next chapter. Furthermore, the Marco Polo programmes have been initiated in two phases: 2003-2010 and 2007-2013. The overlap of three years comes from the fact that funding is normally for three years. The second phase of funding hence already started while the first shift was still in its last stadium.

Finally, it should be noted that all different types of cooperation programmes will be analysed within their own operational framework, in order to avoid misperception due to differences in the kind of projects.

6.5 Sample specification

The data sample that will be used in this analysis focuses on the Benelux member states and the surrounding countries and regions, i.e. Benelux-plus. In a broader perspective the cooperations between the countries within the area of analysis were first considered in full European context and then specified only to Benelux-plus countries. This means that the process of selecting the applicable data went first to a European-wide perspective, concerning cooperation agreements, and then focused solely on the Benelux-plus countries for the actual analysis. Including the United Kingdom (UK) in the analysis has also been considered. However, as the Benelux-plus region is becoming more and more established and acknowledged – although perhaps not officially – this focus seemed most appropriate. Also from the perspective of the Benelux Union, the most intense connections are with the ‘plus’-areas which does not include the UK in that sense.

The western part of Germany and the northern part of France as the adjacent territories to the Benelux countries are the ‘plus’ in Benelux-plus. However, in this research it is difficult only to focus on these adjacent areas as the cooperation agreements are engaged in by the country itself – although it might apply only to one region of the country. Additionally, region specific data is difficult to assemble and implement in the model with the right measurement. Hence, it has been decided to apply the model to the full five countries of Belgium, the Netherlands, Luxembourg, France, and Germany.

The data runs from 1995 until 2009, which also counts for the cooperation agreements. In order not to count anything double or forget important entries the European-wide perspective does only include countries that were part of the EU from 1995 onwards. If any other country appeared in a cooperation agreement, this one will be coloured red. In some cases these countries joined later – e.g. Poland –, other cases are part of the EFTA, like Norway. However, in the actual data analysis the focus is purely on interconnections of the Benelux-plus countries, while any other country in the cooperation is i.c. mainly there for illustration.

Name	Countries
Benelux	Belgium, Luxembourg, the Netherlands
Benelux-plus	Benelux countries plus (western part of)Germany and (northern part of) France
EU-1995	Austria, Belgium, Denmark, the Federal Republic of Germany, Finland, France, Greece, Ireland, Italy, Luxembourg , the Netherlands, Portugal, Spain, Sweden, and United Kingdom

Tabel 6: Sample specification

7 Empirical results

This study examines the presence of the link between cooperation agreements and trade. Recall that trade in this matter relates to trade in goods. More information on the variable and data specification, see paragraph 6.3 on the terminology and measurement used. The connection between cooperation and trade will be estimated by means of a regression analysis. The model applied is specified above in paragraph 6.2. For the regression analysis the statistical programme of STATA²⁷ will be used.

7.1 Data analysis

The data for this research are assembled as panel data which can i.c. be used for a cross section analysis. The five countries of the area of analysis of the Benelux-plus are included here, which all link to the four other countries in terms of trade. The time period is 15 years (i.e. 1995 until 2009) which gives a frequency for each individual country of $15 * 4$ is 60 observations with a total of 300 observations. However, since bilateral trade works two ways the data for the connection between country a and country b are the same as for the connection the other way around. We hence have to eliminate the duplicated connections, which results in half the total number of observations. Table 13 and Table 14 in the appendix give more details on these aspects. The direction of the retained connections is picked randomly with a primary focus at the Benelux countries as first country.

Moreover, Table 7 gives an overview of the descriptive statistics of the different variables used in the model, except for the dummy variables on cooperation agreements. The average overall trade volume of all countries is around 56 billion dollars, while the median (i.e. p50) lies around 49 billion dollars worth of goods transported. There is though a large variation in volumes between different countries, which becomes clear from the range where the minimum lies around 703 million dollars, with a maximum around 238 billion. The values for GDP_i and GDP_j are similar and they contain same country data so the minimum and maximum are i.c. the same – except for Belgium which is only represented in GDP_i as a consequence of the selection procedure. The spread in GDP is very large, which is partly due to the 15-year period in which it is measured. Over the years the GDP values can fluctuate heavily. Another reason for the large spread in GDP is the difference in size of the respective countries themselves.

Distance between the different countries has been measured by a weighted measure of the principal cities in the respective countries. Since not all countries are adjacent to each other and some countries are larger than the others (compare for example Luxembourg and Germany), a weighted measure aims to overcome as good as possible the absolute differences between the countries in order to be used as a reliable measure in the regression. The final two variables listed are the dummy variables on common border and common language which explains the range from 0 to 1. Table 15 in the appendix also presents the dummy variables on the three different types of cooperation agreements selected for the analysis.

²⁷ STATA 11 has been used for the regression analysis

```
. tabstat trade2 gdpj gdpj distancew adjacent1 language1, s(mean median sd var
> count range min max)
```

stats	trade2	gdpj	gdpj	distan~w	adjace~1	langua~1
mean	6.06e+10	5.56e+11	1.57e+12	427.6404	.8	.4
p50	5.38e+10	3.85e+11	1.57e+12	401.2609	1	0
sd	5.59e+10	7.19e+11	1.05e+12	187.1857	.40134	.4915392
variance	3.13e+21	5.17e+23	1.09e+24	35038.5	.1610738	.2416107
N	137	150	150	150	150	150
range	2.37e+11	3.61e+12	3.61e+12	628.6532	1	1
min	7.03e+08	1.85e+10	1.85e+10	160.9283	0	0
max	2.38e+11	3.62e+12	3.62e+12	789.5815	1	1

Table 7: Descriptive statistics

Considering Table 7, note that the diversion between the mean and the median is not very large in any of the cases – except the data on distance –, which limits any direct suspicion on the presence of outliers in the data. Another point that should be mentioned is the fact that for all variables there are 150 observations while the variable on trade only reports 137. The difference of 13 observations comes from the gap in the data availability for Luxembourg for which bilateral trade volumes have only been available from 1999 onwards. This means that for the years 1995 until 1998 there is a gap in the data. For the connection with the Netherlands this gap is even larger as data are only available from 2000 onwards.

For the ease of analysis and interpretation the variables on trade and GDP have been transposed into logarithms which enables us to interpret the corresponding coefficients, that will result from the regression analysis later on, as elasticities. Immediately this also limits any possible extreme values of skewness or kurtosis, and potentially has a positive impact on the normal distribution of the data.

Figure 27 in the appendix shows the dispersion in trade volumes (in logarithm) over the year by means of a scatter plot and also displays the time lag of 4 to 5 years for i.c. the connections with Luxembourg. The red line and dots indicate the mean values through the years. Figure 28 in turn shows the corresponding relative trade volumes by identifying each individual trade connection. The trade flows are rather stable over the years and the difference between the different country-pairs stays the same through most of the years. All pairs follow the same trend, to a certain extent.

	Lntrade2	Lngdpi	Lngdpj	Distancew	Adjace~1	Langua~1	Trend	Campall	Caopall	Catent
Lntrade2	1.0000									
Lngdpi	0.5616**	1.0000								
Lngdpj	0.6237**	-0.1320	1.0000							
Distancew	0.3805**	0.3158**	0.5731**	1.0000						
Adjace~1	0.3285**	-.02370**	0.3534**	-0.1290	1.0000					
Langua~1	-0.1664^	-0.2958**	-0.2330**	-0.3890**	0.4082**	1.0000				
Trend	0.0319	0.1949*	0.1341	0.0000	0.0000	-0.0000	1.0000			
Campall	0.1423^	0.2127**	0.1588^	0.0269	0.0403	0.0439	0.8020**	1.0000		
Caopall	-0.0792	0.0544	0.0328	0.0000	-0.0000	-0.0000	0.5901**	0.3477**	1.0000	
Catent	0.1864*	0.1161	0.1240	-0.0371	0.0714	-0.1166	0.1984*	0.1612*	0.0560	1.0000

^, *, **, ***. Correlation is significant at respectively the 0.1, 0.05, 0.01, and 0.001 level.

Table 8: Correlations

Looking at the correlations between the different variables we can check for multicollinearity. All correlations in Table 8 are below the maximum of 0.8, except for the correlation between the MP programmes and the trend which is slightly over the 0.8 limit. To correct for yearly variation this trend was added to the data. The trend is ranging from 1995 until 2009, and is positively correlated with all independent variables, but not significant in every case. Another way to verify whether the independent variables are perfectly multicollinear or not, is by executing a vif-test, i.e. variance inflation factor. In Table 16 in the appendix we see the results of the vif-test corresponding with the

regression. In all cases the values in the table are below the limits of $vif > 10$ or $1/vif < 0.10$. If the values would exceed these limits multicollinearity could be assumed. Here however, the values do not reach these limits and it can be assumed that the independent variables of this analysis are not perfectly multicollinear.

7.2 Regression analysis

The results from the regression are presented in Table 9. The logarithms on GDP are both significant. The coefficients are both positive and very large. A positive effect of GDP on trade was to be expected. The impact of this effect nevertheless turns out to be fairly high. The value of the beta for distance is a negative value as expected: the longer the distance, the lower the trade volume over that distance. This only holds for minimal effects though. Adjacency has a significantly positive coefficient just as language, both with a rather high effect around 42 percent and 67 percent respectively. The beta for the trend in Table 9 is significantly negative. However, not all coefficients here are significant. Looking at the dummies on the cooperation agreements the first one, on Marco Polo programmes is not significant, nor is the dummy on the TEN-T programmes. These two cooperation programmes have also both negative betas. The Operational Programmes is the only variable with a significant *and* positive beta.

```
. regress lntrade2 lngdpi lngdpj distancew adjacent1 language1 trend campall ca
> opall catent, robust

Linear regression                               Number of obs =      137
                                                F( 9, 127) = 448.49
                                                Prob > F = 0.0000
                                                R-squared = 0.9572
                                                Root MSE = .32145
```

lntrade2	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interva]	
lngdpi	1.122392	.0298694	37.58	0.000	1.063285	1.181498
lngdpj	.9094836	.0274876	33.09	0.000	.8550906	.9638765
distancew	-.0032156	.000203	-15.84	0.000	-.0036173	-.0028138
adjacent1	.4260259	.0873932	4.87	0.000	.2530905	.5989612
language1	.672659	.066034	10.19	0.000	.5419896	.8033284
trend	-.0589276	.0133207	-4.42	0.000	-.0852869	-.0325684
campall	-.0531097	.0939164	-0.57	0.573	-.2389534	.132734
caopall	-.3977266	.1087975	3.66	0.000	-.1824359	.6130173
catent	-.1294807	.0771025	-1.68	0.096	-.2820527	.0230913
_cons	-29.68005	1.238081	-23.97	0.000	-32.12999	-27.23011

Table 9: Regression results overall model

The constant – i.e. β_0 – is negatively significant. In fact, this beta is very large and has hence a significant additional value to the model. Finally, the adjusted R-squared, i.e. the variance in the dependent variable explained by the independent variables, is quite high with the value around 95 percent. The large value of the R-squared, however, raises questions.

To check the robustness, stability and reliability of the model, some tests are performed. First, normality will be checked according to the regression model. Normality refers to the behaviour of the residuals, which are presumed to act ‘normal’ in the regression model. Figure 29 until Figure 34 show the results on the normality test in this model. The first figure, Figure 29, contains the results of the Kernel density estimate. The red line represents the normal density to which the estimated density should come close in case of normality. The blue line represents the results for the residuals and follows i.c. generally the shape of the normal distribution. The next figure, Figure 30, also shows the results of the Kernel density but displays these results against a histogram. Here a rather normal distribution can be observed, although it turns out to be slightly skewed. The following two figures,

Figure 31 and Figure 32, present plots on the normality of the residuals. The standardised normal probability plot (pnorm) in Figure 31 focuses on the middle range of the residuals. The figure here shows that the residuals fairly follow the 45 degree line, with some slight deviations but nothing seriously distressing. Figure 32 presents a quintile-normal plot (qnorm) which focuses on the tails of the data when testing for normality. Again, the middle part of the observed data follows the 45 degree line fairly normal, but the extremes deviate somewhat more from normality. Finally, another test on normality is executed, i.e. the Shapiro-Wilk test which is a non-graphical test and shown here in Table 17. The null hypothesis is that the residuals are normally distributed. With the p-value presented here we fail to reject the null hypothesis at a 95 percent level. So, overall normality of the residuals seems to be confirmed. Nevertheless, some more tests will be carried out to check the robustness of the model.

To get a quick confirmation of whether the model does present a good prediction of trade, a scatter plot on the predicted values is run through STATA where the expectation is to see a pattern along a 45 degree line, with the observed data on the y-axis and the predicted data on the x-axis. Figure 33 below indeed confirms this expectation and there seems to be a good fit of the model. Extra security comes from running an ov-test after running the regression. This test analyses the possibility of a bias to omitted variables to the model. Table 18 shows the results from the test. As stated there, the null hypothesis is that there are no omitted variables to the model. The p-value is here lower than limit of 0.05 for a 95 percent significance. Hence we fail to reject the null and assume there is not enough evidence to fiercely claim a bias to omitted variables in this model, and in turn assume that the model is sufficiently specified by the variables.

Another important check of the model is to test for homoskedasticity. It involves the verification that the variances of the estimates of the standard errors in the regression model are constant and do not depend on the x-variable(s). Two methods are used here. The first one is the rvf-plot presented below in Figure 34. If the data are homoskedastic, the plot should show no pattern in the data. In the figure here there seems to be some clustering on the right hand side of the plot. However, no clear structure is present. Moreover, our second test for homoskedasticity is presented in Table 19 which shows the result of the Breusch-Pagan test to detect heteroskedasticity, i.e. the opposite of homoskedasticity. The null hypothesis is a constant variance, i.e. homoskedasticity. Here we fail to reject the null hypothesis at both 95 percent and 99 percent. This indicates that no direct action is needed on the data. Nevertheless, since the prediction of heteroskedasticity can never be fully eliminated the regression in STATA has been run by adding the command **robust**, which adjusts the model for heteroskedasticity, since STATA by default assumes homoskedasticity.

The regression presented above in Table 9 is a robust regression. Another regression has been run on fixed effects, for the ultimate check on the application of the regression. Fixed effects eliminate the effect of time-invariant characteristics of variables. It controls for all variables which have an impact in the regression but are constant over time. For the model of this study, this means that the control variables for distance, adjacency and language will be omitted in the regression. Table 10 shows the output of the fixed effect analysis against the robust regression already analysed above. GDP is still positive and significant, although GDPi differs heavily in value between fixed and robust effects. Noteworthy as well is the fact that the Operational Programmes are no longer significant in the fixed effects model. At the same time, the TEN-T programme turns positive *and* significant in the fixed effects regression, compared to the robust regression.

. estimates table fixed robust, star stats(N r2 r2_a)

variable	fixed	robust
lngdpi	.29819593**	1.1223916***
lngdpj	.67923886***	.90948357***
distancew	(omitted)	-.00321557***
adjacent1	(omitted)	.42602589***
language1	(omitted)	.67265901***
trend	.01812479**	-.05892761***
campall	-.00179736	-.05310969
caopall	.03044849	.3977266***
catent	.21485058**	-.12948073
_cons	-2.6464781	-29.680049***
N	137	137
r2	.92821161	.95717815
r2_a	.91931222	.95414353

Legend: * p<0.05; ** p<0.01; *** p<0.001

Table 10: Regression results - fixed effects vs robust effects

An extra check has been performed by executing a Hausman test between a fixed and a random effects regression. This tests if the unique errors are correlated with the variables. The null hypothesis states that there is no correlation. If we fail to reject the null hypothesis the random effects model should be applied over the fixed effects regression. Table 20 in the appendix shows the output of the Hausman fixed random test and indicates that the null hypothesis *can* though be rejected. This means that the difference in coefficients is systematic, the unique errors are indeed correlated with the variables. Hence, above analysis of the robust regression represents an erroneous outcome in the sense that it excludes variables that determine trade. The fixed effects regression is in this case favoured over the regression for random effects.

7.3 Discussion

After analysing the results presented through paragraph 7.2, some effects are of great importance. Considering the data in general we recall that the difference between the median and the mean is not excessive for any non-dummy variable. As mentioned any dispersion between the values could indicate outliers in the data. The difference between the medians and means i.c. are not that large to expect the presence of outliers. However, if outliers were present a distorted image of the data could be displayed, especially in combination with the significant explanatory powers to the model that have been found. The adjusted R-squared measures the degree of variance in the DV that is explained by the IVs. The variance, in turn, looks at the divergence of a specific variable from its mean. Another way to get a distorted image of the data is when only a few regression coefficients are significant while the adjusted R-squared suggests high explanatory power of the model. In the model of this study however, the base regression coefficients – all variables except for the dummies on cooperation agreements – are significant while the CAs differ per programme. Nevertheless, the data have been analysed closely and outliers are not so much present. Additionally, if any outliers would prevail this could possibly be a confirmation of the hypothesis in case of any connection between trade volumes and the presence of cooperation agreements.

Looking at the full regression model, it has just been mentioned in paragraph 7.2 that the robust regression analysis has been discarded by a fixed effects regression. The robust regression has been based on the gravity model which is commonly used to estimate trade flow effects. In this study the model is solid but is limited in explaining the dependent variable, i.e. trade.

Recalling the regression results from Table 10, for both regressions the betas corresponding the IVs on GDP are very significant. This counts for both the data on the country-*i* selection and on country-*j*, which was to be expected as this indicates that a increase in GDP in either country would result in an increased demand for trade. This would mean that there are hence *mutual* benefits to trade which could in turn foster the presence of cooperation agreements since those are based on the assumption of mutual benefits for the parties involved. Nevertheless, the trade volume in the model is a calculation of the total of imports and exports between two countries. Hereby the direction of trade should therefore not be relevant to the results of the model. To check whether direction could be of issue here, the *robust* regression was run again but with all connections double in reversed form. The results do however not make any change, as can be seen in Table 12 in the appendix. As has been mentioned briefly, the betas for GDP in the robust regression are higher than expected and the outcome is to be reflected on carefully, even though the R-squared assumes a high explanatory power. The high coefficients on GDP are difficult to explain but could be the result of the measurement of GDP. As discussed in paragraph 6.3 GDP is a commonly used measure for economic development, but the different ways to compose GDP can also provide different outcomes. It could therefore be possible that a different composition of GDP might be able to generate lower coefficients for both GDP-variables in the model. However, the composition of GDP in this study has been carefully considered and selected beforehand. Hence changing the composition might require a new approach to the model. At the same, time the coefficients for GDP in the fixed effects model are much lower, although the GDP for country *j* still has a rather large beta. As the Hausman test indicated (see Table 20) the fixed effects regression should be used over the robust model. As the GDP values of the fixed effects model are less extreme than in the robust regression some doubts on the GDP-representation could be lowered. Nevertheless, possible restrains to this model are taken into account such as the before mentioned use of GDP as a measure for economic development instead of another measure.

The beta on the constant is also noteworthy. In the robust regression it is highly negative *and* significant. This indicates that the intercept in the regression is at a rather low point, meaning that if every variable would be zero negative trade volumes would appear, perhaps in the form of extreme trade barriers and protection. In the fixed effects regression though, the constant is still negative, but not significant any more. The value is also quite lower than in the first discussed model. The presence of negative trade flows when all variables would be zero should therefore not be considered as an immediate threat.

In the fixed effects model the control variables on distance, language and adjacency are omitted. This was already mentioned as the fixed effects model controls for all variables which have an impact in the regression but are constant over time. Distance, language and adjacency are time-invariant and hence not included for the fixed effects analysis. Just for reference, note that in the robust model all three variables are included. In that regression the coefficient for distance is rather small and has hence barely any impact on the overall model, although a very large distance could still constitute a significant effect. Distance has the expected negative sign, meaning that the larger the distance the lower the trade volume. At the same time the correlations between distance and GDP are not extreme. Both adjacency and language seem to have significant impact on trade, as expected. The betas are though rather high which is not extremely surprising but should be considered with care.

However, the aim of the research is to analyse to what extent the presence of cooperation agreements between countries does have an impact on the bilateral trade volume. Hence turning our attention to the dummy variables on the cooperation agreements the corresponding betas differ in value, sign and significance. From this point onwards, only the fixed effects regression will be considered. The only CA that comes out the model with a positive *and* significant beta is the beta on the TEN-T Programmes. Both other two CAs have corresponding coefficients which are not significant. The sign differs however, as the Operational Programmes have a positive beta, while the coefficient on the Marco Polo Programmes turns negative.

The positive significant betas of the TENT-dummy in itself confirms the hypothesis that cooperation agreements can have a positive effect on trade. Table 9 shows a positive effect from the TEN-T Programmes of 21 percent on trade. This is however an extreme value for one cooperation programme to have on trade and should not be taken for granted. Especially in combination with the high explanatory value of the overall model. Reasons for this high beta value are various. First of all the measurement by means of a dummy does not eliminate possible side effects. Moreover, the TEN-T Programmes are only represented by one programme, i.e. The Betuwe Line, while the whole TEN-t development in general is very broad. Therefore, there is the chance that some effect from the other TEN-T programmes on alternative – but perhaps complementary or adjacent – projects and countries affect the selected programmes. This might hence present a distorted image of the effect of the TEN-T Programmes on trade. However, as discussed in chapter 4, in the model of this study the variable on the TEN-T cooperation is only based on the data from one project, since any others in the area of analysis have not been completed yet and can hence not be used in practise due to the nature of the cooperation (see paragraph 4.3). Assigning any value to the outcome of the regression with respect to this variable should therefore be considered with special care.

The other CAs do not correspond to significant betas in the fixed effects model. As indicated above, the OP variable has a positive beta which is though not significant in the fixed effects model. The Marco Polo coefficient is negative but not significant either. Therefore, the possible effect of the OPs and MPs on the trade flows by means of the non significant betas in Table 10 cannot be estimated with security.

Finally considering the full model in combination with the analysis above the overall notion is ambiguous. The robust regression is discarded due to a systematic difference in the coefficients. A fixed effects model is hence applied. Only one of the three variables on cooperation agreements ends up with a positive significant coefficient in the full fixed effects model. The value of this coefficient is rather high however, as discussed above. Multicollinearity does not appear in Table 8 but measurement restrictions could have caused a distortion in the outcomes. The other two cooperation variables are not significant. Adding more variables has been considered to possibly complement the model. For instance breaking down GDP in a productivity measure and a consumer confidence index has been examined. Nevertheless, addition of these variables has been discarded due to the limit supplementary value of the inclusion.

In the end the outcome of the full model is miscellaneous and cannot confirm the hypothesis without any concessions.

8 Summary Section II

The empirical analysis of this study is based on a gravity model regression with trade as the dependent variable. This specific model is used to estimate the effect of logistics cooperation agreements on trade and see whether the hypothesis can be confirmed. The variables of the model include trade, GDP, distance, adjacency, common language, and cooperation agreements. These last three variables are represented by means of dummies. The selected cooperation agreements are the Operation Programmes, the Marco Polo programmes, and the TEN-T programmes. From the first two programmes the cooperation agreements which did *not* involve infrastructure or logistics development have been eliminated. The final programme on TEN-T already has a sole focus on transport enhancement in general. The area of analysis is the Benelux-plus area, which entails Belgium, the Netherlands, Luxembourg, France and Germany. The CAs selected all involve at least two of the countries from the analysed region. The time frame applied ranges from 1995 until 2009.

The hypotheses of this thesis are recalled here:

H0: The presence of cooperation agreements on transport enhancement between governments has no impact on the volume of trade

H1: The presence of cooperation agreements on transport enhancement between governments has a positive impact on the volume of trade

A regression analysis was performed to examine the data. The regression results from paragraph 7.2 presents however an ambiguous result, which makes interpretation difficult. At first no major issues appear. Multicollinearity is not a problem; robustness also seems fine with normal distribution, a good prediction of trade by the model, and homoskedastic data. Moreover, the regression itself is discarded in its robust setting due to a systematic difference in the coefficients. A fixed effects model is hence applied. The regression output shows the expected signs for the base model variables, which are all significant. The time-invariant control variables for distance, adjacency and language are however omitted in the fixed effects regression. Nevertheless, when considering the cooperation agreements, the dummy coefficients are barely significant. The only cooperation beta that is significant is the beta on the TEN-T Programmes. However, the value of the beta is of such strength that a distortion in the data can be expected. At the same time the R-squared, which indicates the explanatory power of the model, is close to 92 percent. Such a high explanatory power puts a lot of pressure on the outcome of regression. The extreme beta value for the TEN-T should hence not be applied without careful consideration. The coefficients on the other CAs turn not significant in the regression.

Purely considering significance and sign, the hypothesis H1 *could* be confirmed. However, as indicated, this outcome is not straightforward. It is not the case that no evidence is found to reject H0 and confirm H1, but compromises are to be made in composing the data which could now result in skewed data output. The tables and graphs with the robustness checks imply an almost perfect representation of trade by this model, whereas the explanatory power suggests being the same. The robustness checks are however only applicable to the robust regression analysis. Nevertheless, as stated above, in relation to the fixed effects regression results, for the matter of ambiguity, nor H0 nor H1 can be confirmed nor rejected.

9 Limitations to the research

Limitations to this thesis are both present in the theoretical and empirical analysis. In the theoretical review various definitions for one concept appear. Only one definition can in the end be applied. The other descriptions are either discarded or put aside. Nevertheless, the other definitions could have had another outcome, if they had been used. Such limitations always need to be considered and recognised to put the whole study into perspective.

An example of such a limitation in this research is defining the concept of cooperation. There are many points of view which analyse the concept of cooperation, all with slightly a different touch. By selecting a certain definition, you exclude all others which could have had an extra contribution. In this study it was decided to focus at formal cooperation agreements, i.e. regimes. Informal relationships were discarded due to the fact that they are not binding in most cases and hard to measure. However, measuring formal cooperations is not easy either. Dummies have been used for specific cooperation agreements, but the use of dummies does not exclude the chance of incorporating side effects from the cooperations. Such side effects might bias the regression results.

One of the limitations of the statistical analysis arises with the data gathering. As already touched upon earlier, data on regional trade and development are very limited available. Concerning the area of analysis, for some regions it was possible to find some data but matching it with data from other regions was very hard either due to a lack in data or different measurements of certain concepts. Moreover, bilateral trade data were available for all countries – with a gap for Luxembourg – as of 1995. This gap for trade with Luxembourg is of course another limitation to this research.

A final point which could possibly add to the limitations of this study is the fact that the area of analysis is rather small. The focus is solely on the Benelux countries and its surroundings. Putting this research into an overall comparison to general European cooperation agreements might give more value to the research and form a better foundation to draw conclusions. However, within the scope of this thesis such an extensive analysis does unfortunately not fit.

Hence, there are several limitations on data and certain other restrictions in this research. A great deal of effort has been put in to deal with the presented limitations, trying to create a solid foundation for future research.

10 Conclusions

This thesis analyses the impact of present cooperation agreements on trade with respect to the research area of the Benelux-plus countries. Hereby the purpose is to identify whether agreements specifically directed at the enhancement of logistics, influence trade positively. Trade has evolved throughout history and various theories have been drafted. The 'new trade theory', however, was established in the 1980s and gained a lot of acknowledgement from researchers and economists. This theory has been recognised as an important factor to explain the link between trade and growth (Yannikaya, 2003). Trade can be influenced by many factors. One of those factors is the infrastructure and logistics quality in place. Logistics has become increasingly important in facilitating trade and logistics has also been incorporated in political discussions. Supporting the quality of infrastructure via governmental support could foster trade through *inter alia* consequent decreased transport costs and increased transport efficiency. Infrastructure can be developed nationally, but also across borders, which requires international cooperation, as goods flow in and out of the countries. It is therefore no surprise that logistics topics are on the agenda of politicians.

The role of the government in the economy can have substantial impact on the creation and maintenance of regimes, i.e. the formalisation of cooperation by setting regulations, procedures and limits of behaviour on the scope of agreement. International trade though, is a matter that involves more countries and a certain basis of trust needs to be present in order to create a basis for free market. As elaborated in this thesis the Benelux Union is a primary example of a situation in which existing trade flows lead to cooperation. The Benelux cooperation, fully established in 1958, was at first mainly focussed on enhancing trade via a customs union and free market agreements. Later on, more fields of cooperation were added to fully exploit the benefits of engaging in regimes. Policies to lift trade barriers – as the Benelux Union did – foster trade and hence, increase trade volume. Increased demand for trade (in volume), in turn stimulates the economy and industrial output, which consequently has a positive effect on GDP, i.e. economic growth. This interpretation of the direction of linkages also works the other way around in many cases. An increase in trade volume and hence an increased demand for the supply of goods and services, stimulates governments to set up (more) trade policies to smoothen and support the trade process. Facilitating efficient logistics is in this sense again an option alleviate trade barriers.

The empirical analysis of this study is based around a gravity model regression with trade as the dependent variable. This model is used to estimate the effect of cooperation agreements focussed at enhancing logistics, on trade. A fixed effects regression is used, due to correlation of the unique errors with the variables, which limits the applicability of a random effects regression. The selected cooperation agreements are the Operation Programmes, the Marco Polo programmes, and the TEN-T programmes. The area of analysis is the Benelux-plus area, which contains Belgium, the Netherlands, Luxembourg, France and Germany. Connections with neighbouring territories to the Benelux Union such as (the Western part of) Germany and (the Northern part of) France have intensified in the past decade. The cooperation agreements selected all involve at least two of the countries from the analysed region. The time frame applied ranges from 1995 until 2009.

Recall the hypothesis H1 here that *the presence of cooperation agreements on transport enhancement between governments has a positive impact on the volume of trade*. Running the regression in STATA, the results show that the hypothesis can only be confirmed when looking purely at the sign and significance of the outcome. This outcome is however not straightforward. It is not

the case that no evidence is found to reject H0 and confirm H1, but compromises are made in composing the data which could now result in skewed data output. The tables and graphs for checking the robustness imply an almost perfect representation of trade by this model. However, of the three dummy variables on cooperation agreements, only one has a significant beta, i.e. for the TEN-T Programme. This beta is though extremely high and far out of the range of expectation. At the same time the R-squared, which indicates the explanatory power of the model, is close to 92 percent. Such a high explanatory power puts a lot of pressure on the outcome of regression. The extreme beta value for the TEN-T Programme should hence not be applied without careful consideration. Therefore, with these regression results, for the matter of ambiguity, H1 cannot be confirmed nor rejected.

Combining the regression results with the discussed theory on trade, cooperation and logistics, the research questions can be reviewed.

Recalling the specific research questions to this study, the first three can already be answered:

1. *Which different countries, regions, districts can be identified within the Benelux and adjacent areas, and hence make up the area of analysis?*

The applicable regions of the area of analysis concern the Benelux-plus countries. This means Belgium, the Netherlands, Luxembourg as the Benelux countries, combined in the Benelux Union. Additionally, the adjacent territories to the Benelux countries North Rhine Westphalia and Nord Pas de Calais are applicable to the Benelux-plus area. Note though that for the measurement and data finding process the whole countries of Germany and France are eventually included in the model.

2. *What is the link between cooperation and trade?*

As extensively discussed in literature trade always involves – at least – two parties. An understanding between those parties about the volume traded and the price for the goods or services is necessary for a successful trade. If such an understanding is stable and can be repeated in the future with more trade, the parties might eventually move to an agreement for standard trade. This can be put in writing by means of regimes where the scope of the cooperation is defined to concern i.c. trade. This general description of the link between cooperation and trade can in every example be applied and amended for the specific case.

3. *Which cooperation agreements on the field of logistics can be identified over the past 15 years within the specific area of analysis?*

Many small and large agreements on logistics exist within the Benelux-plus area. However, only 3 large programmes with their foundation in the EU have been highlighted in this thesis. These three programmes are the most prominent ones within Europe with significant recognition by almost all EU member states. The selected cooperation programmes are the Operation Programmes, the Marco Polo programmes, and the TEN-T programmes. Each programme consists again of smaller cooperation agreements between specific states. As not all these cooperation agreements solely focus on transport enhancement, again a selection has been made by removing the non-relevant agreements. Final selection was to indicate only the programmes in which two or more Benelux-plus countries were involved. The final selection can be reviewed in Table 11 in the appendix of section I.

4. *What is the significance of the presence of cooperation agreements on the field of logistics with respect to the trade volumes within the specific area of analysis?*

Of the selected cooperation agreements only one dummy (for the TEN-T Programme) of the three has a significant beta in the fixed effects regression model. The beta value of the TEN-T Programme is however much higher than expected for mainly two reasons. First of all an effect of around 21 percent on trade is rather large for one cooperation programme. At the same time, the TEN-T programme is only represented in this study by the one project of the Betuwe Line. Considering an effect of 21 percent by only one project is even more extreme and the whole outcome should be considered carefully. The other two cooperation agreements, i.e. Operational Programmes and Marco Polo programmes, have an insignificant beta. The coefficient corresponding to the Marco Polo Programmes also has a negative sign, which is against the expectation. If cooperation would have a negative effect on a country, there would be no trigger for that country to engage in the cooperation. It is hence hard to say anything on the statistical significance of logistical cooperation agreements on trade. Theoretically each concept can be linked to the other concept but the strength of the link can unfortunately not be confirmed by means of this research.

Turning now to the general research question:

To what extent do cooperation agreements on the field of logistics between the governments of countries have a significant impact on the volume of trade?

On the one hand, the theoretical analysis makes it clear that efficient logistics fosters trade via e.g. lower transport costs, higher efficiency, better intermodal transport. The government can assist by developing adequate infrastructure and logistics services. To support international trade, governments can work together in *cooperation* to establish good transport facilities. The empirical analysis, on the other hand, does not generate stable results for interpretation. There are too many concessions to the data analysis. Therefore, no clear-cut answer can be given to the general research question. The extent to which cooperation agreements on the field of logistics between governments of countries have a significant impact on the volume of trade remains – consequently – unknown.

Finally, regarding the limitations to this research, several aspects can be denoted as chapter 9 shows. Coping with these restraints is essentially a matter of data availability and collection, which could not entirely be solved in this study, but has been dealt with to the extent of creating a solid framework. Still, the value of this study might be limited considering the restraints and the limitations of the regression results. Moreover, this research has been performed with the focus on the Benelux Union but putting the complete outcome into perspective with respect to the EU and possibly the world could add another dimension to the analysis which unfortunately goes beyond the scope of this thesis. Nevertheless, future research might be able to overcome the acknowledged restraints and create a broader basis for research on the link between transport related cooperation agreements and trade. Hopefully this research could then add to such a development by providing an initial step towards an integrated analysis.

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- EFTA:
 - o Efta.int
- Eurostat:
 - o Epp.eurostat.ec.europa.eu/
- France:
 - o Bbfrenchtranslation.com
- Germany:
 - o Bundesrat.de
 - o Deutschland.de
- IMF:
 - o Imf.org
- Luxembourg:
 - o Luxembourg.public.lu
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 - o www.mardep.gov.hk
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 - o Nu.nl
- OECD

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 - Portofantwerp.com
- PoR:
 - Portofrotterdam.com
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 - Trouw.nl
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 - Bbc.co.uk
 - Smtt.co.uk
- World Bank:
 - Worldbank.org
- WTO:
 - www.wto.org

11.2 Acknowledgements

I would like to thank the people listed here for their help and advice in the realisation of this thesis:

Mrs Verena Balz	Delft University,
Mr Peter Brulmans	Dutch Embassy in Brussels,
Mr Chris Coeck	Port of Antwerp,
Mrs Karin Jacobs	Secretariat General of the Benelux Union,
Mr Joost Kolkman	Kennis Instituut Mobiliteit (KiM),
Mr Bart Kuipers	Erasmus University Rotterdam,
Mr André van der Niet	Secretariat General of the Benelux Union,
Mr Peran van Reeven	Erasmus University Rotterdam,
Mrs Mariëlla Smids	Secretariat General of the Benelux Union,
Mr Thierry Vanelslander	University of Antwerp,
Mr Aernout Willeumier	Port of Rotterdam,
Mrs Pauline Wortelboer	Kennis Instituut Mobiliteit (KiM).

12 Appendix

12.1 Appendix Section I

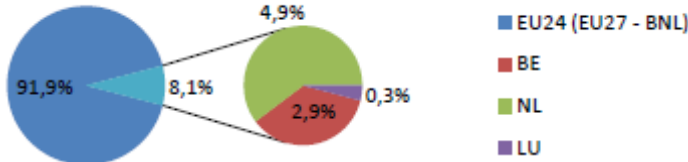
United States' merchandise trade by transport mode, 2001 (Percentage shares based on values and weight)

Mode	United States				Japan			
	Imports		Exports		Imports		Exports	
	value	weight	value	weight	value	weight	value	weight
Water	45.5	78.7	27.2	75.1	70.7	99.8	74.8	99.2
Air	23.4	0.3	34.4	0.6	29.3	0.2	29.3	0.8
Land	26.2	20.8	29.5	23.9	0.0	0.0	0.0	0.0
Miscellaneous	5.0	0.2	8.9	0.8	0.0	0.0	0.0	0.0

Note: Land transport includes rail, truck and pipeline transport.

Source: US Department of Transportation, Bureau of Transportation Statistics, May 2002; Japan Tariff Association, the summary report on Japan's trade, December 2002.

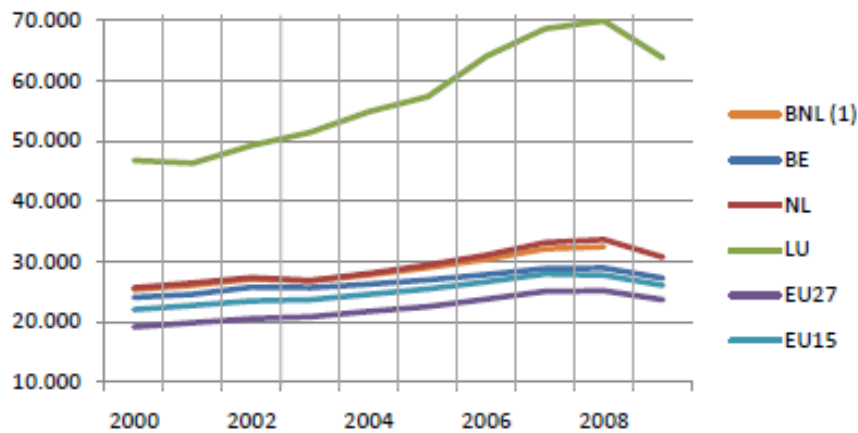
Figure 16: US vs Japan trade transport modes. Source: WTO, 2004, p.116



Source: Eurostat (tec00001)

Figure 17: GDP (% of EU-27 total in mIn EUR). Source: Bergers, 2010.

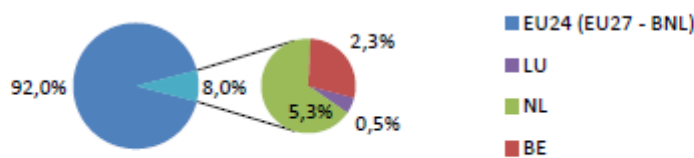
Korte beschrijving: GDP (gross domestic product) is an indicator for a nation's economic situation. It reflects the total value of all goods and services produced less the value of goods and services used for intermediate consumption in their production. Expressing GDP in PPS (purchasing power standards) eliminates differences in price levels between countries, and calculations on a per head basis allows for the comparison of economies significantly different in absolute size.



(1) Calculated as the population-weighted average of BE, NL and LU

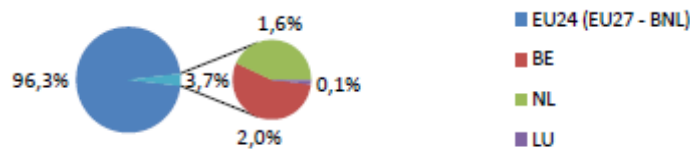
Note: The purchasing power standard, abbreviated as PPS, is an artificial currency unit. Theoretically, one PPS can buy the same amount of goods and services in each country. PPS are derived by dividing any economic aggregate of a country in national currency by its respective Purchasing power parities. PPS is the technical term used by Eurostat for the common currency in which national accounts aggregates are expressed when adjusted for price level differences using PPPs. Thus, PPPs can be interpreted as the exchange rate of the PPS against the euro. Source: Eurostat (tec00001)

Figure 18: GDP in PPP per capita, 2009. Source: Berger, 2010.



Source: Eurostat, International Transport Forum, Union Internationale des Chemins de Fer, national statistics

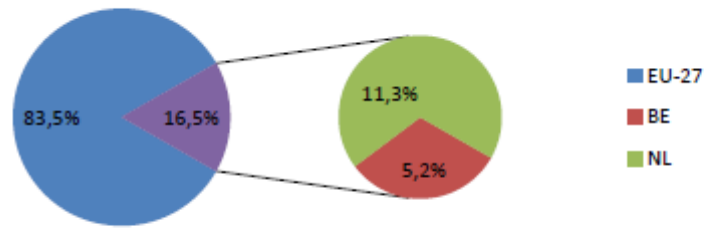
Figure 19: Total of goods transported: road (national and international), rail and barge, 2008. (% of EU27 total in 1.000 mln tom/km). Source: Bergers, 2010.



Source: Eurostat (ttr00005)

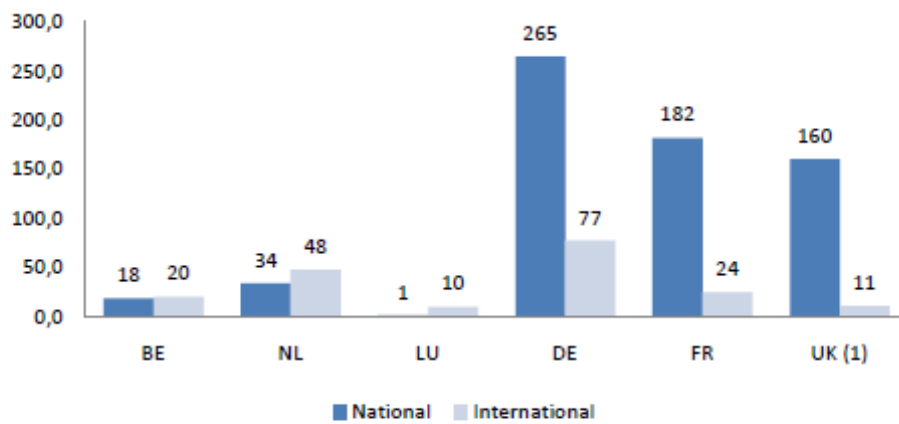
Figure 20: Railway: goods transport, 2008 (% of EU27 total in mln ton/km). Source: Bergers, 2010.

Korte beschrijving: The table displays the gross weight of seaborne goods handled in ports (goods unloaded from vessels plus goods loaded onto vessels). Data are collected according to Directive 95/64/EC of 8.12.1995. Luxembourg has no maritime ports.



Note: Not applicable for Luxembourg
Source: Eurostat (ttr00009)

Figure 21: Port throughput, 2008 (% of EU27 total in mln ton). Source: Bergers, 2010.



(1) 2007
Source: Eurostat (road_go_ta_to)

Figure 22: International and national road transport of goods, 2008 (1.000 mln ton/km loaded transport). Source: Bergers, 2010.

Ranking of Container Ports of the World

'000 TEUs

Rank	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1	Hong Kong 16 211	Hong Kong 18 098	Hong Kong 17 826	Hong Kong 19 144	Hong Kong 20 449	Hong Kong 21 984	Singapore 23 192	Singapore 24 792	Singapore 27 936	Singapore 29 918	Singapore 25 867	Shanghai 29 069
2	Singapore 15 945	Singapore 17 087	Singapore 15 571	Singapore 16 941	Singapore 18 411	Singapore 21 329	Hong Kong 22 602	Hong Kong 23 539	Shanghai 26 150	Shanghai 28 006	Shanghai 25 002	Singapore 28 431
3	Kaohsiung 6 985	Kaohsiung 7 426	Busan 8 073	Busan 9 453	Shanghai 11 282	Shanghai 14 554	Shanghai 18 080	Shanghai 21 720	Hong Kong 23 998	Hong Kong 24 494	Hong Kong 21 040	Hong Kong 23 699
4	Busan 6 440	Busan 6 383	Kaohsiung 7 541	Shanghai 8 610	Shenzhen 10 650	Shenzhen 13 660	Shenzhen 16 200	Shenzhen 18 470	Shenzhen 21 100	Shenzhen 21 416	Shenzhen 18 250	Shenzhen 22 510
5	Rotterdam 6 400	Rotterdam 6 290	Shanghai 6 340	Kaohsiung 8 493	Busan 10 408	Busan 11 492	Busan 11 843	Busan 12 039	Busan 13 261	Busan 13 453	Busan 11 980	Busan 14 194
6	Long Beach 4 408	Shanghai 5 612	Rotterdam 6 120	Shenzhen 7 620	Kaohsiung 8 843	Kaohsiung 9 714	Kaohsiung 9 471	Kaohsiung 9 775	Rotterdam 10 791	Dubai 11 827	Guangzhou 11 200	Ningbo-Zhoushan 13 144
7	Shanghai 4 210	Los Angeles 4 879	Los Angeles 5 184	Rotterdam 6 534	Los Angeles 7 179	Rotterdam 8 292	Rotterdam 9 288	Rotterdam 9 653	Dubai 10 653	Guangzhou 11 001	Dubai 11 124	Guangzhou 12 550
8	Los Angeles 3 829	Long Beach 4 601	Shenzhen 5 080	Los Angeles 6 106	Rotterdam 7 144	Los Angeles 7 321	Hamburg 8 088	Dubai 8 923	Kaohsiung 10 257	Ningbo-Zhoushan 10 934	Ningbo-Zhoushan 10 503	Qingdao 12 012
9	Hamburg 3 750	Hamburg 4 248	Hamburg 4 689	Hamburg 5 374	Hamburg 6 138	Hamburg 7 003	Dubai 7 619	Hamburg 8 862	Hamburg 9 890	Rotterdam 10 784	Qingdao 10 262	Dubai 11 600
10	Antwerp 3 614	Antwerp 4 082	Long Beach 4 463	Antwerp 4 777	Antwerp 5 445	Dubai 6 429	Los Angeles 7 485	Los Angeles 8 470	Qingdao 9 460	Qingdao 10 024	Rotterdam 9 743	Rotterdam 11 100

Figure 23: Container ports of the World (TEU). Source: www.mardep.gov.hk²⁸

²⁸ http://www.mardep.gov.hk/en/publication/pdf/portstat_2_y_b5.pdf, 21 July 2012

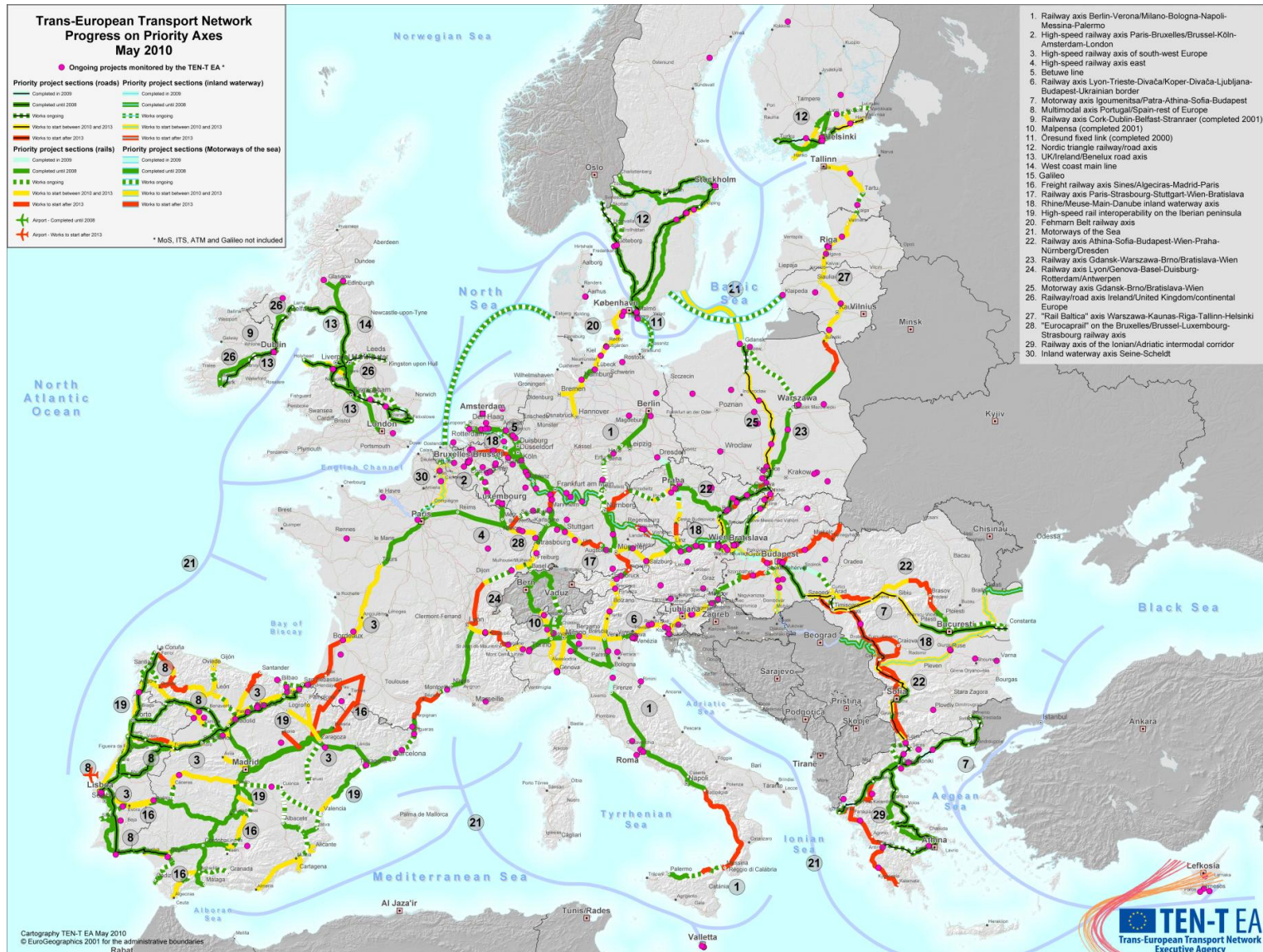


Figure 24: TEN-T Network

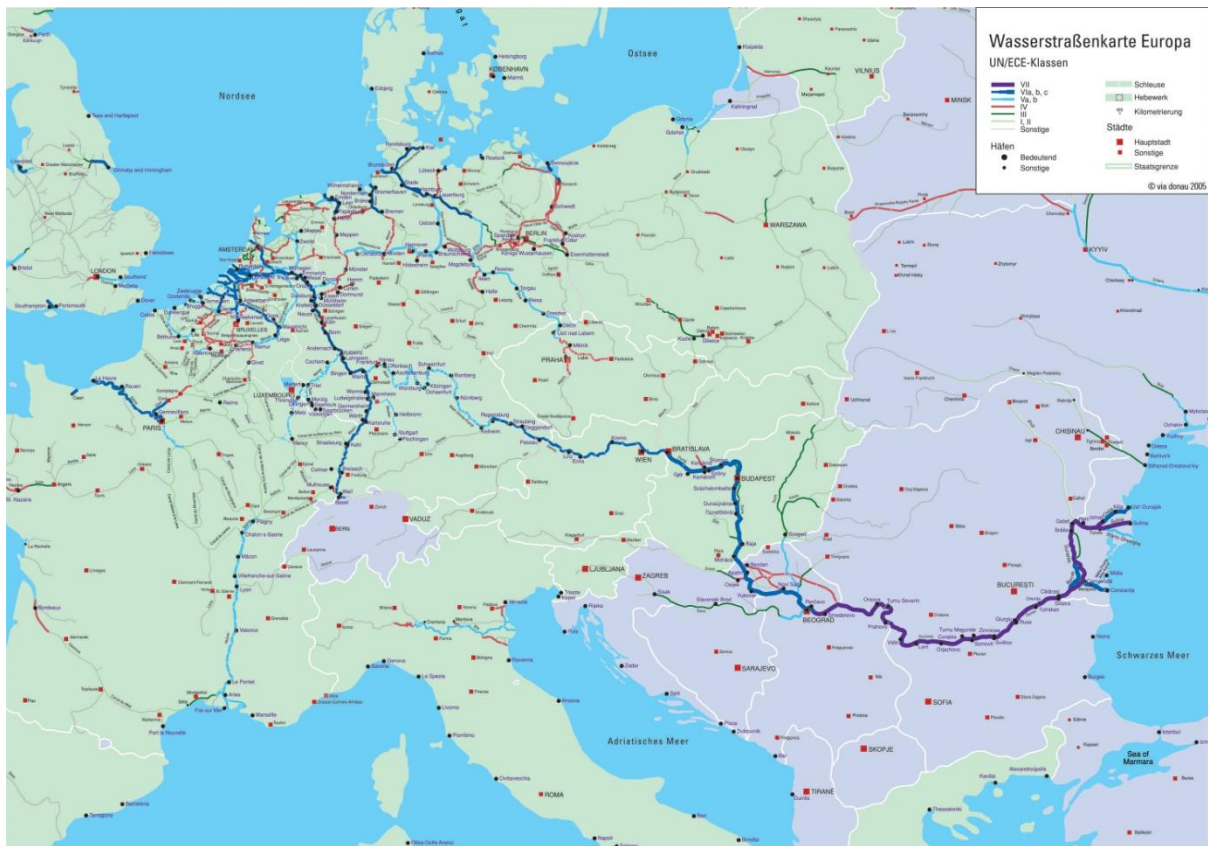


Figure 25: Inland waters Europe applicable for transport²⁹

²⁹ www.inlandnavigation.org, 13 September 2011

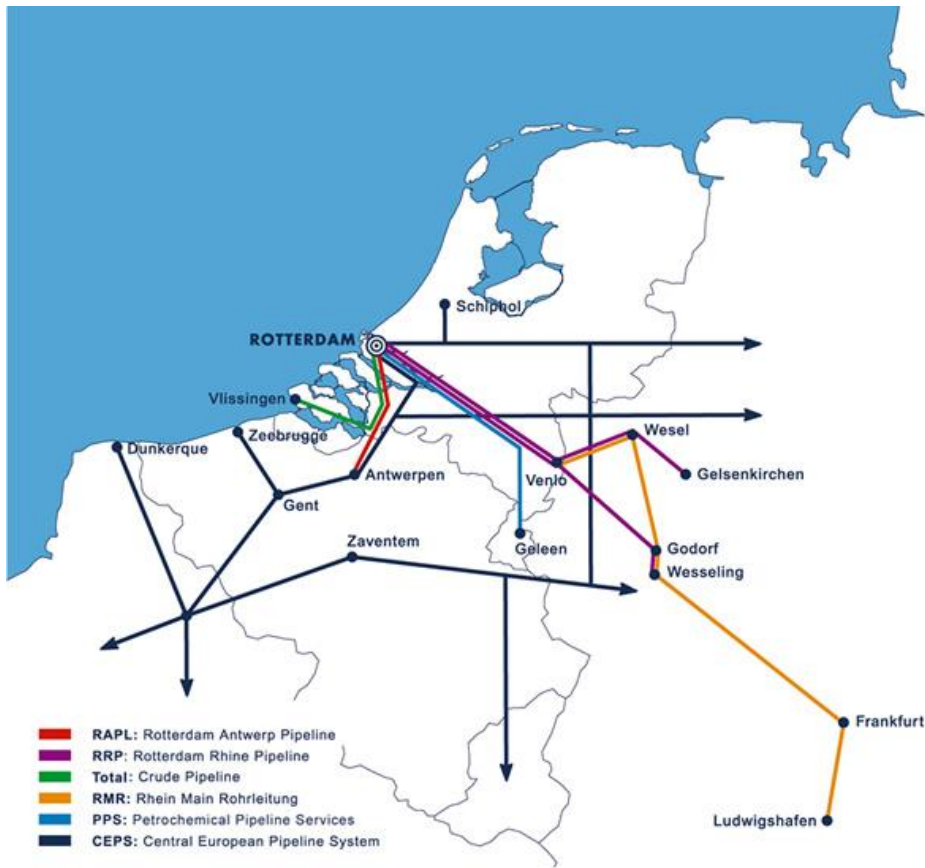


Figure 26: Benelux pipeline network. Source: www.portofrotterdam.nl

Cooperation agreement	Start	Finish	Countries involved
1. INTERREG IIC - North Western Metropolitan Area (NWMA)	1997	1999	Belgium, France, Germany, Ireland, Luxembourg, the Netherlands, UK
2. INTERREG IIC – Rhine Meuse Activities 'IRMA'	1997	1999	Belgium, France, Germany, Luxembourg, the Netherlands
3. INTERREG IIIB – North West Europe	2000	2006	Belgium, France, Germany, Ireland, Luxembourg, the Netherlands, UK, Switzerland
4. INTERREG IIIC – West Zone	2000	2006	Belgium, France, Germany, Ireland, Luxembourg, the Netherlands, UK
5. Marco Polo – BSH-Traffic-Venture (mod)	2003	2006	Belgium, France, Germany, Luxembourg, the Netherlands, UK (/Poland)
6. OP North West Europe (NWE)	2007	2013	Belgium, France, Germany, Ireland, Luxembourg, the Netherlands, UK, Switzerland
7. Marco Polo – Fresh Express (mod)	2009	2012	Belgium, France, Germany, Luxembourg, the Netherlands, Spain, UK
8. Marco Polo – ARCON (mod)	2009	2012	Belgium, France, Germany, Luxembourg, the Netherlands, Norway
9. INTERREG IIIA – Belgium / the Netherlands	2000	2006	Belgium, the Netherlands
10. INTERREG IIIA – Euregio Meuse-Rhine	2000	2006	Belgium, Germany, the Netherlands
11. INTERREG IIIB – North Sea Region	2000	2006	Belgium, Denmark, Germany, the Netherlands, Sweden, UK, Norway
12. Marco Polo – Project EUCON (mod)	2003	2006	Belgium, France, Ireland, the Netherlands, UK
13. Marco Polo – AIN (Antwerp Intermodal Network) (mod)	2003	2006	Belgium, France, Germany, the Netherlands
14. Marco Polo – ROLYS (mod)	2005	2008	Belgium, France, the Netherlands
15. Marco Polo – TRANGLE (mod)	2006	2009	Belgium, France, Germany, the Netherlands, Spain, Poland
16. Marco Polo – RIGAMODAL (mod)	2007	2010	Belgium, Germany, the Netherlands, Cyprus, Latvia
17. OP Belgium – Netherlands	2007	2013	Belgium, the Netherlands
18. OP North Sea Region	2007	2013	Belgium, Denmark, Germany, the Netherlands, Sweden, UK
19. OP INTERREG IV-A – Euregio Maas-Rhein	2007	2013	Belgium, Germany, the Netherlands
20. OP Two Seas	2007	2013	Belgium, France, the Netherlands, UK
21. Marco Polo – The Juice Vessel (mod)	2009	2012	Belgium, Germany, the Netherlands, Spain, UK, Latvia
22. INTERREG III A - Germany - Luxembourg - German-speaking Community of Belgium	2000	2006	Belgium, Germany, Luxembourg
23. INTERREG IIIA – Belgium / France / Luxembourg	2000	2006	Belgium, France, Luxembourg

24. Marco Polo – IBERSHUTTLE (mod)	2006	2009	Belgium, France, Luxembourg, Spain
25. OP Grande Région	2007	2013	Belgium, France, Germany, Luxembourg
26. Marco Polo – Rail2 (mod)	2009	2012	Belgium, France, Germany, Italy, Luxembourg
27. INTERREG IIIA – France / Wallonia / Flanders	2000	2006	Belgium, France
28. Marco Polo – ARAGO PROJECT (mod)	2006	2009	Belgium, France, Spain
29. Marco Polo – DZRS (mod)	2006	2009	Belgium, Germany
30. INTERREG IVA – France-Wallonie-Vlaanderen	2007	2013	Belgium, France
31. Marco Polo – RUBY (mod)	2007	2010	Belgium, France, Germany
32. Marco Polo – SLO-UK-COMBI (mod)	2007	2010	Belgium, Germany, UK, Czech Republic, Slovenia
33. Marco Polo – KOTCAR (mod)	2008	2011	Austria, Belgium , Finland, Germany, Poland, Russia
34. Marco Polo – OFE (mod)	2008	2011	Belgium, France, Germany
35. INTERREG IIC – North Sea region	1997	1999	Denmark, Germany, the Netherlands , Sweden, UK, Norway
36. INTERREG IIIA – Ems-Dollart region	2000	2006	Germany, the Netherlands
37. Marco Polo – RoRo-ESPERANCE (mod)	2004	2007	France, the Netherlands , Spain
38. Marco Polo – Bridge over Europe (mod)	2004	2007	Spain, Germany, the Netherlands, UK
39. Marco Polo – NePolExpress (mod)	2005	2008	Germany, the Netherlands, Poland
40. Marco Polo – HRE (mod)	2006	2009	Austria, Germany, the Netherlands, Hungary
41. Marco Polo – NETHPOLA (mod)	2007	2010	Germany, the Netherlands, Cyprus, Poland
42. OP Netherlands – Germany	2007	2013	Germany, the Netherlands
43. TEN-T Priority Axis no 5: Betuweline		2007	Germany, the Netherlands
44. Marco Polo – Euro Car Shuttle(mod)	2009	2012	Austria, Germany, the Netherlands, Hungary, Poland, Slovakia
45. Marco Polo – LORRY RAIL (mod)	2006	2009	France, Luxembourg

Table 11: Selection of cooperation agreements on transport between Benelux-plus countries

12.2 Appendix Section II

```
. regress lntrade2 lngdpi lngdpj distancew adjacent1 language1 trend campall ca
> opall catent, robust
```

Linear regression

Number of obs = 271
 F(9, 261) = 791.97
 Prob > F = 0.0000
 R-squared = 0.9382
 Root MSE = .37398

lntrade2	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
lngdpi	.9775829	.0265241	36.86	0.000	.9253545	1.029811
lngdpj	.9972126	.0277352	35.95	0.000	.9425994	1.051826
distancew	-.0032952	.0001965	-16.77	0.000	-.0036821	-.0029082
adjacent1	.2173785	.0547512	3.97	0.000	.1095681	.3251889
language1	.6331307	.0459965	13.76	0.000	.5425593	.7237021
trend	-.0614818	.0103975	-5.91	0.000	-.0819555	-.0410082
campall	-.0256778	.0730159	-0.35	0.725	-.1694531	.1180974
caopall	.3548402	.0840239	4.22	0.000	.1893893	.5202912
catent	-.0658337	.0612438	-1.07	0.283	-.1864287	.0547612
_cons	-28.05759	1.220472	-22.99	0.000	-30.46081	-25.65436

Table 12: Regression results with doubled observations

```
. tab nationi1
```

nation i	Freq.	Percent	Cum.
Belgium	60	40.00	40.00
Germany	15	10.00	50.00
Luxembourg	30	20.00	70.00
Netherlands	45	30.00	100.00
Total	150	100.00	

Table 13: Area of analysis - nations

```
. tab country1
```

country + connection	Freq.	Percent	Cum.
BE-DE	15	10.00	10.00
BE-FR	15	10.00	20.00
BE-LU	15	10.00	30.00
BE-NL	15	10.00	40.00
DE-FR	15	10.00	50.00
LU-DE	15	10.00	60.00
LU-FR	15	10.00	70.00
NL-DE	15	10.00	80.00
NL-FR	15	10.00	90.00
NL-LU	15	10.00	100.00
Total	150	100.00	

Table 14: Area of analysis - connections

```
. tabstat campall caopall catent, s(mean median sd var count range min max)
```

stats	campall	caopall	catent
mean	.44	.8666667	.02
p50	0	1	0
sd	.4980499	.3410734	.140469
variance	.2480537	.1163311	.0197315
N	150	150	150
range	1	1	1
min	0	0	0
max	1	1	1

Table 15: Descriptive statistics - cooperation dummies

. vif

variable	VIF	1/VIF
trend	3.86	0.259023
campall	2.95	0.339435
lngdpj	2.82	0.353988
distancew	2.63	0.380158
language1	1.78	0.563355
lngdpi	1.69	0.592807
adjacent1	1.68	0.595982
caopall	1.62	0.615619
catent	1.14	0.879972
Mean VIF	2.24	

Table 16: VIF - variance inflation factor

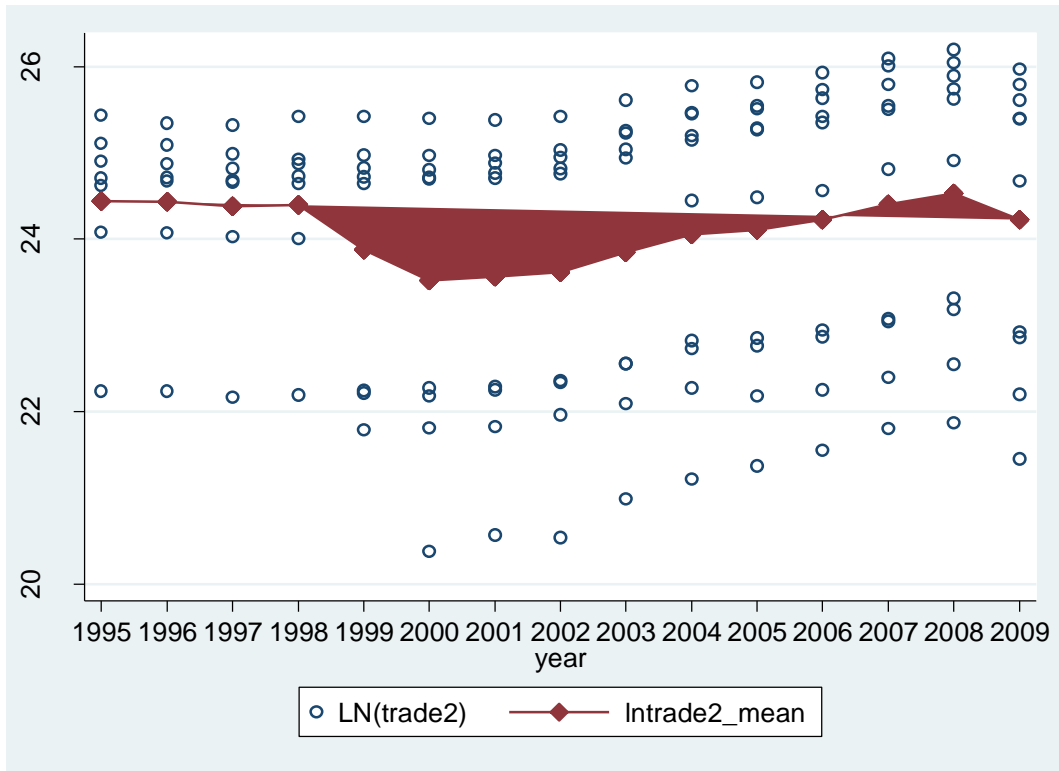


Figure 27: Twoway scatterplot trade-year

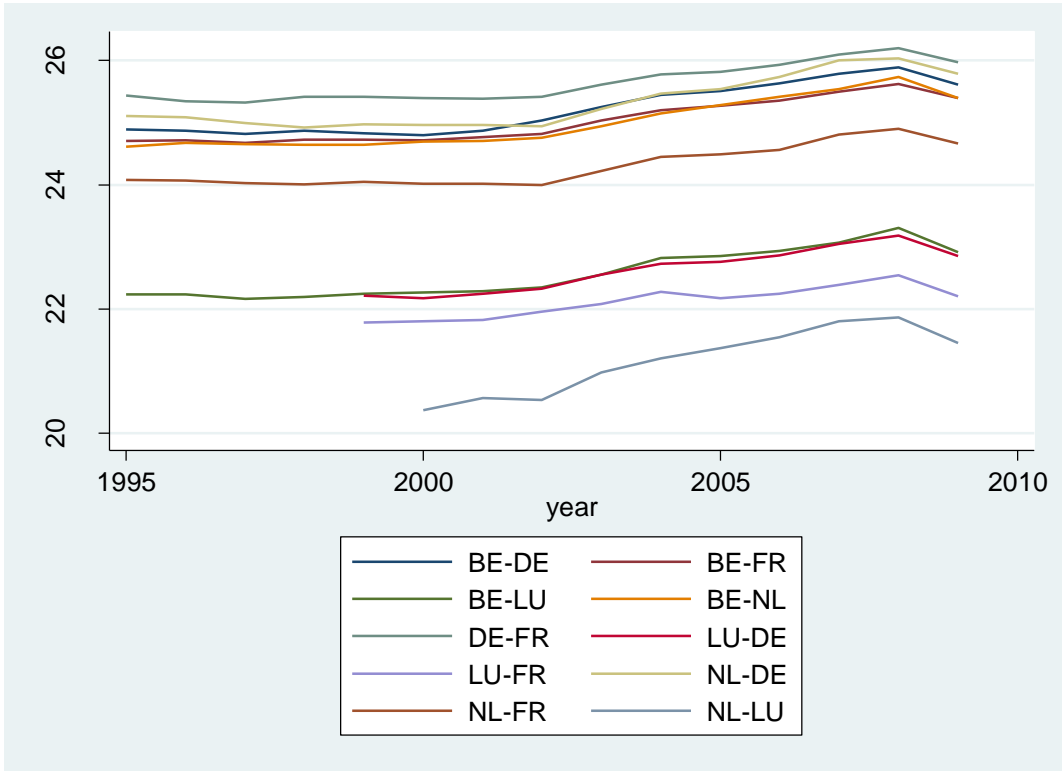


Figure 28: Trade connections and relative volumes

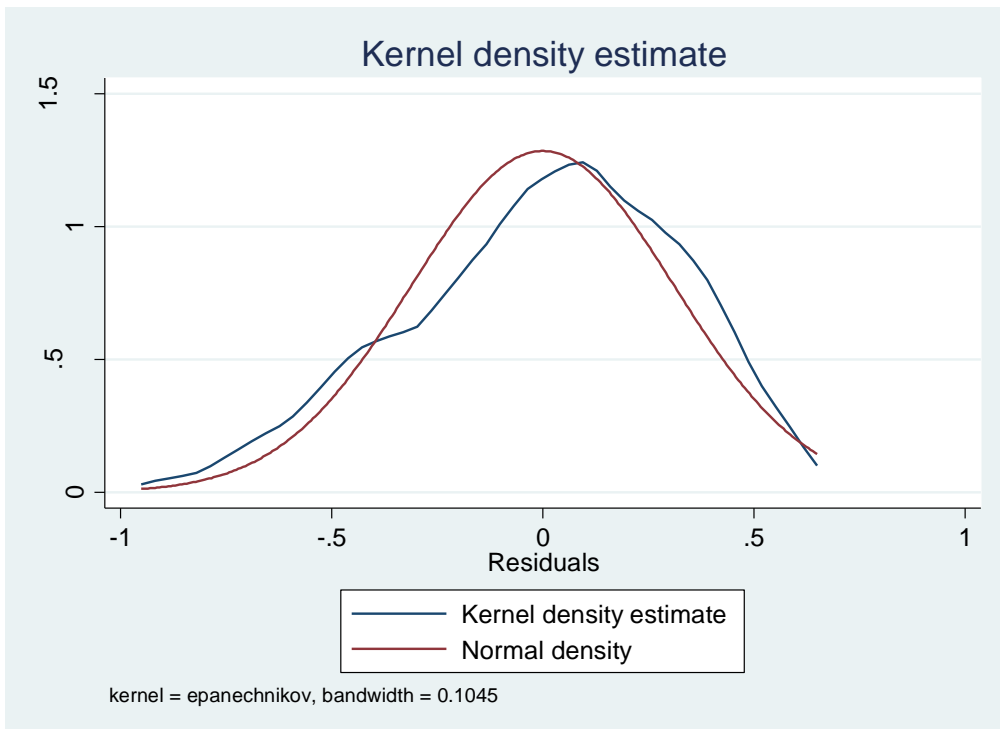


Figure 29: Kernel density

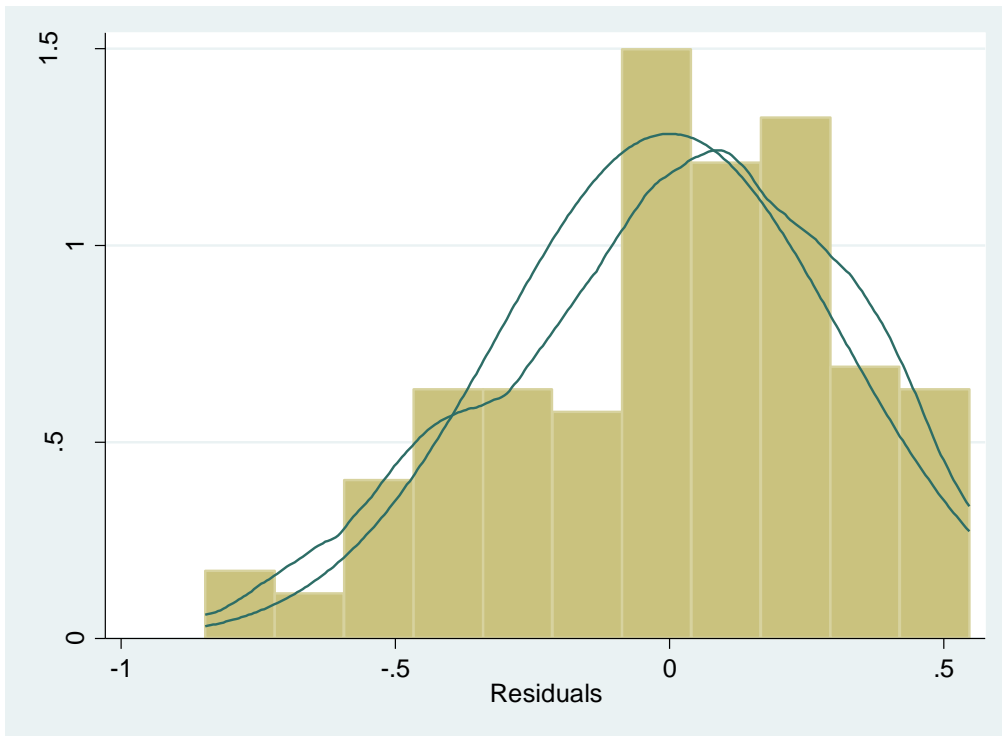


Figure 30: Histogram with kernel density

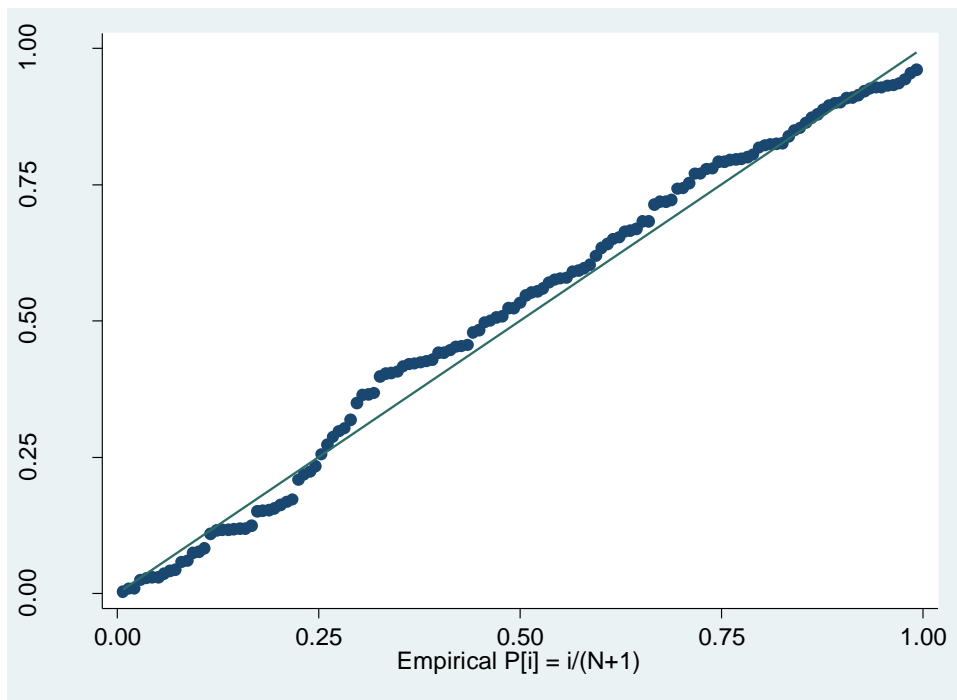


Figure 31: Pnorm – standardize normal probability plot

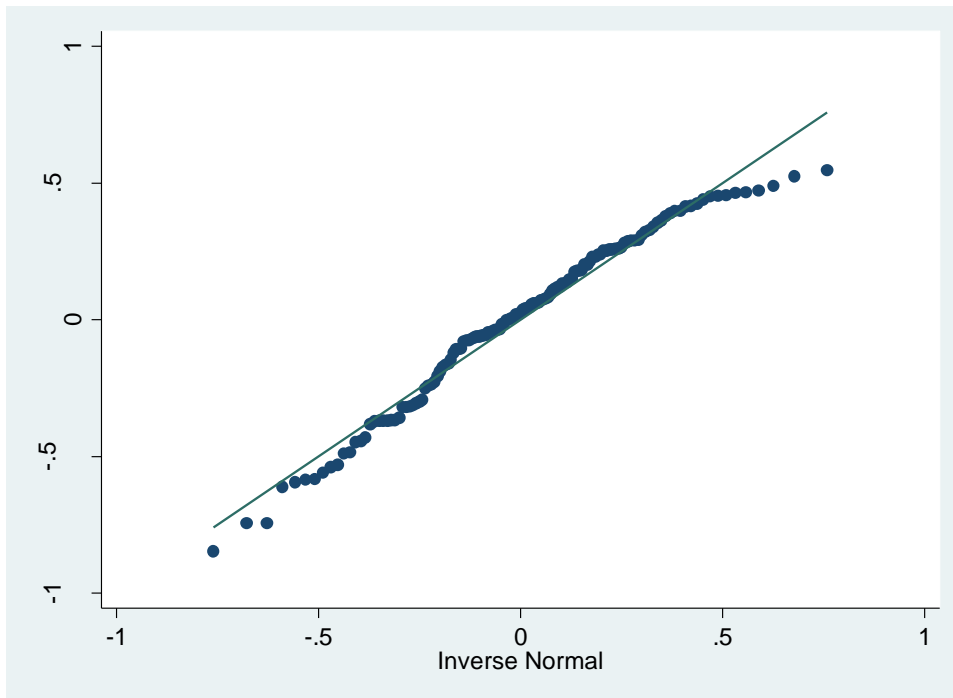


Figure 32: Qnorm – quintile-normal plot

```
. swilk e
```

Shapiro-wilk w test for normal data					
variable	obs	w	v	z	Prob>z
e	137	0.97271	2.938	2.432	0.00751

Table 17: Shapiro-Wilk test for normality

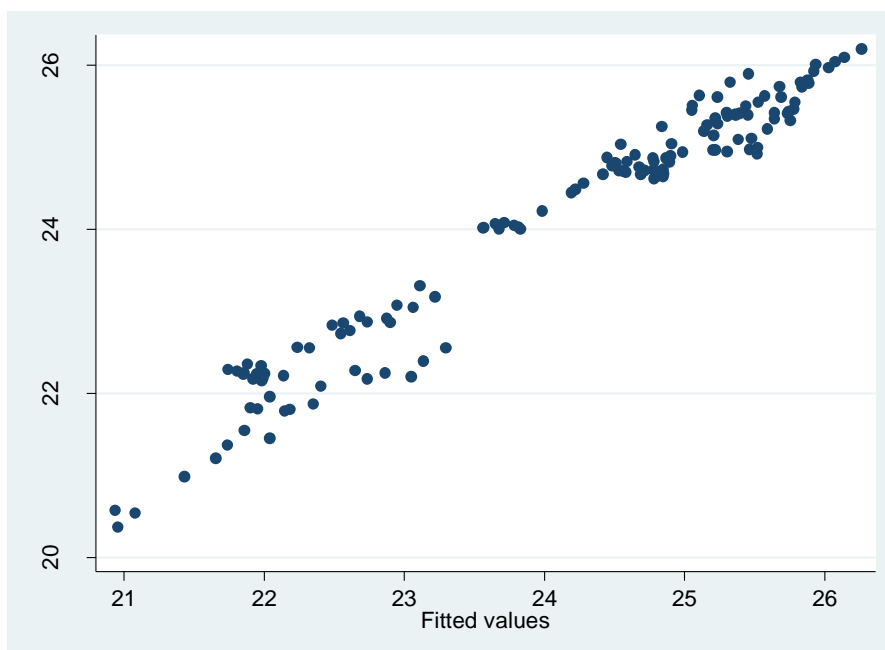


Figure 33: Predicted values

```

. ovtest
Ramsey RESET test using powers of the fitted values of lntrade2
Ho: model has no omitted variables
F(3, 124) = 9.17
Prob > F = 0.0000

```

Table 18: OV test on omitted variables

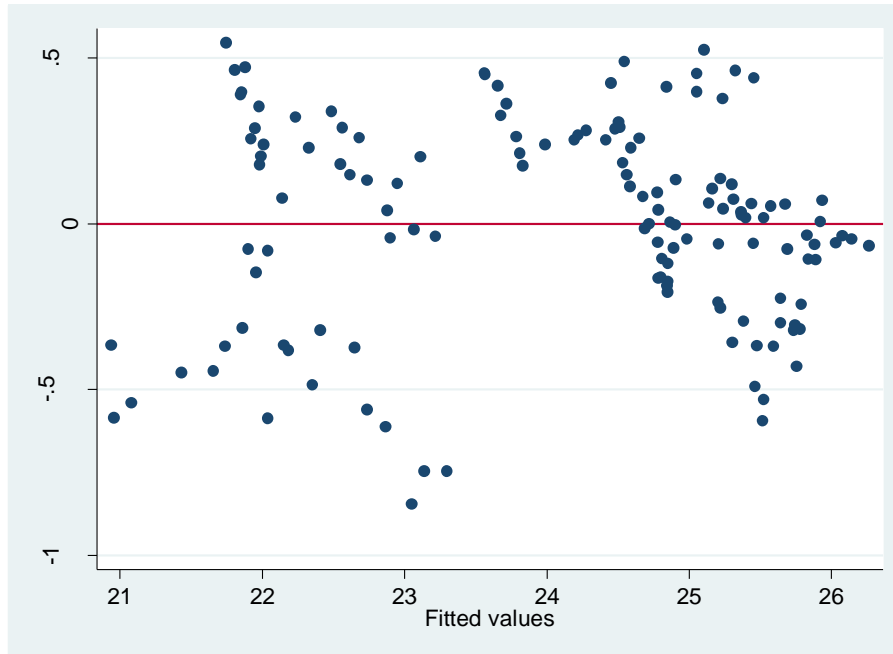


Figure 34: RVF plot

```

. estat hettest
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of lntrade2

chi2(1) = 10.98
Prob > chi2 = 0.0009

```

Table 19: Breusch-Pagan test

```

. hausman fixed random

```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) random		
lngdpi	.2981959	1.122392	-.8241957	.0971359
lngdpi	.6792389	.9094836	-.2302447	.0930895
trend	.0181248	-.0589276	.0770524	.
campall	-.0017974	-.0531097	.0513123	.
caopall	.0304485	.3977266	-.3672781	.
catent	.2148506	-.1294807	.3443313	.

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$\chi^2(6) = (b-B)'[(V_b-V_B)^{-1}](b-B)$
= 226.37
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Table 20: Hausman test, fixed - random

12.3 Abbreviations

BLEU	Belgium-Luxembourg Economic Union
CA	Cooperation agreement
ECSC	European Coal and Steel Community
EEC	European Economic Community
EFTA	European Free Trade Agreement
ERDF	European Regional Development Fund
ESF	European Social Fund
ESPON	European Spatial Planning Observation Network
EU	European Union
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
IMF	International Monetary Fund
MAHHL	Maastricht, Aachen, Heerlen, Hasselt and Liege
MP	Marco Polo programme
NATO	North Atlantic Trade Organisation
OECD	Organisation on Economic Cooperation and Development
OP	Operational Programme
TEN-T	Trans-European Networks – Transport
WTO	World Trade Organisation