The effect of entering the EU on road transport of the member states

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__________________________  ________________________  ________________________
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Växjö, 24th May 2017
Abstract

Title: The effect of entering the EU on road transport of the member states.

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The European Union (EU) is a framework of 28 member states that are working together for safety purposes and economic stability. The EU created a single market to increase trade and to create economic advantages. For this, physical barriers, technical barriers, tax barriers, natural barriers and legislative barriers had to be overcome by creating a common framework. The logistics sector is vital for the EU market and economy, because it is important for the effective and efficient functioning of the internal market. Due to the fact that road transport accounts for 70% of the transported volumes this research focuses on this transport mode.

The purpose of this research is to see the economic and legal effects on road transport for the member states when entering the EU. Due to doubts about the EU by member states this research focuses on the effect of the EU on road transport of the EU sample. Therefore, an analysis will be done on short-term (4 years) and long-term (12 years) and legal changes influencing the road transport. A deductive approach focused on secondary data is used. Via non-probability sampling, a sample of eight out of 28 member states is used. The data analysed is mostly quantitative data supported by qualitative data focusing on the legislation. To analyse the two variables, GDP per capita and road transport volumes, calculations regarding correlation, decoupling and significance are used to see the link between the variables and to test the reliability.

The conclusion based on the results of this research show a positive effect of member states after entering the EU. On the short-term and long-term, the GDP per capita and road transport volumes showed positive results and the investments on the short-term also showed a positive outcome. Long-term results showed that the financial crisis had a strong influence during the period 2007-2011 but positive outcomes are still seen.

Keywords: Road transport volumes, GDP per capita, European Union, Single market, Legislation, Decoupling, Correlation.
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VII
1. Introduction

The following chapter covers the introduction to the research. Therefore, an introduction regarding the research topic is given. Furthermore, the problem discussion, purpose and research questions of the research along with the structure are presented.

1.1. Background

The European Union (EU) has been established in 1993 and currently includes 28 countries with the last addition of Croatia in 2013 (Tiwary, 2015). A co-operation between several countries was established in 1951 when Belgium, France, Germany, Italy, Luxembourg and the Netherlands started the European Coal and Steel Community (ECSC) to rebuild the economy after World War II (Gordon, 2015). Throughout this research, the term EU is referred to from the moment the basis was created in 1951 by the creation of the ECSC.

Logistics is defined as the lifeblood of the global economy (Heriot-Watt University, 2016). Logistics itself is a broad definition that can reach from IT to transport. The logistics sector is vital for the EU market and economy, because it is important to the effective and efficient functioning of the internal market. Additionally, this sector contributes substantially to the Gross Domestic Product (GDP), creates jobs and helps other sectors to perform efficiently (European Commission, 2015). In this research the focus is on road transport. Road transport is defined as freight transported by road (European Commission, 2012). The EU already has a well-established transport sector, which is only surpassed by the US and Japan (European Commission, 2015). It is vital for the EU to maintain a well-developed transport sector not just because it ensures the global competitiveness, but also to increase intra-European trade (European Commission, 2015).

EU is a single market that has a common legal base and legislations that apply to all member states. Many of these legislations are related to road transport and influence the movement of goods and persons. The EUR-Lex website includes all directives created by the EU (EUR-Lex, 2017). The directives are focusing on speed and weight of the vehicles (directive 2002/85/EC), insurance (1999/37/EC; 2009/103/EC, 2009/103/EC), the improvement of time efficiency and safety on roads (80/1263 EEC) and the free...
movement of goods and persons (2005/36/EC). The European Commission states that the legislation applicable to the road transport has led to positive effects on this sector (European Commission, 2012). One of the reasons as stated by Sun and Pelkmans (1995) for the positive numbers seen in road transport is the situation that is created where cross-border is not more costly than intra-national freight. Furthermore, the trans-European network is improved by the single market with uniform standards and intelligent transport systems (European Commission, 2012). Besides looking at costs, time efficiency has increased whereas less borders controls are needed (Sun and Pelkmans, 1995).

The focus of this research is to see what economic and legal effects member states have experienced from entering the EU related to road transport. Transport literature traditionally reflects the view that transport volumes, road transport volumes in particular, are coupled to GDP (Tapio, 2005). In this research, it is referred to road transport when freight internationally is transported via road by vehicles registered in EU member states (European Commission, 2014b). Throughout this research, economic effects are considered to be an increase or decrease of the GDP per capita and transport volumes. The transport volume is the total freight in tonnes that has been transported by road (European Commission, 2014b). The effects will be split up in two time frames from the moment of entering in 2004: short-term and long-term. During this research, short-term will be seen as a time period of the first four years after entering the EU. By long-term effects a reference is made to a time period of 12 years from entering the EU. The short-term period of four years is chosen whereas the effects of entering the EU can potentially be seen within this period. To see long-term effects, a 12 year period is chosen whereas this is the longest time-frame possible due to availability of data. In addition, changes in the regulations of road transport will also be discussed to see the effect of the EU on legal aspects of the member states.
1.2 Problem Discussion

The EU is an economic union that has created a framework where 28 countries work together to improve the social and economic situation of the union as a whole and also individually. This union has proved to add value to the member states and over the years it grew from 6 to the current 28 member states (Tiwary, 2015).

The positive effects and the necessity of the EU have been questioned ever since the EU is established. The intensity of these debates has been increasing after 2004, when ten new member states entered (Sjursen, 2006). As a result of Brexit, which means that the UK will move out of the EU, a chain of reactions and doubts regarding the EU came up among the member states. Countries with the strongest reaction and most doubts include: Austria, Finland, France, Hungary and the Netherlands (Squires, 2016).

The uncertainty of the EU due to Brexit and the possibility of other member states leaving the EU has led to doubts about the added value of the EU for the member states. In this research, the added value is defined as the positive effects of the EU, and its single market, on the road transport of the member states. Therefore, this research is conducted to see what the economic and legal effects of entering the EU were on road transport since road transport accounts for approximately 75% of all transport by volume (European Commission, 2014a).

In 2011, the EU released a “White Paper” in which the future of freight transport has been described. One of the points discussed in this research is a potential modal shift from road to rail. A lot of researchers took the “White Paper” and used it as a base for research regarding implementation, feasibility and reasoning (Islam, 2016). Research on this topic is also done by the EU itself to explain the steps that need to be taken in order to achieve the goals and to find the reasoning for rail freight transport not being as popular as other modes of transport (Dionori, et. al, 2015). This kind of study does somewhat analyse the potential impact of entering the EU on road transport, but focuses on potential future scenarios instead of events in the past. In addition, the research is not country specific and only evaluates the EU as a whole (Dionori, et. al, 2015; Sjursen, 2006).
The single market exists for 30 years but still has to deal with difficulties. The European Economic Community has solved many difficulties but new issues continue to arise. Difficulties can for example apply to “physical barriers, technical barriers and legislative barriers” (European Economic Social Committee, 2012, p.5-6). The European Economic Social Committee (2012) found 89 issues of which 10 refer to the cross-border activities and 25 issues are related to the movement of goods. The first concerns issues within the Single European Transport Area to make the transportation of goods more easy, less expensive and increase the sustainability. The second refers to, among other things, difficulties related to an integrated rail transport network.

In this research, the discussion is focused on the effects member states have experienced related to road transport from entering the EU. As by the examples mentioned it is possible to see that the research already done by academia are usually focused on a specific country in a specific region or on the EU as a whole (European Economic Social Committee, 2012). In addition, the research regarding the single market within the EU is not focused on each country specifically nor does it evaluate the effects on road transport (Islam, 2016; Dionori, et. al, 2015). Therefore, the research gap found is the analysis of how entering the EU effected road transport in the EU by analysing different member states and combining the results into an EU sample.

1.3 Purpose and Research Questions

The purpose of this research is to see the economic and legal effects on road transport for the member states of entering the EU. Nowadays, issues related to being a part of the EU have been mentioned more regularly due to, for example, Brexit. Therefore, the research discusses the effects of the EU on road transport of the EU sample. The economic changes from entering the EU that sample countries have experienced related to road transport will be analysed by looking at the correlation and decoupling point on short-term (4 years) and long-term (12 years) and legal changes influencing the road transport.
Since the EU offers a single market for road transport, the positive and negative effects will be researched. Research about current road transport will be further detailed. This will include an analysis of the EU single market. Finally, the theoretical and analytical information will be linked to see if the EU affect the sample countries.

To create an overview of the effects on road transport for member states entering the EU the following sub-questions will guide this research:

1. What short-term economic effects can be seen between changes in GDP per capita and road transport volumes 4 years from entering the EU?
2. What long-term economic effects can be seen between changes in GDP per capita and road transport volumes 12 years from entering the EU?
3. What legal effects regarding road transport did member states experience from entering the EU?

Two sub-questions mention the economic link between changes GDP per capita to display the countries’ welfare per inhabitant and road transport volumes that reflects the amount of goods transported by the EU member states. The third sub-question researches the legal effects that influenced the EU sample when entering the EU. The use of these three sub-questions will guide the research towards its goal of answering the main research question: **What economic and legal effects from entering the EU have member states experienced related to road transport?**

The research goal is to create a clear overview of the effects of entering the EU on road transport of relatively recent entered member states. The analysis will look into the positive and negative effects but will not look into the reasoning behind the consequences. This research is done to create a first more detailed overview of the effects of entering the EU on road transport for new member states, which can lead to more detailed follow-up studies carried out by other researchers.
1.4 Structure

The research is structured in several chapters:

*Chapter 1* covers the introduction to the research. In this chapter, the background of related topics as the EU, road transport and the single market. Furthermore, the problem discussion, purpose, research question and structure are provided.

*Chapter 2* will explain the methodology that will be used throughout this research to produce results and conclusions. Therefore, an overview is given about scientific perspectives, scientific approaches, research methods, sampling, data collection, analysis methods, scientific credibility and ethical considerations to create a suitable framework for this research.

*Chapter 3* will give an explanation of GDP and road transport where after the relationship between GDP per capita and road transport volumes as well as road transport legislation in the EU single market will be discussed. In addition, the effects of the global financial crisis of 2008 will be explained. Finally, the chapter will be concluded with a summary.

*Chapter 4* will provide empirical data regarding economic background and road transport volume statistics of the countries. The second section within this chapter will cover a cross-case study of the EU sample to merge all results of the individual countries to focus on the research question. Empirical data about road transport legislation in the EU will be found at the end of the chapter.

*Chapter 5* will analyse the previous collected theoretical and empirical information. The relation between GDP per capita and road transport volumes will be analysed first. Thereafter, data on the first sub-question regarding short-term economic effects will be analysed to be able to answer the sub-question. The third section will cover the long-term analysis to answer the related sub-question. Each of the two sub-questions will form an answer based on a cross-case study of the EU sample where the individual data of the countries will be combined. Finally, the third sub-question will be answered based on an analysis of all information gathered regarding legislation.

*Chapter 6* will conclude the research by answering the main research question. Besides, the research will be critically reviewed to explain limitations and possibilities for further research.

Figure 1 illustrates the structure of the research.
Figure 1 - Methodology (Own figure).

Introduction
- Background
- Problem Discussion
- Purpose and Research Question
- Structure

Methodology
- Scientific Perspective
- Scientific Approach
- Research Method
- Sampling
- Data Collection
- Analysis Method
- Scientific Credibility
- Ethical Considerations
- Summary

Theoretical Framework
- Relationship between GDP per capita and Road Transport Volumes
- Road Transportation Legislation in the EU
- Example Countries
- EU Study

Empirical Study
- Road Transport Volumes 1 Year from Entering the EU
- Short-Term Economic Effects can be seen between Changes in GDP per Capita and Road Transport Volumes 1 Year from Entering the EU
- What Long-Term Economic Effects can be seen between Changes in GDP per Capita and Road Transport Volumes 1 Year from Entering the EU
- What Long-Term Economic Effects can be seen between Changes in GDP per Capita and Road Transport Volumes 2 Years from Entering the EU
- What Long-Term Economic Effects can be seen between Changes in GDP per Capita and Road Transport Volumes 3 Years from Entering the EU

Analysis
- Final Empirical Study
- Member State Experience from Entering the EU

Conclusion
- Findings and research
- Contribution
- Critical review
- Limitations and further research

The effect of entering the EU on road transport of the member states
2. Methodology

In this chapter, the methodical approach to work towards the goal of the research will be given. The methodology framework is based on the Research Onion of Saunders, Lewis and Thornhill (2007) shown in figure 2. This chapter will cover the scientific perspective, scientific approaches, research methods, sampling methods, data collection, analysis methods, scientific credibility and ethical considerations. These aspects will be the base for the research.

2.1 Scientific Perspective

The philosophies related to businesses can be divided into five groups (Saunders, Lewis and Thornhill, 2016). The corresponding groups are critical realism, postmodernism and pragmatism (Saunders, Lewis and Thornhill, 2016) besides positivism and hermeneutics, which are related to interpretivism (Åge, 2011). Throughout this research, the focus will be on hermeneutics and positivism. Therefore, further explanation of these two groups will follow.
2.1.1 Hermeneutics

Hermeneutics along with phenomenology and symbolic interactionism are components of interpretivism. Interpretivism selects information that is useful for the research and is commonly used for inductive studies (Saunders, Lewis and Thornhill, 2016). Each component has a focus on the practical applicability. Hermeneuticist focuses on resources like texts and stories (Froggatt, 2001). Whereas phenomenologists focus on the personal outlook, the focus of symbolic interactionists is on the influence of the social environment (Saunders, Lewis and Thornhill, 2016).

2.1.2 Positivism

When following the positivism perspective, the given rules regarding the methodology will in every situation lead to the truth (Åge, 2011). Bryman and Bell (2015) add that research concerning positivism covers the social reality. Saunders, Lewis and Thornhill (2016) explain that positivism makes it possible to reproduce through the use of an orderly methodology and is usually applied during deductive research. The characteristics of a deductive research will be discussed in section 2.2.2. Thereby, where interpretivism is influenced by personal interpretation, positivism is not determined by the environment but completely based on objective facts (Saunders, Lewis and Thornhill, 2016).

2.1.3 Applied Scientific Perspective

Throughout this research, the positivism perspective will be applied since it is based on theories and numbers which are not influenced by the research environment. Besides, social reality is the basis for this research because the influences of entering the EU on the member states are examined. An orderly methodology will be applied and a deductive research approach will be used to perform this research.

2.2 Scientific Approach

There are methods focusing on different research areas. The applied method is focusing on problems that society, industries or businesses are currently facing (Kothari and Garg, 2014). Fundamental research is focused on more general problems related to theories. This research method can focus on a wide range of topics, relating to mathematics, human behaviour or economic issues. The emphasis is often on social,
economic or political trends that could influence the future of the society, an industry or a business. For both methods, the base of research papers is often based on a deductive or an inductive approach (Kothari and Garg, 2014).

2.2.1 Inductive Approach

Inductive reasoning is working from a specific observation to a broader field of theories (Dubois and Gadde, 2002). The inductive approach is typically used in qualitative studies and consists of several steps. At first, the researcher stances generalizations or theories based on past experiences and literature. Broad patterns will be sought and data related to the topic will be analysed. To gather more in-depth information, participants will be asked open-ended questions. Lastly, all information is gathered to see the outcome of the study (Creswell, 2014). The inductive research can therefore be seen as an analytical research and is focused on the cause-and-effect relationship that has resulted in a certain outcome (Ethridge, 2004). Thus, the researcher has to focus on available information that has been established before (Kothari and Garg, 2014).

2.2.2 Deductive Approach

The goal of a deductive approach is to test rather than to develop a theory. The outcome of a deductive research approach will be a confirmation or disconfirmation of the theory that has been researched (Creswell, 2014) and it shows the link between theory and research (Bryman and Bell, 2011). The deductive approach is also known as the top-down approach because it starts from an established theory, which is coming from a more general topic and moves towards a more specific topic (Dubois and Gadde, 2002). It starts with creating a theory related to the area of interest and will be narrowed down to hypotheses that can be tested.

The deductive approach typically used in quantitative studies exists out of four steps. At first, the theory will be tested or verified by the researcher and will be followed up by testing hypotheses or research questions. After that, the variables derived from the theory will be defined. The last step is to obtain the scores by measuring or observing the chosen variables (Creswell, 2014).
The deductive approach can therefore be seen as a descriptive research whereas it describes or identifies the current situation through data collection by the use of surveys and fact-finding enquiries (Ethridge, 2004; Fox and Bayat, 2007). The researcher does not have any influence on the variables that lead to the outcome (Kothari and Garg, 2014).

2.2.3 Applied Scientific Approach

In this research, a deductive approach is used. The basic theories in academia regarding the positive and negative effects of entering the EU have already been created but not on a country based level or with the focus on road transport. Therefore, the links between GDP per capita and road transport volumes are analysed to see if positive or negative effects can be seen when entering the EU.

2.3 Research Method

To answer the research question by applying a scientific approach, several types of research approaches can be used. As stated by Kothari and Garg (2014), there are several basic methods but all approaches come back to the basics of the quantitative and qualitative approach.

2.3.1 Quantitative Research

Quantitative research is based on the quantity or number of measurements (Kothari and Garg, 2014). Numeric data and closed-ended questionnaires are used to work towards the final outcome (Creswell, 2003). Within the quantitative area, the survey approach and experimental research approach can be used to gather information (Creswell, 2009). Structured interviews are used for data collection when using the survey research approach. A sample of the population will be evaluated by focusing on i.e. trends, opinions or attitudes. The outcomes are generalized to get an overview of the total population. The experimental research focuses on a cause-and-effect relationship. By comparing two different target groups with slightly different circumstances the outcomes are compared to see what the influence of the factor is that one group was influenced by, but the other not (Creswell and Plano Clark, 2011).
2.3.2 Qualitative Research

Qualitative research is often focused on more in-depth research to find underlying reasons to support a certain outcome. Qualitative methods are often the most effective when the research is focused on new phenomena (Rubin and Babbie, 2016). This type of research is mostly used in behavioural sciences whereas the underlying motives are the most important in this area (Kothari and Garg, 2014). Contradicting with quantitative research, open-ended questions are used to find the right outcome to get to the goal of the research (Creswell, 2003). One of the main advantages of qualitative data is that objective and subjective information can be gathered to create a detailed overview (Denzin, 2005). But the fact that the researcher is involved in the process of gathering the answer is also a danger for the research because it can influence the outcome too much. The most important to create a successful research when using qualitative data is that the researchers are objective towards the outcomes. This is often difficult due to the close involvement of the researcher with the topic (Bryman and Bell, 2011).

2.3.3 Triangulation

Instead of using one of the two methods the triangulation method can be applied. A mix of quantitative and qualitative data will be used for research purposes (Todd, 1979). Traditional surveys, interviews and observations are combined and evaluated side by side (Creswell, 2009). By combining both research methods the ability to question the other method and to see if the data aligns or contradicts will help to improve the outcomes on the long-term (Creswell and Plano Clark, 2011; Todd, 1979).

2.3.4 Research Strategies

There are several research strategies to eventually answer the research question. For quantitative studies experiments and surveys may be used (Creswell, 2014; Saunders, Lewis and Thornhill, 2016). When experiments are applied, an independent variable is changed to see the effect on a dependent variable (Kothari and Garg, 2014; Saunders, Lewis and Thornhill, 2016). Questionnaires are the best-known variant of surveys (Creswell, 2014) but also interviews and observations belong to this group (Saunders, Lewis and Thornhill, 2016). Surveys are conducted from a sampling group of the population (Creswell, 2014; Saunders, Lewis and Thornhill, 2016). “Convergent
parallel, explanatory sequential, exploratory sequential and transformative mixed methods” (p.12) can be used when quantitative and qualitative research are mixed (Creswell, 2014).

2.3.5 Applied Research Method

Quantitative research is focused on gathering numeric data. Therefore, information from the European Commission is the main source in this research. The European Commission provides data regarding the GDP per capita of member states and growth volumes. In addition to the European Commission, the OECD provides information related to the economic situation of member states. The quantitative research can therefore be based on these two sources due to the broad amount of data available and the sources are considered to be trustworthy. The quantitative research will focus on the two first sub-questions that are related to the economic effects.

Qualitative research focuses on non-numerical information. Background information of each sample country will be provided using information from the MIT database and finally the legislation will be described. The European Commission provides information related to the laws that apply to road transport within the EU. All directives that are connected to the EU can be found there and by filtering out the directives that are related to road transport, the qualitative research will be a useful addition to the quantitative research. Qualitative research will be used to better understand the situation of the EU and to find out which legislations are connected to the countries that become a member state.

Concluding, in this research qualitative data is the base and qualitative data is used to support the quantitative research.

2.4 Sampling

The process of gathering information is often difficult due to the limited availability of data, time restrictions and financial limitations. Therefore, many researchers use sampling methods to create a representative outcome while decreasing the amount of data needed (Saunders, Lewis and Thornhill, 2016). In the following chapter an overview of sampling methods is given.
2.4.1 Population

The sampling method is the next step in the research process. Measuring all elements of the population is known as census inquiry or census study (Kothari and Garg, 2014). Because it is often difficult to do a census inquiry, samples of the population are taken to give a representative view of the population (Bryman and Bell, 2015). The population refers to the complete group that a sample is taken from (Saunders, Lewis and Thornhill, 2016).

Sampling is a research methodology whereby a sample is taken from the population, which should represent the total population (Kothari and Garg, 2014). When selecting the sample group and the parameters, it is highly important to be able to justify the chosen sample and measures (Becker, 1998). The reason to take samples is that it is often difficult or impossible to measure parameters and gather all required information from the complete population (Bryman and Bell, 2011). Furthermore, issues can occur regarding data availability, time restrictions and financial limitations (Saunders, Lewis and Thornhill, 2016).

2.4.2 Sampling Methods

To create an overview of a population without measuring every single individual parameter, two major sampling techniques are used (Levy and Lemeshow, 2013):

- Probability sampling
- Non-probability sampling

2.4.2.1 Probability Sampling

Probability sampling is also known as representative sampling (Saunders, Lewis and Thornhill, 2016). When using probability sampling, the selected parameters have an equal chance of inclusion in the sample (Kothari and Garg, 2014; Saunders, Lewis and Thornhill, 2016). An example of probability sampling is to draw researches with names out of bowl where all names have the same chance of being picked. This method of random sampling is seen as the best method to create a representative sample (Kothari and Garg, 2014). Random sampling can be done by simple random sampling or by systematic random sampling. When using the simple random sampling techniques, the selected samples are picked unsystematically (Hair, et al., 2003). When a systematic
sampling method is used, the samples are chosen based on regular intervals, i.e. every fourth number will be picked out of the population (Saunders, Lewis and Thornhill, 2016).

2.4.2.2 Non-probability Sampling

Non-probability sampling is another method often used when samples are taken for research purposes (Hair, et al., 2003). The reason for non-probability sampling is often related to business purposes due to the lack of a sampling frame or because the research question cannot be answered using probability sampling (Saunders, Lewis and Thornhill, 2016). When non-probability sampling is used, the objectivity that is seen in probability sampling is partly overtaken by a subjective judgement of the researchers. The decision of the researcher influences the outcome of the sample whereas the chosen parameters and the chosen target group focus on the outcome that the researcher is working towards (Kothari and Garg, 2014).

2.4.3 Applied Sampling Method

During this thesis, research will be done regarding the effects on road transport of countries entering the EU. To conduct this research non-probability sampling is used. Therefore, historical data will be analysed regarding road transport of eight countries: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. The objectivity that is seen in probability sampling is partly overtaken to answer the research question in the best possible way (European Union, 2017a). The reason for using non-probability sampling is due to the fact that the eight chosen countries entered the EU at the same moment in 2004 so the regulations would be the same from that moment.

When using probability sampling, countries that enter the EU at different moments in time would have a substantial chance to be included in the sample and this is not wanted by the researchers. Even though Cyprus and Malta also entered in 2004, the countries are excluded due to limited available data. Only countries with the same variables are compared in order to get a trustworthy conclusion. Thereby, for all countries the time-frame of being an EU member state is the same but the situation in each country was different before 2004. Economical and legal effects of entering the EU can be measured
for all countries to see if correlations can be found. The effects will be split up according to the time period. For the short-term period effects within four years after entering the EU will be covered. A time period of 12 years from entering the EU will be used to analyse long-term effects.

2.5 Data Collection

This research will use secondary data to formulate conclusions. Despite the fact that primary data is not used nor collected throughout this research, it will still be addressed and argumentation for not using it will be discussed. The data collection process will also be explained.

2.5.1 Primary Data

Primary data is defined as data that has been collected specifically for the research in order to achieve specific research goals (Hox and Boeije, 2005). Primary data is classed as purest and unfiltered since this data is collected by the researcher themselves with a specific study in mind. Because the data is collected directly it is unfiltered and gives a clear view of the topic. Primary data is favoured in research since it is classed as the most reliable and credible. Even though primary data is classed as reliable, there are disadvantages. Collected data needs to be collected properly and the measured data needs to be at the correct level in order to align with the research (Salkind, 2010). Another issue that is associated with primary data is the availability. Data collection, especially from business organisations, can be complicated due to confidentiality terms within the organisation. In addition, qualitative data can be opinion based (Salkind, 2010).

Primary data is gathered from different sources and in different ways. The first and most reliable way of collecting primary data is to conduct an experiment. This way, when the results are obtained, it is possible to see the correlation between the input and output of the experiment. Experiments are a good way to collect primary data, but this data collection method is most effective in a scientific setting (Hox and Boeije, 2005).
In business studies, the most commonly used primary data collection methods are surveys and interviews. Surveys are an effective tool since a large audience can be reached in a relative short time (Kothari and Garg, 2014). But surveys have the difficulty that response rates are low, especially in Western Europe, and thus the samples from surveys can lead to incorrect conclusions (Hox and Boeije, 2005).

Interviews are another effective way of collecting primary data. This is usually done by asking the correspondent series of pre-established questions. This is usually done in-person or via the telephone. Telephone interviews are used when the respondent is located at a different location than the researcher or the time frame for a research is limited (Kothari and Garg, 2014). The main problem with interviews is that both parties need to be present and that is time consuming, meaning that it can be difficult to arrange. In addition, the data collected from an interview might be opinion based. This can lead to an invalid conclusion drawn from the research (Hox and Boeije, 2005).

2.5.2 Secondary Data
Secondary data is defined as information that was gathered by other researchers (Ghauri and Grønhaug, 2005). The advantages of using secondary data is that it can be used to understand and define the research problems. Furthermore, secondary data gives a starting point for the research. In order to have a clear and comprehensive view multiple sources of secondary data need to be used, because some publications might be either opinion based or have specific intentions behind the research. The most common sources of secondary data are scientific articles, textbooks and other documents (Yin, 2012). Other documents can be publications from companies or other online publications (Ghauri and Grønhaug, 2005). Another publication can be government publications. Government publications used in this research are statistical and give the research periodical and reliable data to base conclusions on. In addition to data, government publications incorporate some conclusions in the form of reports. These conclusions need to be carefully evaluated and only be used as part of final conclusions (Kumar, 2008).
2.5.3 Applied Data Collection
This research does not involve the usage of primary data to limit the research. If statistical primary data would be collected the amount of data would be too large due to the number of countries to analyse for this research. Obtaining primary data for each country with the same conditions influencing these data will be difficult. Besides, if qualitative primary data would be collected, for example through interviews, the data would be opinion based and that would limit the validity of the conclusions. Therefore, secondary data will support this research. Since very limited academic research has been conducted on the subject of the EU’s impact on road transport, the secondary data will have a limited usage of scientific articles and textbooks. Therefore, most of the data will come from government publications, which in this research is the European Commission. Limited sources will be used when it comes to secondary quantitative data. As a result, quantitative data cannot be confirmed by multiple sources. The advantage is that all quantitative data is influenced by the same variables and therefore comparisons between countries can easily be made. To give the readers a better overview of secondary data usage the findings from secondary data are detailed in the following paragraphs.

2.6 Analysis Method
This research will have a high focus on qualitative and quantitative data. The two data types are different and thus require different methods of analysis. The analysis of data is important to formulate a conclusion. In general, data analysis is important since the ideas raised need to be backed up by some kind of data to distinguish data from opinions (Miles, Huberma and Saldaña, 2014).

2.6.1 Qualitative Data Analysis
Miles, Huberman and Saldaña (2014) define 13 different modes of analysing qualitative data. Noting patterns, themes, seeing plausibility, clustering, making metaphors and counting are classed as analysis methods that consolidate the data and put it into the right place by asking the questions “What goes with what?” and “What is there?”. The ideas are shaped by making contrast or comparisons whilst differentiation is made by partitioning variable. When a relationship is needed to be established subsuming particulars into general and factoring can be used. Adaptations from quantitative
techniques are noting the relations between variables and finding intervening variables. Finally, data needs to contain a coherent understanding of data to be systematically assembled by building a logical chain of evidence and making conceptual or theoretical coherence. Data might be visualised in order to give a clearer overview (Sullivan, 2009).

### 2.6.2 Quantitative Data Analysis

Quantitative data analysis focuses on the variables on hand. These variables are analysed to see whether there is any connection amongst the variables and/or the theory that the researcher is proposing. This is the reason why the number of variables might change depending on the actual research. Single variable research is sometimes referred to as univariate analysis. This analysis method is useful when there is a need to establish a proportion. Most of the time a single variable analysis will not suffice and more variables will need to be used which is called the bivariate analysis. This analysis method is useful in order to see connections or differences that can be established amongst variables. If the research needs to examine the connection amongst more than two variables then a multivariate analysis should be used (Bryman and Cramer, 2011; Cramer, 2007).

When analysing data, researchers are looking for patterns or relationships among the collected data (Hair, et al., 2003). Two major categories of an analysis are descriptive and inferential analysis. A descriptive analysis is focused on the distribution of variables involved in the study. The inferential analysis method is also known as statistical analysis and is used in this research to see if there is a correlation between the chosen variables (Kothari and Garg, 2014). Within the statistical analysis, the method focusing on one dependent variable and one independent variable is known as causal analysis. Thereby, the study is a construct that represents the causal links to see the influence of one or more variables on another (Riseng, et. al, 2001). The outcomes of correlations are always between -1 and 1. When the correlation is equal to 1, a perfect correlation is found. This means that the dependent variable will increase when the independent variable increases. When the correlation is equal to 0.5 the correlation is still considered fair and with 0 as an outcome no correlation is found (Happel, 1928). A negative correlation implies that the dependent variable will decrease when the independent
variable increases and vice versa. By studying the relationship between variables, the understanding of the application of statistics in the real world will increase (Hair, et al., 2003).

2.6.3 Mixed Analysis Method

The convergent parallel mixed method builds an analysis based on the combination of qualitative and quantitative information. When first quantitative data is analysed and then supported with qualitative data, the explanatory sequential mixed methods is used since quantitative data is explained with qualitative data. For the exploratory sequential mixed method it is the other way around. First, the qualitative information is analysed where after this will be supported with quantitative information. Transformative mixed methods can be split into two mixed methods; embedded and multiphase (Creswell, 2014). Creswell (2014) explains embedded mixed methods as “a type of mixed methods design that nests a convergent explanatory sequential, or exploratory sequential method within a larger strategy” (p.242). When a multiphase mixed method is used, a researcher applies several research methods.

For qualitative studies researchers can use narrative research, grounded theory or ethnography (Creswell, 2014; Miles, Huberman and Saldaña, 2014). Saunders, Lewis and Thornhill (2016) add action research to this list where Creswell (2014) refers to the additional term phenomenology. Narrative research involves personal stories in the analysis. With the grounded theory, a researcher formulates theory based upon the actions of participants. During ethnography, the researcher collects data from observations and interviews (Creswell, 2014; Saunders, Lewis and Thornhill, 2016). Saunders, Lewis and Thornhill (2016) explain that action research is applied when changes occur and is based on the collaboration between researcher and participant. Phenomenology is according to Creswell (2014) about displaying the importance of involving the experience of participants regarding the topic.

2.6.4 Applied Analysis Method

The sequential mixed method will be used in this research to answer the research questions. The analysis is based on the combination of qualitative and quantitative information. Quantitative data is analysed first and then supported with qualitative data.
Since this research is heavily based on quantitative data the results from quantitative analysis will be used to back up the theories raised in this research. As stated by Tapio (2005), transport literature traditionally reflects the view that transport volumes, road transport volumes in particular, are coupled with GDP per capita. Several variables will be analysed to find connections between the variables itself. In this research, a multivariate analysis will be used to answer the research questions. An analysis will be carried out by looking into each of the eight countries individually and doing a cross-case study to give an overview of the EU sample as a whole. The economic situation of the countries entering the EU will be analysed to see what the effects are when becoming a EU member state. Thereby, the focus will be on the international trade of the countries. The trade situation of the countries will be analysed against the GDP per capita and volume that road transport accounts for. For road transport volumes, each country will be looked into individually to establish whether there is a correlation for its growth after entering the EU. By the use of the correlation, the relationship between the variables and its strength will be displayed in a numeric manner and enables it to compare the difference in effect on the countries (Hair, et al., 2003). Additionally, the decoupling point is measured to show the link between the variables and the significance level of 0.05 will be tested. Whereas the time period that is analysed had to deal with a financial crisis, the numbers in this time period can be influenced by the effects of the crisis. Therefore, the 12 year time period will be divided into three periods of four years to create a more detailed overview of the correlation between GDP per capita and road transport volumes.

2.7 Scientifically Credibility

The credibility of a research is a critical point regarding the trustworthiness. As stated by Yin (2014), there are four main focus points for a successful research: reliability, internal validity, external validity and concept validity.

2.7.1 Reliability

Reliability focuses on the consistency of a research. It is highly important that the approach of the researchers is consistent across different projects and that the same approach is used by different researchers (Gibbs, 2007). Furthermore, as stated by Saunders, Lewis and Thornhill (2016) the reliability can be tested by finding other
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researchers to check the codes. To be able to prove the reliability, case studies have to be documented as detailed as possible to be able to show the trustworthiness of the research (Yin, 2014).

2.7.2 Validity

Validity is stated as the effectiveness of measures and defines to which degree an instrument measures what it should measure (Graziano and Raulin, 2013; Kothari and Garg, 2014; Saunders, Lewis and Thornhill, 2016). The validity refers to the quality of the research and increases when the number of sources expand whereas more data will be backing up the findings.

Validity can be divided into three types; internal, external and concept validity. Internal validity refers to the results that have been gathered to be true and the validity is established when a causal relationship can be seen between the variables (Yin, 2014; Saunders, Lewis and Thornhill, 2016). In this research, the internal validity refers to the relationship between GDP per capita and road transport volumes. To find the causal relationship the correlations and decoupling point will be used to achieve a high level of internal validity.

When findings are generalized, it refers to external validity. When a sample is taken and the results can be successfully generalized to i.e. other people, places or time, then the external validity is achieved (Yin, 2014). In this research, a sample of eight EU countries entering in 2004 are analysed that refer to the external validity. By analysing the link between GDP per capita and road transport volumes after proven to be linked, a sufficient external validity level will be created.

The third type is construct validity. As stated by Kothari and Garg (2014) construct validity relates to the degree that the predicted conformations agree with other theoretical propositions. It refers to the degree of the ideas or theories being translated into measures. The construct validity does have a problem. It is unclear how it is set up and under what measures since it is decided by the researchers themselves. There are models established to ensure the validity but the models that might be used can be outdated and therefore no longer be valid. If an outdated, invalid model is taken the
research might seem valid but in reality it is not (Lissitz, 2009). In this research, the level of construct validity is achieved by measuring the relationship between GDP per capita and road transport volumes by calculating the correlation and decoupling point to prove the link between the variables to confirm propositions from earlier researchers. The mentioned models are relevant to the current situation and for that reason valid to use.

2.7.3 Applied Scientific Credibility

To summarize the application of scientific credibility throughout this research the following can be said. To ensure high reliability during this research corresponding theories stated by different researchers will be mentioned to make sure that the theory is not based on one single research. For the quantitative part, data from the European Commission and OECD will be used. Even though these are only two sources for this part of the research, due to the fact that these organizations have the most reliable data when it comes to this topic it will reassure the reliability of the research overall. At the same time, the data provided by the sources are all measured in the same way which assures the calculations that will be made during this research to show the same variables in the end.

Validity will be maintained on a high level throughout this research due to the use of many sources to back up the qualitative findings. Whereas this research is a sample study, the purpose is to create results that can be successfully generalized. Therefore, eight countries are analysed as a representative group of the 28 member state that are working together as the EU. By analysing the GDP per capita growth and the road transport volume growth, the internal validity is covered whereas the gathered results should be true and represent the EU. The construct validity is limited due to the restricted amount of conducted research on the level that this research focuses on. Therefore, related research that is connected to this research but with a different focus point will be included to create a higher construct validity level.
2.8 Ethical Considerations

During a research, ethical aspects matter concerning the impact on humans involved and the environment (Miles, Huberman and Saldaña, 2014). Guidelines regarding ethical issues are captured in codes of ethics related to the professional field. In these examples issues and possible ways of responding can be read (Creswell, 2014). Ethical issues can occur before, during and after the research (Creswell, 2009). To be able to cope with this in a correct manner it is recommended to decide before starting the research what to do when issues occur. When this approach is applied, the research is divided into smaller phases than the three previously mentioned. Smaller phases are for example collecting data and analysing the data (Creswell, 2013). Miles, Huberman and Saldaña (2014) emphasize the importance with the quote “First, do no harm” (p.56). It is therefore important to reach an agreement when it comes to working with participants. Alignments when it comes to expectations from both sides, researcher and participants influence the quality of the research. Agreements cover subjects as confidentiality, anonymity and benefits (Miles, Huberman and Saldaña, 2014). Furthermore, honesty, plagiarism and publication can be mentioned as additional subjects to monitor regarding ethics (Creswell, 2013).

2.8.1 Applied Ethical Considerations

To make sure that this research is conducted in an ethical way all information will be gathered from scientific sources available in the Intranet of Linnaeus University, Google Scholar, published academic books and publicly available government databases. Hereby, only objective information will be used to make sure that organizations and individuals cannot be harmed by subjective information. Furthermore, all information mentioned throughout this research will be referenced in a correct manner to avoid plagiarism and maintain an honest point of view.
2.9 Summary of Method

![Figure 3-Applied Research Onion Model (Saunders, Lewis and Thornhill, 2007).]

Figure 3 above shows the methodologies that will be applied based on the Research Onion model (Saunders, Lewis and Thornhill, 2007). Positivism will be used as a scientific perspective since the research is inspired by the current situation and the change of opinions towards the EU. The deductive approach is chosen as a scientifically approach since a top-down research approach is needed to answer the research question. The research method that will be applied is quantitative since this study will be based on statistics, which is quantitative data. But qualitative data will support the research mainly regarding legislation. Sampling in this study is done by using non-probability sampling since the countries taken as a sample are used due to the specific background. The data used for this study is secondary since collecting primary data for this type of research would be difficult and it would not lead to any specific conclusions.
3. Theoretical Framework

In this chapter, the relation between GDP per capita and road transport will be explained with the use of the decoupling method and correlation. In addition, financial crises affecting the EU will be mentioned. Subsequently, the regulations relating to EU road transport will be looked into. Finally, the chapter will be concluded with a summary of the theoretical framework. Figure 4 will give an overview of which sections of this chapter will support which sub-question.

Figure 4-Theoretical framework (Own figure).

3.1 The Relation Between GDP per Capita and Road Transport Volumes

There are several ways to analyse relationships between different types of data. One of the main and most widely used method is correlation. The second one to be applied in this research is decoupling. It will be used since it directly evaluates the relationship between two variables which are in this research GDP per capita and road transport volumes. The theoretical aspect of both methods will be explained in this section after the explanation of both variables. Subsequently, financial crises will be discussed to determine the influence on the EU. Thereafter, road transport legislation in the EU will be explained with a focus on the single market. Finally, a summary of the chapter will be provided at the end of the chapter.
3.1.1 Gross Domestic Product

GDP is an abbreviation of Gross Domestic Product. The concept of GDP was introduced in 1930 by Simon Kuznets in response to the Great Depression of the United States and measures the economic situation (Costanza, 2014).

The GDP is the measurement of the monetary value of final goods or services that are bought by the final users (Callen, 2012). The GDP can be looked into in three perspectives:

- The production approach: this sums up the value added to each step of the production. This is counted by subtracting the sum of intermediate parts from the sales value.
- The expenditure approach: this adds the value of purchases made by the final user.
- The income approach: this calculates the income generated by production.

A country’s GDP is calculated and published by the country's statistical department that collects data from various sources (Callen, 2012).

A similar view of the GDP is shared by Stephen Morse, who claims that there are two main flows to the GDP which are the spending by final customers on products and the income generated from production. Morse as well argues that despite having drawbacks, GDP is still the main criteria to assess the economic situation in a country. This includes the GDP rate of growth (Tavidze, 2011).

The four main influences to the GDP are as follow (Narker, 2015):

- Human capital: the value of an employee's skill set.
- Physical capital: any manufactured assets that are used for further manufacturing.
- Entrepreneurship: the process of identifying and starting a new business whilst putting together resources.
- Natural resources: the resources that a country has and can use in order to have a financial benefit.
Another influence on the GDP might be exchange rates. In some countries, it is difficult to measure the real GDP since the currencies used might not be stable. Most of GDP statistics worldwide is evaluated against the US dollar. This means that if a currency falls against the US dollar the GDP statistics might not reflect the reality (Eichengreen, 2003).

The EU focuses on the influences affecting the GDP and invests in it. Human development is an important part of the EU’s investment. The EU has funds to increase people's literacy and to develop skills in order for people to become more employable (European Commission, 2014f). In terms of physical capital, the EU invests in infrastructural developments to make a country more attractive for potential business development (European Commission, 2014d). Same as with people development, the EU invests in entrepreneurship development by having specific entrepreneurship funds (European Commission, 2014e). In the EU, there is a single currency the Euro. Not all member states use the Euro but over half of them do. This eliminates the GDP from being distorted by currency value variations (TNS Political and Social, 2014; European Union, 2017b).

Despite being one of the most used measurements of the economy, GDP still receives criticism. The main criticism is that GDP only takes in the economic factors from monetary functions and thus does not measure the satisfaction of countries’ population. Another form of criticism is related to the combination of the financial results of companies and individual alike. Thus, it is not giving a clear picture of the economic situation of the population. Several new measures were suggested, but none of those managed to deliver the same accurate results as the GDP (Committee of the Regions; Progress Consulting S.R.L.; Living Prospects Ltd, 2010).

3.1.2 Road Transport in the EU

Among the logistics sector there is transport. Within transport, road and rail transport are seen as the backbone of transportation systems (European Commission, 2015). The transport sector accounts for approximately 5% of the EU’s GDP and employs around ten million persons. It is vital for the global and local economy to have an efficient transport sector since transport and storage account for 10 to 15% of the total cost of
finished goods. This leads to an average spending for a household of approximately 13% of the budget only on transport (European Commission, 2016a).

The biggest mode of transport in the EU is road transport. Road transport is referred to when freight is imported and exported via road by vehicles registered in EU member states (European Commission, 2014a). As table 1 shows, it is possible to see that road freight carries over three times more freight than the two other modes of transport combined. Road transport is defined as the movement of goods or people from one place to another by road (European Commission, 2014a). Because road transport accounts for the largest percentage of the different transport modes, the focus is on the road transport in this research.

<table>
<thead>
<tr>
<th>Country</th>
<th>Road (') (million tkm)</th>
<th>Rail (') (million tkm)</th>
<th>Inland waterways</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU-28</td>
<td>1 725 240</td>
<td>422 594</td>
<td>150 526</td>
</tr>
<tr>
<td>Belgium</td>
<td>31 808</td>
<td>7 593</td>
<td>10 451</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>27 854</td>
<td>3 439</td>
<td>5 074</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>54 092</td>
<td>14 574</td>
<td>27</td>
</tr>
<tr>
<td>Denmark</td>
<td>16 184</td>
<td>2 449</td>
<td>–</td>
</tr>
<tr>
<td>Germany</td>
<td>310 142</td>
<td>112 629</td>
<td>59 093</td>
</tr>
<tr>
<td>Estonia</td>
<td>6 310</td>
<td>3 255</td>
<td>–</td>
</tr>
<tr>
<td>Ireland</td>
<td>9 751</td>
<td>100</td>
<td>–</td>
</tr>
<tr>
<td>Greece</td>
<td>19 223</td>
<td>311</td>
<td>–</td>
</tr>
<tr>
<td>Spain</td>
<td>195 767</td>
<td>10 821</td>
<td>–</td>
</tr>
<tr>
<td>France</td>
<td>165 225</td>
<td>32 217</td>
<td>8 789</td>
</tr>
<tr>
<td>Croatia</td>
<td>9 381</td>
<td>2 119</td>
<td>716</td>
</tr>
<tr>
<td>Italy</td>
<td>117 813</td>
<td>20 072</td>
<td>–</td>
</tr>
<tr>
<td>Cyprus</td>
<td>538</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Latvia</td>
<td>13 670</td>
<td>19 441</td>
<td>–</td>
</tr>
<tr>
<td>Lithuania</td>
<td>28 067</td>
<td>14 307</td>
<td>–</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>9 599</td>
<td>208</td>
<td>285</td>
</tr>
<tr>
<td>Hungary</td>
<td>37 517</td>
<td>10 158</td>
<td>1 811</td>
</tr>
<tr>
<td>Malta</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Netherlands</td>
<td>70 897</td>
<td>6 169</td>
<td>49 327</td>
</tr>
<tr>
<td>Austria</td>
<td>24 299</td>
<td>20 494</td>
<td>2 177</td>
</tr>
<tr>
<td>Poland</td>
<td>250 931</td>
<td>50 073</td>
<td>110</td>
</tr>
<tr>
<td>Portugal</td>
<td>34 863</td>
<td>2 434</td>
<td>–</td>
</tr>
<tr>
<td>Romania</td>
<td>35 136</td>
<td>12 264</td>
<td>11 760</td>
</tr>
<tr>
<td>Slovenia</td>
<td>16 273</td>
<td>4 110</td>
<td>–</td>
</tr>
<tr>
<td>Slovakia</td>
<td>31 358</td>
<td>8 829</td>
<td>905</td>
</tr>
<tr>
<td>Finland</td>
<td>23 401</td>
<td>9 597</td>
<td>–</td>
</tr>
<tr>
<td>Sweden</td>
<td>41 964</td>
<td>21 296</td>
<td>–</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>143 177</td>
<td>22 143</td>
<td>–</td>
</tr>
</tbody>
</table>

Table 1-Volume of freight moved in the EU by mode/by country (European Commission, 2014a).
The mode of transport is mainly dependent on the type of goods that need to be transported and the distance. Transport via road is chosen for all kinds of goods: valuable, perishable, fragile and high-value. Therefore, it can be said that road transport is appropriate for all continental transportations and for both long and short distances. Flexibility of road transport is often a reason to choose this mode of transport since this enables just in time delivery. Besides, the possibility of door-to-door delivery makes it a convenient mode (Blauwens, De Baere and Van der Voorde, 2010).

Since road transport is part of logistics there are similar threats. One of the biggest threats for the logistics sector is economic uncertainty. When there is regional economic uncertainty, the logistics industry and thus the road transport industry instantly start suffering from decreased load factors and capacity surplus. This means that any kind of financial crisis will have a big negative influence on road transport (European Commission, 2015).

To stimulate trade between member states, the EU funds a lot of infrastructural investments in member states particularly related to road transport infrastructure. EU’s investment in road infrastructure has increased from 67 billion Euro to 120 billion Euro between 1995 and 2008. This increase can partly be linked to the expansion of the EU. There has been a vast number of investments in all transportation modes but road transport received the largest share accounting of over 50% of all investments between 1995 and 2008 (EEA, 2011).

### 3.1.3 Decoupling Between GDP per Capita and Road Transport Volumes

To link road transport volumes and GDP per capita, a framework is created by Vehmas, et al. (2003) including different decoupling aspects. Tapio (2005) modified the model of Vehmas, et al. (2003) which resulted in figure 5. With this model, the relation between GDP per capita and road transport volumes can be seen. Therefore, the link between both variables is analysed with the help of six sub-categories out of two main categories. By calculating the changes over a chosen time period the results show if the road transport volumes have the same pattern during this period.
Within the framework two main categories are created: decoupling and negative decoupling.

The category of decoupling is divided into three sub-categories: weak decoupling, strong decoupling and recessive decoupling.

- Weak decoupling means that road transport volumes and GDP per capita both increase and have an elasticity smaller than 0.8 and bigger than 0.
- Strong decoupling refers to a growing GDP per capita but a decline of the road transport volumes with an elasticity that is smaller than 0.
- Recessive decoupling states that GDP per capita and road transport volumes both decrease and the elasticity is bigger than 1.2.

The category of negative decoupling is also divided into three sub-categories: expansive negative decoupling, strong negative decoupling and weak negative decoupling.

- Expansive negative decoupling refers to increasing GDP per capita and road transport volume with elasticity bigger than 1.2.
- Strong negative decoupling states that GDP per capita decreases whereas per capita transport volumes increases with an elasticity smaller than 0.
- Weak negative decoupling is occurring when the GDP per capita and road transport volume decrease. Besides, the elasticity is found between 0.8 and 0 (Tapio, 2005).

Figure 5-The degrees of coupling and decoupling of transport volume growth (ΔVOL) from economic growth (ΔGDP) (Tapio, 2005; modified from Vehmas et al., 2003, p. 31).
3.1.4 Correlation Between GDP per Capita and Road Transport Volumes

Correlation is an important part of data analysis and can be explained as a dependent relationship between two variables. The stronger the correlation, the more closely the variables are linked. When the correlation is positive, one dependent variable will increase when the independent variable increases. In some cases, a negative correlation exists. Thereby, the dependent variable will decrease when the independent variable increases and vice versa (Hair, et al., 2003). As stated by the European Commission (2015), road transport volumes highly correlates to GDP per capita. To analyse road transport, the GDP per capita and the road transport volumes have been examined to see if a correlation can be found.

The correlation as principle is widely used in both business research and real business environments. The type of questions that are answered by correlation analysis are about how Y is associated with X. An example of this would be a company trying to analyse the influence of spending on marketing is increasing sales (Hair, et al., 2003).

In this research, correlation is used as a business research model and is used to evaluate if road transport volumes are connected to GDP per capita and if so, how? The correlation is used in order to get a simplified answer. The results of correlation are given in a correlation coefficient. The correlation coefficient is an already established scale and the meaning of each number between -1 and 1 is created. Using this analysis will benefit the research since the results are objective and it is virtually impossible to misinterpreted the numbers (Hair, et al., 2003).

Statistical significance is important for the research as well since significance measures the reliability. There are numerical criteria to assess the significance and that is the probability of error. It depends on the research, but in most cases the probability of failure needs to be smaller than 0.05 or in some cases smaller than 0.01. This means that when a sample is used 100 it has to be wrong less than five times or in the latter situation less than one. If it is not possible to meet the criteria of the statistical significance, it can be decided by the researcher whether there is significance (Hair, et al., 2003).
3.1.5 Financial Crises Affecting the EU

The most recent financial crisis began mid 2007 (Feldkircher, 2014; Dwyer and Lothian, 2011). Due to the fall of Lehman Brothers in 2008 this has been seen for many people as the real start of the financial crisis with the global recession that followed (Allen and Moessner, 2012). Countries with a mature economy were highly affected (Balli, Basher and Balli, 2013). Research of Balli, Basher and Balli (2013) showed that finances of OECD (Organisation for Economic Co-operation and Development) countries decreased to 8% of GDP in 2010 while it was 1% of GDP in 2007. Governmental debt reached 97% of GDP three years after it had been measured as 73% of GDP. The main reasons for this were the big changes worldwide on the financial markets, decrease of confidence, strong decline in trade on an international level and growth of the level of output could hardly been seen (Balli, Basher and Balli, 2013).

Afonso and Alves (2015) concluded that due to the international financial crisis the growth dropped in 2009. All researched countries showed a lower real GDP Growth Rate after the crisis in 2009 compared to the real GDP Growth Rate between 2006 and 2008. Most of the investigated countries for this research have a negative growth rate. Except for Greece, all investigated countries have a better real GDP Growth Rate between 2010 and 2013. Another noticeable change is that almost all rates became positive (OECD, 2012). The crisis caused a decrease in demand from outside the countries which led to a downfall in production. Less investments will be made in Research and Development what leads to the possibility of continues drops in growth rates (Afonso and Alves, 2015).

After the financial crisis of 2008, Afonso and Alves (2015) noticed three main effects: long-term decline of growth, more periods in which growth flattens and sudden drop in external demand. When public accounts are positive or slightly negative, a country is able to better limit the negative impact when external demand fluctuate highly. A country should respond quickly to these changes in demand to prevent delays and associated costs. Countries that are not able to get the public accounts in that same direction will experience negative effects (Afonso and Alves, 2015).
Bank crises are discussed to be one of the reasons for a recession (Boyd, Kwak and Smith, 2005; Cerra and Saxena, 2008) besides currency crises, twin financial crises and political shocks (Cerra and Saxena, 2008). There is a twin financial crisis when a currency crisis occurs at the same time as a banking crisis (Dietrich, Knedlik and Lindner, 2011). Countries with a highly developed economy are less sensitive to these influences. For the countries that do notice the recession within the economy it has a substantial impact on the economy for a longer period of time (Cerra and Saxena, 2008). Research of Boyd, Kwak and Smith (2005) showed that on average the real GDP decreased with numbers between 63 and 30%.

Additionally, the research showed that of 23 investigated countries from all over the world only four countries reached the output level from before the crisis within 17 years. The level of output is negatively influenced by a currency crisis for at least ten years. For the same period of time, a bank crisis is twice as influential on the level of output. But it is the twin financial crises that are the most influential (Cerra and Saxena, 2008). Kaminsky and Reinhart (1999) conclude that in most situations a currency crisis follows a banking crisis. When an economy gets into a recession, a crisis will arise. ‘Credit, capital inflows, and an overvalued currency’ (p.473) cause a long-lasting increase in trading (Kaminsky and Reinhart, 1999).

### 3.2 Road Transport Legislation in the EU

All EU member states have the same legislation regarding road transport due to the single market. The following paragraph will mention the road transport legislation which is valid for all member states (EUR-Lex, 2017). The second paragraph will discuss all characteristics of the EU single market.

#### 3.2.1 Road Transport Legislation

When countries enter the EU, many new regulations will overrule the national legislation that have been implied till that moment. Regarding road transport, many directives influence the movement of goods and persons when transporting freight. An overview of the directives related to road transport is given in table 2 and is obtained from the EUR-Lex website (EUR-Lex, 2017).
<table>
<thead>
<tr>
<th>Directive</th>
<th>What it is</th>
<th>What barrier it tackles</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002/85/EC</td>
<td>Speed limitation</td>
<td>Technical barriers</td>
</tr>
<tr>
<td>2002/15/EC</td>
<td>Working hours</td>
<td>Legislative barriers</td>
</tr>
<tr>
<td>2006/22/EC</td>
<td>Working hours control</td>
<td>Legislative barriers</td>
</tr>
<tr>
<td>2009/40/EC</td>
<td>Vehicle registration</td>
<td>Legislative barriers</td>
</tr>
<tr>
<td>2011/76/EU</td>
<td>Road tolls</td>
<td>Tax barriers</td>
</tr>
<tr>
<td>83/182/EEC</td>
<td>Temporary imports</td>
<td>Tax barriers</td>
</tr>
<tr>
<td>2008/96/EC</td>
<td>Safety regulations</td>
<td>Legislative barriers</td>
</tr>
<tr>
<td>EC 561/2006</td>
<td>Working time and control</td>
<td>Legislative barriers</td>
</tr>
<tr>
<td>Council reg. 3821/85</td>
<td>Working time control</td>
<td>Technical barriers</td>
</tr>
<tr>
<td>2003/59/EC</td>
<td>Driver certification</td>
<td>Legislative barriers</td>
</tr>
<tr>
<td>Council reg. 2135/98</td>
<td>Working time control</td>
<td>Technical barriers</td>
</tr>
<tr>
<td>2000/56/EC</td>
<td>Driver certification</td>
<td>Legislative barriers</td>
</tr>
<tr>
<td>80/1263 EEC</td>
<td>Certification recognition</td>
<td>Legislative barriers</td>
</tr>
<tr>
<td>2009/103/EC</td>
<td>Insurance validity</td>
<td>Legislative barriers</td>
</tr>
<tr>
<td>1999/37/EC</td>
<td>Vehicle usage documentation</td>
<td>Legislative barriers</td>
</tr>
<tr>
<td>2005/36/EC</td>
<td>Qualification recognition</td>
<td>Legislative barriers</td>
</tr>
<tr>
<td>96/53/EC</td>
<td>Vehicle size unification</td>
<td>Technical barriers</td>
</tr>
</tbody>
</table>

Table 2: Road Transport Directives issued by the EU Name/Issue/Barrier (EUR-Lex, 2017).

3.2.2 Single Market in the EU

The single market is defined as a common market between member states that ensures a free movement of capital, services, goods and people. Without a single market, all of these can be facing physical border barriers, standardisation and other legal barriers, taxation barriers and finally, general discriminatory barriers. There are several customs unions in the world, but the one that comes the closest to an actual single market is the EU (DeGroote, 2009). For this reason, it will be used in this research.
The beginning of the EU single market can be dated back to 1951 when the Treaty of Paris was signed. Even though the basis of a single market has been discussed in 1958, by 1970 barriers still existed, at this point a goal for single market to be in place by 1992, was raised. In 1992, the EU and therefore the single market have been created by signing the Maastricht Treaty. In 2004, ten new members entered the EU, followed by two more in 2006. This created a bigger pool of customers, allowing people to move and work freely within the EU, and finally allowing goods to be manufactured in a member state to then be sold in another. All of these benefits came with drawbacks, for instance some member states started to feel tension due to emigration, immigration and taxation. But overall the establishment of the EU single market has been beneficial (DeGroote, 2009).

The EU itself defines five different barriers to a single market: physical barriers, technical barriers, tax barriers, natural barriers and legislative barriers. Physical barriers are defined as borders. In the EU single market there are no border controls and goods can move without customs checks. The technical barriers are referred to as manufacturing and certification barriers. In the EU single market, any product legally manufactured in one member state can be sold in another member state since the certifications are standardised. The taxation barrier is one of the most important when it comes to organising trade. The EU has a system to calculate tax and to avoid double taxation, but since each member state can decide on taxation independently double taxation is still common within the union. Natural barriers are barriers associated with culture, language and distances. To ensure these barriers are overcome the EU has programs for integration and mutual understanding. The final barrier for the single market is the legislative barrier. This barrier is overcome by the EU implementing a unified legislation that all countries need to follow (European Economic Social Committee, 2012).
3.3 Summary of Theoretical Framework

<table>
<thead>
<tr>
<th>Sub-question</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What short-term economic effects can be seen between changes in GDP per capita and road transport volumes 4 years from entering the EU?</td>
<td>Global Financial Recession</td>
</tr>
<tr>
<td>2. What long-term economic effects can be seen between changes in GDP per capita and road transport volumes 12 years from entering the EU?</td>
<td>Correlation</td>
</tr>
<tr>
<td>3. What legal effects regarding road transport did member states experience from entering the EU?</td>
<td>Decoupling Point</td>
</tr>
<tr>
<td></td>
<td>Significance</td>
</tr>
<tr>
<td></td>
<td>EU Road Transport Legislation</td>
</tr>
</tbody>
</table>

Figure 6-Summary theoretical framework (Own figure).

Figure 6 above visualises the summary of the theoretical framework and shows which topic will be used for which sub-question.

The global recession occurred after the financial crisis started in 2008 (Allen and Moessner, 2012). OECD countries showed that the finances were affected by this crisis when looking at the GDP (Balli, Basher and Balli, 2013). The amount of a country’s output is negatively influenced by a currency crisis for at least ten years. When it comes to a bank crisis, this is twice as influential on the level of output during the same ten year period. The twin financial crises are the most influential out of the three mentioned (Cerra and Saxena, 2008). There are two methods mentioned to find out if there is a relation between GDP per capita and road transport volumes. Decoupling will explain if the value of the variables increased or decreased and the elasticity will be calculated (Tapio, 2005). The other method is correlation whereby the relation between two variables can be measured. The correlation is the strongest when the variables are close connected (Hair, et al., 2003). Additionally, the significance level is tested to evaluate the trustworthiness of the results.
The EU single market ensures that physical borders between member states disappear, standardisation of transport procedures and other legal barriers are made possible, taxation barriers vanish and general discriminatory barriers do not longer exist (DeGroote, 2009). The single market brings regulations along for road transport. When entering the EU, member states need to adjust the legal aspect of road transport, and other subjects, to the general legislation founded by the EU (EUR-Lex, 2017).
4. Empirical Study

In the following chapter decoupling and correlation for data analysis will be explained. Statistics relevant to the research for each of the sample countries will be given and explained. The statistics will finally be connected into a cross-case study to give a wider overview of the effects in section 4.3. Lastly, the legislations connected to the EU will be explained. The following figure 7 illustrates the structure of this chapter. The data used throughout the empirical study is secondary data that has been collected from databases and literature.

![Figure 7-Empirical study framework (Own figure).](image)

4.1 Sample countries

In the following sub-chapters, data that will be used for the analysis of each sample country will be introduced. Based on these analyses the cross-case study of the EU sample will be executed.

In 2004, the largest expansion in EU’s history occurred when ten new member states entered: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia. The main reason for this expansion were the potential positive economic effects of the developing regions (European Union, 2017a). In the following chapter only eight out of the ten countries are analysed due to a lack of data of Cyprus and Malta. In the sub-chapters a short background per country is given. Additionally,
information regarding the main import and export products is given including the main trading partners. Afterwards, data regarding GDP per capita, road transport volumes and investments in road transport is presented.

4.1.1 Czech Republic

Czech Republic is a landlocked country in Central Europe. The capital and the largest city is Prague. In Czech Republic, the population counts 10.5 million inhabitants, which accounts for 2% of all inhabitants in the EU. Czech Republic was a joined country with Slovakia till 1993 (European Union, 2017d).

Czech Republic is a highly industrialised country. The main items exported by Czech Republic are cars, vehicle parts and computers. Vehicle parts, computers and broadcasting equipment are the main import products. The main export partners are Germany, Slovakia and the United Kingdom whilst main import partners are Germany, China and Poland. Due to a balanced export and import market, Czech Republic has a positive trade balance (OEC, 2017a).

Czech Republic is a member state since 2004 and the GDP per capita has increased since that moment. In 16 years, the GDP per capita grew from 6.500 Euro to approximately 15.800 Euro (figure 8). Furthermore, a sharp increase of the GDP per capita growth rate is seen between 2004 and 2008 (figure 9). The economy has had ups and downs over the years but managed to increase the GDP per capita more than twice compared to 1995 (European Commission, 2016b). Focusing on the transport logistics sector, only approximately 6% of the total GDP is coming from transport logistics as can be seen in table 3 below.
Road transport volumes in Czech Republic have fluctuated since entering the EU. Initially, there has been a decrease followed by a small increase. The period from 2008 to 2012 shows a decrease that has been getting smaller each year. From 2013 till 2015, it is possible to see that there has been a large and stable growth (figure 10).
Czech Republic is one of the EU member states that received more funds than it puts into the union. In 2012, Czech Republic received nearly three times more funds than it had put in. The funds were used for infrastructure development and high tech industry development (European Commission, 2014d). In 2015, the EU invested 7,075 billion Euro in Czech Republic while the country contributed 1,315 billion Euro which accounted for 0.87% of the EU’s budget (European Union, 2017d).

As stated before, Czech Republic is one of the countries that gets more investments from the EU then the country financially contributes to the EU (European Union, 2017d). Czech Republic has invested a lot of capital to the national road infrastructure and the amount has been increasing every year till 2008 (figure 11). After that, the amount of investments in infrastructure has been decreasing. The sharpest rise can be seen from 2004 when Czech Republic entered the EU. Figure 12 shows the growth percentage of investments in road transport and it can be seen that the investments fluctuated but have been steadily increasing in the past five years (OECD, 2017).
4.1.2 Estonia

Estonia is a Northern European country on the east coast of the Baltic sea. The capital and the largest city in Estonia is Tallinn. The total population of Estonia is 1,3 million, which accounts for 0,3% of the total EU population. Till 1991 Estonia was part of the Soviet Union (European Union, 2017e).

Estonia is a knowledge and service based economy but industrial manufacturing still plays a vital role in country's economy. The main products exported from Estonia are telephones, refined petroleum and cars whereas the main imports are also refined petroleum, telephones and cars. Estonia's main trading partners are Sweden, Finland and Russia for exports and Russia, Finland and Germany for imports. Since Estonia imports more than it exports there is a negative trade balance (OEC, 2017b).
Estonia entered the EU in 2004 and since that moment positive GDP per capita growth numbers can be seen in general (figure 13). The GDP per capita has been growing and positive growth percentages can be seen in figure 14 until 2008. In 2016, the GDP per capita was 15,400 Euro (European Commission, 2016b). The share of the logistics market of the GDP per capita is the largest for Estonia of the chosen member states with 12,3% (table 3).

![Figure 13-GDP per capita in Euro in Estonia (Own figure; based on European Commission, 2016a).](image)

Estonia has seen a stable growth in road transport volumes since entering the EU in 2004 (figure 15). The growth started to slow down in 2008 and was negative till 2011 where it seen a sharp drop, but the growth rate continued to be negative from 2012 till 2014. In 2015, there has been a small growth.
Estonia has greatly benefited from the EU funds. The EU funds account for nearly 5% of Estonia’s total budget. As some countries, Estonia takes more from the EU than it gives. These funds were used to invest in infrastructure, employment, science and healthcare development (European Commission, 2014e). In 2015, the EU invested 443 million Euro in Estonia, but Estonia contributed 185 million Euro which is 0,92% of EU’s total budget (European Union, 2017e).

The EU funds Estonia receives are partly used for road construction development. Estonia’s investment in road infrastructure development has been increasing every year, except for a small dip in 2008 which can be seen in figure 16. Figure 17 shows how the growth rate of investments in infrastructure grew in Estonia. From the figure, it is possible to see that the investments have been fluctuating but it had a positive peak in 2005 after Estonia entered the EU (OECD, 2017).
4.1.3 Hungary

Hungary as Czech Republic is a landlocked country in Central Europe. Budapest is the capital and the biggest city. The total population of Hungary is 9.8 million which accounts for 1.9% of the total population of the EU (European Union, 2017g).

Hungary is a highly industrialised country. The main export products are cars, vehicle parts and spark ignition engines, where the main imports are vehicle parts, packaged medicaments and cars. Hungary’s main export partners are Germany, Romania and the US, whereas the main import partners are Germany, Austria and China. Since Hungary has a lot of manufacturing activities the trade balance is positive (OEC, 2017c).

Since Hungary entered the EU in 2004, positive GDP per capita growth numbers can be seen in general (figure 18). Hungary's GDP per capita fell from 2008 till 2012, but has started to grow again (figure 19). In 2015, the GDP per capita was 11.100 Euro (European Commission, 2016b). The share of the logistics market of the total GDP is approximately 4.3% (table 3).

Hungary has greatly benefited from the EU funds. The EU funds account for nearly 95% of total foreign investments in Hungary. As some countries, Hungary takes more from the EU than it gives back in monetary terms. These funds were used to invest in infrastructure, employment, science and healthcare development (European Commission, 2014h). In 2015, the EU invested 5,6 billion Euro in Hungary while
Hungary contributed 0,9 billion Euro, which is 0,89% of the EU’s total budget (European Union, 2017g).

Figure 18-GDP per capita in Euro in Hungary (Own figure; based on European Commission, 2016a).

Figure 19-GDP per capita growth rate in % in Hungary (Own figure; based on European Commission, 2016a).

Hungary’s road transport volume growth has been highly fluctuating (figure 20). Initially after entering the EU, Hungary’s road transport volume increased, but started to decrease from 2007 till 2012, with 2008 as an exception. The volumes started to rise again in 2013 for a few years but dropped again in 2015.
A part of the EU funds is used for road construction development (European Union, 2017h). Hungary investments in road infrastructure development has been fluctuated and no stable growth can be seen with a big fall after 2008 which can be seen in figure 21. Figure 22 shows how the growth rate of investments in Hungarian infrastructure grew. From the figure, it is possible to see that the investment peaked in 2004, but overall the growth has been either low or negative after entering the EU (OECD, 2017).
4.1.4 Latvia

Latvia is a Northern European country on the east coast of the Baltic sea. The biggest city and the capital is Riga. Latvia has 1.9 million inhabitants accounting for 0.4% of the total EU population. Till 1991 Latvia was part of the Soviet Union (European Union, 2017h).

The Latvian economy is mainly based on trade but industrial manufacturing is still clearly present in the country’s economy. Latvia’s main exports are refined petroleum, sawn mill and hard liquor. The imports are refined petroleum, broadcasting equipment and cars. Lithuania, Russia and Estonia are the export partners. The import partners are Lithuania, Russia, Germany. Since Latvia is not manufacturing focused, the trade balance is negative (OEC, 2017d).

After Latvia entered the EU in 2004, positive GDP per capita growth numbers can be seen in general (figure 23). Latvia’s GDP per capita fell from 2007 till 2010, but has started to grow again (figure 24). In 2015, the GDP per capita was 12,300 Euro (European Commission, 2016b). The share of the logistics market of the total GDP is approximately 5% (table 3).
Latvia has greatly benefited from the EU funds. The EU funds account for nearly 5% of total funds of Latvia. As some countries, Latvia takes more from the EU than it gives. These funds were used to invest in employment and entrepreneurship (European Commission, 2014i). In 2015, the EU invested 980 million Euro in Latvia, but Latvia contributed 200 million Euro which is 0.85% of EU’s total budget (European Union, 2017i).

Latvia has had mixed road transport volume growth results (figure 25). Initially, there has been a drop and then an increase followed by a substantial drop between 2008 and 2009. The growth returned in 2010 but another drop happened between 2011 and 2012. There has been an increase in 2013, followed by a two-year decrease.
The EU funds are partly used for road construction development (European Union, 2017h). Latvia’s investment in road infrastructure development has rocketed from 2004 till 2008 (figure 26). After that, a big fall happened, but it quickly rehabilitated. Figure 27 shows how the growth rate of investments to infrastructure grew in Latvia. It is possible to see that the investment peaked in 2004, but overall the growth has been either low or negative after entering the EU (OECD, 2017).
4.1.5 Lithuania

Lithuania is a Northern European country on the eastern shores of the Baltic sea. The biggest city and capital is Vilnius. The Lithuanian population counts 2.9 million people which accounts for 0.6% of the total EU population. Till 1991 Lithuania has been part of the Soviet Union (European Union, 2017f).

Lithuania is not a manufacturing focused country but manufacturing is still an important part of the economy. The main exports are refined petroleum, furniture and rolled tobacco, whereas the imports are crude and refined petroleum and packaged medicine. Since Lithuania imports more than it exports the trade balance is negative (OEC, 2017e).

A positive growth of the GDP per capita can be seen since Lithuania entered the EU in 2004 (figure 29). The GDP per capita tripled between 2000 and 2016 (figure 28). The economic situation of the country grew for 21 years except for 2009. In 2016, the GDP per capita is 12,900 Euro (European Commission, 2016b). Looking at the transport logistics as a part of the country’s GDP, approximately 7.4% of the total GDP comes from transport logistics (table 3).
Lithuania generally had positive numbers looking at the growth of road transport volumes. Initially, there has been a drop in 2006, followed by a rise and thereafter a two-year dip between 2008 and 2010. From that moment, there has been a steady and stable increase with a decrease in 2015 (figure 30).
Lithuania is taking more from the EU funds than it contributes to the union. The funds in Lithuania are used for people development through increasing computer literacy and increasing employability (European Commission, 2014f). In 2015, the EU contributed to Lithuania by 877 million Euro whilst Lithuania contributed 316 million Euro to the EU, which accounted for 0.88% of the EU’s budget (European Union, 2017f).

A part of EU’s funding is spent on road infrastructure development (European Union, 2017e). The investments had a steady growth till 2008 and after that the investment reduced (figure 31). The investment rose sharply after Lithuania entered the EU in 2004 (figure 31). As for the investment growth rates from figure 32, it can be seen that there has been a sharp rise between 2004 and 2008, afterwards there has been a decrease and a small growth returned in 2014 (OECD, 2017).
4.1.6 Poland

Poland is a country in Central Europe on the southern shores of the Baltic sea. Warsaw is the biggest city and capital. Poland’s population is 38 million, which accounts for 7.5% of EU’s total population (European Union, 2017c).

The economy of Poland is heavily based on industry. The main exports are vehicle parts, cars and seats. The main imports are vehicle parts, crude petroleum and cars. Poland's biggest export partners are Germany, United Kingdom and Czech Republic. The biggest import partners are Germany, China and Italy. Despite being an industrial country, Poland has a negative trade balance (OEC, 2017f).

Poland has grown tremendously and doubled the GDP per capita in the past sixteen years (figure 34). Looking at the numbers of Poland, a constant increase of the GDP per capita can be seen in all years and this resulted in a GDP per capita in 2016 of 12,900 Euro (figure 33). In 2012, Poland had a large share of the logistics market of the GDP accounting for 11.56% (table 3).
Poland has experienced positive growth numbers of road transport in general since 2004 (figure 35). Between 2005 and 2011 the growth numbers varied, but remained positive. There has been a decline in 2012 and an increase in 2013. Overall a positive pattern is seen in Poland.
Poland was the biggest beneficiary of EU funds in 2013. The funds received from the EU have been used mainly to improve the infrastructure, educational facilities and agricultural sector (European Commission, 2014c). In 2015, Poland contributed 3,718 billion Euro to the EU’s budget, which equivalent to 0.9% of the total EU budget. Poland received 13,358 billion Euro from the EU. In the current situation, Poland is receiving more from the EU monetary than it is putting in (European Union, 2017c).

After entering the EU, Poland has seen a stable growth of the economy, the unemployment rate went down and salaries increased. The downside of Poland entering the EU was the large amount of workforce emigration out of Poland (Ministry of Treasury, 2014).

Poland has a high investment in road infrastructure (figure 36). Poland’s investment in road infrastructure has had a sharp and stable rise since 2004 till 2011. The rise even continued after 2008 but dropped after 2011 (figure 36). As for the growth rate, it has been very stable till 2011. After 2011, the growth rate has decreased (figure 37).
4.1.7 Slovakia

Slovakia is an Eastern Central European Country. Like Czech Republic and Hungary, Slovakia is landlocked. The biggest city and capital is Bratislava. The total population of Slovakia is 5,4 million, which accounts for 1,1% of EU’s total population (European Union, 2017i).

Slovakia’s economy is heavily based on industry. The main export commodities are cars, video displays and vehicle parts. The main import commodities are vehicle parts, broadcasting equipment and crude petroleum. Germany, Czech Republic and Hungary are the main export countries. The main import countries are Germany, Czech Republic and China. Despite being a heavily reliant on manufacturing Slovakia has a negative trade balance (OEC, 2017g).
Slovakia entered the EU in 2004. A large increase in GDP per capita from approximately 4.100 Euro to approximately 14.500 Euro can be seen (figure 38). Similar to Lithuania, the country experienced a steady increase with only a drawback in 2009 (figure 39). Slovakia has a low transport logistics value related to the total GDP. Only 3,82% of the total GDP is coming from transport logistics (table 3).

Slovakia had a fluctuating growth rate over the past years since 2004 (figure 38). Initially, there has been a decrease from 2005 till 2007 which was followed by an increase in 2008. A massive drop and continued negative growth rates followed between 2009 and 2013. In 2014, there has been a sharp increase where after a decrease took place in 2015 (figure 40).
Slovakia receives a vast amount of funding from the EU. The EU’s funding accounts for 75% of public investments in Slovakia. Most of the funds from the EU have been invested in infrastructure and tourism development (European Commission, 2014g). EU’s contribution to Slovakia in 2015 was 3,735 billion Euro whilst Slovakia contributed 608 million Euro, which accounted for 0.8% of EU’s budget.

The EU investment is partly dedicated to road infrastructure development (European Union, 2017f). This can be seen in figure 41. Slovakia’s investment in road infrastructure rocketed after 2004, but then dropped after 2008 following by a fluctuating line till 2014. From figure 42 it is possible to see that the growth rate of investment for road transport in Slovakia has been fluctuating. There is no clear pattern on the growth rate within the numbers shown.
Slovenia

Slovenia is a country in Southern Central Europe on the east coast of the Adriatic sea. Ljubljana is the biggest city and capital of Slovenia. Slovenia has 2 million people inhabitants that accounts for 0.4% of total population of the EU (European Union, 2017j).

Slovenia's economy is heavily based on industry. The main export commodities are cars, packaged medicaments and vehicle parts. Looking at the imports, the main commodities are refined petroleum, cars and vehicle parts. The top trading partners in terms of export are Germany, Italy and Croatia and main import partners are Germany, Italy and Austria. Since a lot of manufacturing is done in Slovenia, the trade balance is positive (OEC, 2017h).

Positive GDP per capita growth numbers can in general be seen since Slovenia entered the EU in 2004 (figure 44). Slovenia’s GDP per capita fell from 2008 till 2013, but has started to grow again. In 2015, the GDP per capita was 18,700 Euro (figure 43). The share of the logistics market of the GDP is approximately 5.1% (table 3).

Slovenia has greatly benefited from EU funds. As some countries, Slovenia takes more from the EU than it puts back on the EU account. These funds were used to invest in transport infrastructure and farming (European Commission, 2014j). In 2015, the EU invested 940 million Euro in Slovenia, but Slovenia contributed 340 million Euro, which is 0.89% of EU’s budget, to the EU (European Union, 2017j).
Slovenia has had a rather stable road transport volume growth from 2005 till 2008. There has been a sharp drop in 2009 and that was followed by a sharp rise in 2010. Then two consecutive drops happened in 2011 and 2012. Onwards, there has been a sharp rise from 2013 till 2014 and a sharp drop in 2015 (figure 45).
Part of the EU funds are used for road construction development (European Union, 2017). Investments in the Slovenian road infrastructure development has rocketed from 2004 till 2008 but was followed by a big fall after 2008. It can be seen in figure 46 that the investments never fully came back. Figure 47 shows how the growth rate of investment in infrastructure grew in Slovenia. From the figure, it is possible to see that the investment has been fluctuating and no clear indication regarding the growth or fall can be seen.
4.2 EU Study

In this section, the EU sample data regarding the GDP per capita, road transport volumes and investment in road transport infrastructure is given. When taking the average of the individual countries, positive GDP per capita growth can be seen (figure 49). Between 2000 and 2003 a slight increase is experienced but in the period after entering the EU from 2004 till 2007, the GDP per capita increased in a faster pace (figure 48). Since 2004, the GDP per capita grew from 7.638 Euro to approximately 14.000 Euro on average (figure 48).
Looking at the total numbers of the eight member states together that are used as a sample of the EU, a sharp increase of the road transport volumes can be seen after entering the EU. Between 2000 and 2003 the road transport volumes slightly grew but a positive increase can be seen after entering the EU until 2008 (figure 50). Between 2008 and 2010 the volumes were stable and dropped after 2011.

The EU sample have experienced positive growth numbers focusing on the road transport. Between 2004 and 2007 road transport grew every year. The growth of the road transport started to get back up from 2010 and over the time period 2004-2015 the road transport volumes of the EU sample grew with approximately 27% (European Commission, 2016a). Positive numbers are seen in general when looking at the investment in road transport growth of the EU sample. Especially in the period 2004-2011, positive growth numbers are seen with a large peak in 2004 where the investment grew with 64% (OECD, 2017). From figure 51 it is possible to see that the investment has mainly been positive but fluctuated a lot. The growth rate show a fluctuation as well (figure 52)
4.3 Road Transport Legislation in the EU

In chapter 3.2.1 a broad overview of the laws connected to road transport within the EU single market is given. These laws are connected to the free movement of goods and people and are created to improve the efficiency of the road transport logistics. Therefore, a more detailed explanation of the laws is given below.

Limitations regarding speed and weight can be seen by focusing on regulations of vehicles that transport goods. Vehicles between 5 and 10 tonnes have a speed limitation device that limits the speed to either 90 or 100 kilometres per hour (directive 2002/85/EC). Furthermore, legislation within the national and international transport market are set up to limit the dimensions of vehicles. Regarding road transport, the maximum length of a vehicle is set at 16,50 meters, maximum height at 4 meters and maximum width at 2,55 meters. This applies for all vehicles except superstructure of
condition vehicles that are allowed to have a width of 2.60 meters (directive 96/53/EC). The maximum weight of most commonly used transport vehicles with five or six axles is 40 tonnes (directive 96/53/EC).

Besides the legislation related to the weight and dimensions, transport vehicles have to be insured to be allowed on European roads. Therefore, a registration certificate is needed that specifies the technical characters of the vehicle, the person driving the vehicle and the goods that are transported (directive 1999/37/EC). Regarding the required insurance, it is stated in directive 2009/103/EC that it is needed to be insured and to be connected to the vehicle. Also, insurances can require a special license plate. In case a special license plate is required, a valid green card or frontier insurance contract should be provided. A green card is an international certificate of insurance issued on behalf of a national organisation in accordance with Recommendation No. 5 adopted on 25 January 1949 by the Road Transport Sub-committee of the Inland Transport Committee of the United Nations Economic Commission for Europe (directive 2009/103/EC). The reason to use documentation accepted within the whole EU improves the free movement of goods and persons between member states because no separate controls and documents have to be provided. The time efficiency increases because of the usage of common accepted documents (DeGroote, 2009).

Another directive, 80/1263 EEC, about improving the time efficiency and safety on the roads is the community driving license established in 1968 in Vienna on the Convention on Road Traffic. The community-driving license is valid in all member states and created common standards and regulations regarding the validity of driving vehicles in different categories. In addition, according to directive 80/1263 EEC, other professions qualifications to create the free movement of goods and persons are stated in directive 2005/36/EC to create a minimum level of qualifications in the EU.
5. Analysis

To see if there is a link between variables, this analysis focuses on correlations and decoupling. Therefore, generally accepted correlation measurements are used to measure the correlations (Happel, 1928). The variables that will be analysed are the GDP per capita and the road transport volumes. Every country will be analysed individually with a short-term and long-term perspective. To answer the first sub-question, the economic effects regarding these two variables with a short-term perspective of 4 years will be analysed. The second sub-question will be answered based on the analysis of the two variables on the long-term which includes a period of 12 years. In addition, the statistical significance will be analysed for both short-term and long-term. This chapter will be completed with answering the third sub-question regarding the legal effects of the EU on road transport.

5.1 What Short-Term Economic Effects Can Be Seen Between Changes in GDP per Capita and Road Transport Volumes 4 Years from Entering the EU?

In chapter 5.1 the short-term correlation between GDP per capita and road transport volumes will be analysed. Therefore, two time periods will be used to evaluate the country specific situation. The period of 2000-2003 will be used to compare the GDP per capita growth before entering the EU with the period 2004-2007 when the member states have entered the EU. Furthermore, a correlation between GDP per capita and road transport volumes will be tested, but there is no road transport data before 2004 available. Therefore, for road transport only the period 2004-2007 will be analysed. Additionally, the investment in road infrastructure is given.

5.1.1 Decoupling Between GDP per Capita and Road Transport Volumes

In this sub-chapter decoupling point of GDP per capita and road transport volumes is analysed. The data used can be seen in appendix tables 33 and 34. Whereas the financial crisis had a big influence on the economy of Europe, the 12 year time-frame is split up into three smaller segments of four years each to see if the outcomes on the long-term were influenced by the crisis.
As stated by Tapio (2005), a strong link can be found between the GDP per capita and road transport volumes. The hypothesis is tested by calculating the correlation between GDP per capita and road transport volumes. The results are shown in table 4.

<table>
<thead>
<tr>
<th></th>
<th>2004-2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>-0.063</td>
</tr>
<tr>
<td>Estonia</td>
<td>0.755</td>
</tr>
<tr>
<td>Latvia</td>
<td>0.345</td>
</tr>
<tr>
<td>Lithuania</td>
<td>0.312</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.652</td>
</tr>
<tr>
<td>Poland</td>
<td>0.664</td>
</tr>
<tr>
<td>Slovenia</td>
<td>0.834</td>
</tr>
<tr>
<td>Slovakia</td>
<td>0.011</td>
</tr>
<tr>
<td>EU sample</td>
<td>0.439</td>
</tr>
</tbody>
</table>

Table 4-Short-term decoupling level GDP per capita and road transport volumes (Own figure; based on European Commission, 2017; European Commission, 2016a).

The results of table 4 show that there is a weak decoupling between the two variables in most member states from the EU sample. This means that the GDP per capita and road transport volumes both increase during the same period of time. Seven out of eight countries show the weak decoupling as a result of the period 2004-2007 and looking at the EU sample as a whole the same result is seen. By looking at these results, a pattern is seen which refers to a link between both variables.

5.1.2 Correlation Between GDP per Capita and Road Transport Volumes

The road transport volumes in thousand tonnes and the GDP per capita are analysed and tested to see if there is a correlation between the two variables by the help of the correlation formula in Excel. Therefore, the eight countries and the EU sample as a whole have been analysed on a four year time frame. In table 5 the results of the correlation calculations are shown. Six out of eight countries show a strong correlation, which refers to a strong link between the variables. A varying outcome is seen for Czech Republic and Slovakia which can be a result of national circumstances influencing the outcomes. Due to the focus of this research no further research is done regarding these discrepancies.
Looking at the EU sample, a moderate positive correlation is seen. Based on this outcome a link between both variables is seen which is used to analyse the effects of entering the EU on a country base level and on a EU sample base level.

To measure the reliability, statistical significance is researched. The outcome will show the probability of error (Hair, et al., 2003). Whereas in most research the probability of failure is smaller than 0,05, this probability is used in this research.

When focusing on the short-term significance level, a big difference can be seen on a country base level (table 6). Only Poland meets the significance level. Additionally, Czech Republic and Estonia almost meet the stated requirements. The other countries are further away from meeting the significance level. Based on these results the outcomes show that the results are not completely trustworthy. When focusing on the EU sample, a significance level of 0,3388 is seen. This number is far off the statistical significance level of 0,05 that is accepted in this research. Reasons for the big differences of countries and the EU sample can be the limited data that is available and the small sample that is used for this research. Therefore, further research has to be done to create a more detailed overview of national circumstances to see if they influenced the results.
5.1.3 Czech Republic

Czech Republic had in the first four years after entering the EU a stable and high growth rate. Between 2000 and 2003, the GDP per capita grew with 32.3%. This number shows a positive growth but after entering the EU the GDP per capita grew in four years with 42.6% (European Commission, 2016a). The road transport volumes decreased with 2.7% in these years, which does not correspond with the expectations due to the correlation found between GDP per capita and road transport volumes (European Commission, 2017). The GDP per capita does show a positive influence of the EU on Czech Republic (table 7; European Commission, 2016a).

When looking at the investment in road infrastructure, it can be seen that it has steadily been increasing between 2004 and 2008 from 1.03 billion Euro to 2.04 billion Euro (figure 8; OECD, 2017).

Focusing on the GDP per capita and investment in road transport infrastructure it is possible to conclude that Czech Republic has benefited from the EU (table 7). In the first four years, the GDP per capita has steadily been increasing (European Commission, 2016a). Besides, the investment in road infrastructure was increasing (OECD, 2017). The GDP per capita growth can possibly be linked to the fact that after entering the EU single market, it was possible for Czech Republic to freely trade with the majority of its main export and import partners that are European countries (OEC, 2017a).
Despite that, it is possible to see that on the short-term the volumes of Czech Republic import and export have dropped. This might be linked to the increased competition on the single market (Allen, 1998).

<table>
<thead>
<tr>
<th>GEO/TIME</th>
<th>Measure</th>
<th>Period 1</th>
<th>Period 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>GDP per Capita</td>
<td>32,3%</td>
<td>42,6%</td>
</tr>
<tr>
<td></td>
<td>Road Transport Volume</td>
<td>-2,68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investment to Road Infrastructure</td>
<td>102,67</td>
<td>44,73</td>
</tr>
</tbody>
</table>

Table 7-Overview of growth GDP per capita, road transport volume and road infrastructure investments between 2000 and 2007 (Own Figure; based on European Commission, 2016a; European Commission, 2017; OECD, 2017).

### 5.1.4 Estonia

Between 2000 and 2003 Estonia’s economic situation changed quickly with an increase of GDP per capita of 43,2%. In the period between 2004 and 2007 after entering the EU, the GDP per capita increased even more with 70,4% (European Commission, 2016a). This shows a positive effect of the EU on Estonia. In these years, also the road transport grew with 53,2% (table 8; European Commission, 2017).

The investment in road infrastructure has been sharply increasing between 2004 and 2006 from 56 million Euro to 130 million Euro. From 2006 till 2008 there has been an increase but not as sharp (figure 17; OECD, 2017).

From all of this it is possible to conclude that Estonia has benefited from the EU on the short-term (table 8). In the first four years, the GDP per capita has sharply increased (European Commission, 2016a). Also, Estonia’s investment in road infrastructure increased (OECD, 2017). The GDP per capita growth can possibly be linked to the fact that after entering the EU single market Estonia was available to freely trade with all EU member states. Despite the fact that Estonia is a service based country, the road transport volume growth has been large and stable (European Commission, 2017). This might be because Estonia sourced more products from the EU (OEC, 2017b), taking advantage of the EU single market, since Estonia’s biggest trading partners are EU member states (DeGroote, 2009). As can be seen in table 8 bellow, positive results on GDP per capita, road transport volume and investment in to road infrastructure have been experienced in Estonia.
5.1.5 Hungary

Hungary has seen a high increase of GDP per capita between 2000 and 2003. The GDP per capita grew with 48%. After entering the EU, the growth slowed down to 21.7% between 2004 and 2007. The GDP per capita went from 8.300 Euro in 2004 to 10.100 Euro in 2007 (European Commission, 2016a). The growth is positive and the road transport volume grew with 14.1% between 2004 and 2007 (European Commission, 2017). Even though Hungary is the only analysed country with a slowdown period of the GDP per capita in the period 2004-2007 compared to 2000-2003, a growth in road transport and GDP per capita can be seen (table 9).

The investment in road infrastructure has been increasing between 2004 and 2005 from 1.4 billion Euro to 1.7 billion Euro. From 2005 till 2007 there has been a sharp decrease to 58 million Euro in 2006 and 64 million Euro in 2007 (figure 18; OECD, 2017).

From the above, it is difficult to evaluate whether Hungary has benefited from the EU. The GDP per capita on the short-term did increase but the growth rates were not high (European Commission, 2016a). In terms of road transport volume growth, initially an increase was seen but that was followed by a drop (European Commission, 2017). The same is for investment in road transport since there was an increase but it was followed by a decrease (OECD, 2017). Even though, the numbers of growth are not big, they still show growth that in the end accumulated to 21% overall increase in GDP per capita and 14% increase in road transport volumes. Hungary benefited from the EU single market since it is an industrial country that trades mostly with other EU countries (OEC, 2017c). Overall, Hungary’s road transport volumes have benefited most from entering the EU since the numbers on the short-term are positive even though they are not high (table 9).
Latvia seems to have been positively influenced by entering the EU. The four years before entering the EU the GDP per capita grew with 27.8%. In the following four years after entering the EU, the growth rate increased to 98.1% over this time period (European Commission, 2016a). Besides that, the road transport volumes grew with more than 33.8% (table 10; European Commission, 2017).

The investment in road infrastructure has sharply been increasing between 2004 and 2007 from 55 million Euro to 231 million Euro (figure 26; OECD, 2017).

From the outcomes, it can be seen that after entering the EU Latvia’s economic situation has been improving. The GDP per capita maintained a strong and stable growth (European Commission, 2016a), and the investment in road infrastructure rocketed (figure 26; OECD, 2017). The growth rate of road transport volumes has been fluctuating, but in the four year period Latvia managed to achieve a high growth of road transport volumes (European Commission, 2017). Whereas Latvia is a trade based country, the road transport volumes show positive numbers (OECD, 2017d). Overall, Latvia’s GDP per capita and road transport volumes have benefited from entering the EU on the short-term and even though the investment was lower in the period after entering the EU compared to the period before, a high increase is experienced (table 10).
5.1.7 Lithuania

Zooming in on the GDP per capita in the period between 2000 and 2007 a steady growth was established in Lithuania. The GDP per capita between 2000 and 2003 grew with 36,1%, but after entering the EU the percentage increased even more to 66,7% in the period of 2004-2007. The GDP per capita went from 5.400 Euro in 2004 to 9.000 Euro in 2007 (European Commission, 2016a). Additionally, the road transport volumes increased with 20,8% between 2004 and 2007 (table 11; European Commission, 2017).

The investment in road infrastructure has been increasing sharply in Lithuania between 2004 and 2007 from 137 million Euro to 312 million Euro (figure 31; OECD, 2017).

From this it is possible to see that after entering the EU, Lithuania’s economic situation has been improving. The GDP per capita maintained stable growth (European Commission, 2016a) and the investment in road infrastructure increased to more than the double amount (OECD, 2017). The growth rate of road transport volumes has also increased over this four year period with 20,8% (European Commission, 2017). This is a positive number whereas Lithuania is not a manufacturing based country (OEC, 2017e). Overall, Lithuania’s GDP per capita, road transport and road infrastructure have benefited from entering the EU in the short-term (table 11).

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<thead>
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<tbody>
<tr>
<td>Lithuania</td>
<td>GDP per Capita</td>
<td>36,1%</td>
<td>66,7%</td>
</tr>
<tr>
<td></td>
<td>Road Transport Volume</td>
<td></td>
<td>20,79</td>
</tr>
<tr>
<td></td>
<td>Investment to Road Infrastructure</td>
<td>30,28</td>
<td>127,74</td>
</tr>
</tbody>
</table>

*Table 11-Overview of growth GDP per capita, road transport volume and road infrastructure investments between 2000 and 2007 (Own Figure; based on European Commission, 2016a; European Commission, 2017; OECD, 2017).*

5.1.8 Poland

In the period 2000-2003 the GDP per capita of Poland stayed at almost the same level. Only a 2% increase is seen over this period but a fast growth was experienced after entering the EU (European Commission, 2016a). Between 2004 and 2007 the GDP per capita grew with 51,9% over these years. Also, the road transport volumes increased fast with a 34,4% growth rate (European Commission, 2017). Based on these numbers, a positive effect from entering the EU can be seen (table 12).
The investment in road infrastructure in Poland has sharply been increasing between 2004 and 2007 from 1,2 billion Euro to 3,4 billion Euro (figure 36; OECD, 2017).

From this it is possible to see that after entering the EU Poland’s economic situation has been improving. The GDP per capita maintained stable yet small growth can be seen (European Commission, 2016a) and the investment in road infrastructure nearly tripled (OECD, 2017). The growth rate of road transport volumes in the four year period after entering the EU show positive numbers (European Commission, 2017). The road transport volumes increased with 34,4% in this period. Overall, Poland's GDP per capita, road transport and road infrastructure have benefited from entering the EU in the short-term (table 12).

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>GDP per Capita</td>
<td>2,0%</td>
<td>51,9%</td>
</tr>
<tr>
<td></td>
<td>Road Transport Volume</td>
<td>34,45</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investment to Road Infrastructure</td>
<td>-0,89</td>
<td>178,40</td>
</tr>
</tbody>
</table>

Table 12: Overview of growth GDP per capita, road transport volume and road infrastructure investments between 2000 and 2007 (Own Figure; based on European Commission, 2016a; European Commission, 2017; OECD, 2017).

5.1.9 Slovakia

Slovakia’s economic situation has improved in the period of 2000 and 2007. In the first part of this period, 2000-2003, the GDP per capita grew with 36,6% and this increased in the following years to 62,5% after entering the EU (European Commission, 2016a). In the period 2004-2007, the growth of road transport volumes was stable and only grew 0,7% (European Commission, 2017). Even though the road transport volumes did not grow much, a positive effect on the GDP per capita can be seen after entering the EU (table 13).

The investment in Slovakia’s road infrastructure has sharply been increasing between 2004 and 2007 from 240 million Euro to 520 million Euro (figure 41; OECD, 2017).

From this it can be seen that after entering the EU Slovakia’s economic situation has been improving. The GDP per capita increased in a fast pace. It increased with approximately 63% in the four year period after entering the EU compared to 36,6% in the four year period before entering the EU (European Commission, 2016a). The
The effect of entering the EU on road transport of the member states

growth rate of road transport volumes has been mostly negative but overall on the short-term came out at 0.7% (European Commission, 2017). Since Slovakia is a manufacturing focused country it is surprising that entering the EU did not have a larger effect on the road transport volumes (OEC, 2017g). Based on the GDP per capita and the road infrastructure investment a positive effect of entering the EU is seen (OECD, 2017), but the road transport volumes did not experience positive or negative effects (table 13).

<table>
<thead>
<tr>
<th>GEO/TIME</th>
<th>Measure</th>
<th>Period 1</th>
<th>Period 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovakia</td>
<td>GDP per Capita</td>
<td>36.6%</td>
<td>62.5%</td>
</tr>
<tr>
<td></td>
<td>Road Transport Volume</td>
<td>-7.49</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>Investment to Road Infrastructure</td>
<td>-116.67</td>
<td></td>
</tr>
</tbody>
</table>

Table 13-Overview of growth GDP per capita, road transport volume and road infrastructure investments between 2000 and 2007 (Own Figure; based on European Commission, 2016a; European Commission, 2017; OECD, 2017).

5.1.10 Slovenia

Slovenia experienced a high degree of growth in the first four years of entering the EU. Between 2000 and 2003, a GDP per capita growth of 20% is experienced by Slovenia. After entering the EU, the GDP per capita grew even faster with 25.2% over the period between 2004 and 2007 (European Commission, 2016a). Also, the road transport volumes have experienced a high increase. From 2004 till 2007 the growth percentage was 21.0% (European Commission, 2017). Based on these numbers a positive influence of entering the EU can be seen for Slovenia (table 14).

The investment in Slovenia’s road infrastructure has been increasing between 2004 and 2007 from 496 million Euro to 666 million Euro (figure 46; OECD, 2017).

From this it is possible to see that after entering the EU Slovenia’s economic situation has been improving. The GDP per capita maintained stable growth (European Commission, 2016a) and the investment in road infrastructure has increased (OECD, 2017). The growth rate of road transport volumes has been moderate with an average increase of approximately 5% per year (European Commission, 2017). Since Slovenia is a manufacturing focused country it is surprising that entering the EU did not have a bigger effect on the road transport volumes, although, Slovenia’s road transport growth accumulated to 21% on the short-term (OEC, 2017h). Overall, Slovenia’s GDP per
capita, road transport and road infrastructure have benefited from entering the EU on the short-term (table 14).

<table>
<thead>
<tr>
<th>GEO/TIME</th>
<th>Measure</th>
<th>Period 1</th>
<th>Period 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>GDP per Capita</td>
<td>20.0%</td>
<td>25.2%</td>
</tr>
<tr>
<td></td>
<td>Road Transport Volume</td>
<td>21.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investment to Road Infrastructure</td>
<td>26.34</td>
<td>34.27</td>
</tr>
</tbody>
</table>

Table 14-Overview of growth GDP per capita, road transport volume and road infrastructure investments between 2000 and 2007 (Own Figure; based on European Commission, 2016a; European Commission, 2017; OECD, 2017).

5.1.11 EU Study

The correlation between the GDP per capita and road transport volumes for the short-term has been proven in chapter 5.1.2. Therefore, both variables were analysed in chapter 5.1.3 till 5.1.10 on a country base level. Based on the results shown in table 17, a positive effect on the GDP per capita is seen from entering the EU. In the period of 2000-2003 positive growth numbers are seen but in seven out of eight analysed countries the GDP per capita increased significantly more after becoming a member of the EU (European Commission, 2016a). Whereas data about road transport volumes in the countries is limited, a comparison with road transport volumes before 2004 cannot be made. But due to the proven correlation between GDP per capita and road transport volumes it can be concluded that entering the EU had a positive effect on the road transport of the new member states. In the period 2004-2007 the road transport growth numbers of six countries strongly increased, while Czech Republic and Slovakia did not see much change (table 17).

The short-term effect of entering the EU on its member states can be seen when looking at the average numbers of the eight countries taken as a sample of the EU. Clear positive numbers are seen. The GDP per capita grew with 24.1% more in the first four years after entering the EU compared to the four years before (table 15). Furthermore, road transport volumes grew on average with 21.9% (table 16). Based on these numbers, entering the EU seems to have a positive influence on the member states of the sample on the short-term (table 17).
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>32,3%</td>
<td>42,5%</td>
<td>10,2%</td>
</tr>
<tr>
<td>Estonia</td>
<td>43,2%</td>
<td>70,4%</td>
<td>27,2%</td>
</tr>
<tr>
<td>Latvia</td>
<td>27,8%</td>
<td>98,1%</td>
<td>70,3%</td>
</tr>
<tr>
<td>Lithuania</td>
<td>36,1%</td>
<td>66,7%</td>
<td>30,6%</td>
</tr>
<tr>
<td>Hungary</td>
<td>48,0%</td>
<td>21,7%</td>
<td>-26,3%</td>
</tr>
<tr>
<td>Poland</td>
<td>2,0%</td>
<td>51,9%</td>
<td>49,8%</td>
</tr>
<tr>
<td>Slovenia</td>
<td>20,0%</td>
<td>25,2%</td>
<td>5,2%</td>
</tr>
<tr>
<td>Slovakia</td>
<td>36,6%</td>
<td>62,5%</td>
<td>25,9%</td>
</tr>
<tr>
<td>EU sample</td>
<td>30,8%</td>
<td>54,9%</td>
<td>24,1%</td>
</tr>
</tbody>
</table>

Table 15 - Growth in % of GDP per capita between 2000-2003 and 2004-2007 (Own figure; European Commission, 2016a).

<table>
<thead>
<tr>
<th>GEO/TIME</th>
<th>2004-2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>-2,7%</td>
</tr>
<tr>
<td>Estonia</td>
<td>53,2%</td>
</tr>
<tr>
<td>Latvia</td>
<td>33,8%</td>
</tr>
<tr>
<td>Lithuania</td>
<td>20,8%</td>
</tr>
<tr>
<td>Hungary</td>
<td>14,1%</td>
</tr>
<tr>
<td>Poland</td>
<td>34,4%</td>
</tr>
<tr>
<td>Slovenia</td>
<td>21,0%</td>
</tr>
<tr>
<td>Slovakia</td>
<td>0,7%</td>
</tr>
<tr>
<td>EU sample</td>
<td>21,9%</td>
</tr>
</tbody>
</table>

Table 16 - Growth % of road transport volumes 2004-2007 (Own figure; based on European Commission, 2017).

<table>
<thead>
<tr>
<th>GEO/TIME</th>
<th>Measure</th>
<th>Period 1</th>
<th>Period 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU sample</td>
<td>GDP per Capita</td>
<td>29,0%</td>
<td>48,8%</td>
</tr>
<tr>
<td></td>
<td>Road Transport Volume</td>
<td></td>
<td>18,29</td>
</tr>
<tr>
<td></td>
<td>Investment to Road Infra</td>
<td>24,60</td>
<td>58,92</td>
</tr>
</tbody>
</table>

Table 17 - Overview of growth GDP per capita, road transport volume and road infrastructure investments between 2000 and 2007 (Own figure; based on European Commission, 2016a; European Commission, 2017; OECD, 2017).

5.2 What Long-Term Economic Effects Can Be Seen Between Changes in GDP per Capita and Road Transport Volumes 12 Years from Entering the EU?

In the next sub-chapter, the long-term correlation between GDP per capita and road transport volumes will be analysed. To support the final statements about the long-term period of 12 years a subdivide of three shorter periods of four years each will be used to create a better overview of the influences over time to the twelve year period that led to the final outcomes. Furthermore, funds of the EU for infrastructural investments received throughout these 12 years per member state will be displayed.
5.2.1 Decoupling Between GDP per Capita and Road Transport Volumes

As stated by Tapio (2005), a strong correlation can be found between the GDP per capita and road transport volumes. Therefore, this hypothesis is tested and the results are shown in table 18.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>-0.063</td>
<td>-14,724</td>
<td>11,097</td>
</tr>
<tr>
<td>Estonia</td>
<td>0.755</td>
<td>-13,661</td>
<td>-0.717</td>
</tr>
<tr>
<td>Latvia</td>
<td>0.345</td>
<td>0.077</td>
<td>1.361</td>
</tr>
<tr>
<td>Lithuania</td>
<td>0.312</td>
<td>-23,013</td>
<td>1.384</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.652</td>
<td>5,218</td>
<td>1,825</td>
</tr>
<tr>
<td>Poland</td>
<td>0.664</td>
<td>6,697</td>
<td>0,147</td>
</tr>
<tr>
<td>Slovenia</td>
<td>0.834</td>
<td>4,024</td>
<td>1,801</td>
</tr>
<tr>
<td>Slovakia</td>
<td>0.011</td>
<td>-4,536</td>
<td>1,377</td>
</tr>
<tr>
<td>EU sample</td>
<td>0.439</td>
<td>-4,990</td>
<td>2,284</td>
</tr>
</tbody>
</table>

Based on the results (table 18), a similar view can be seen in the period 2004-2007 and 2012-2015. In both periods the GDP per capita increased and the road transport volumes grew. This shows that an expansive negative decoupling or weak decoupling is experienced in general. In the period 2008-2011, the results are varying more with three types of decoupling: strong decoupling, recessive decoupling and expansive negative decoupling. No clear outcome can be seen of the relation between the GDP per capita and road transport volumes in this time period.

When focusing on the EU sample the outcomes are similar to most countries on an individual level. In the first period after entering the EU a weak decoupling is seen followed by a period with a strong decoupling. In the period 2012-2015 expansive negative decoupling is experienced. Whereas the period 2008-2011 has varying numbers on a country base level, the results in this period are hard to analyse. But in the other periods a strong link is seen between the GDP per capita and road transport volumes.
Even though there is a discrepancy in the period 2008-2011, which is probably a result of the financial crisis of 2008, it can be concluded that a link between the GDP per capita and road transport volumes can be seen.

### 5.2.2 Correlation Between GDP per Capita and Road Transport Volumes

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>-0.280</td>
<td>0.180</td>
<td>0.562</td>
</tr>
<tr>
<td>Estonia</td>
<td>0.958</td>
<td>0.692</td>
<td>0.687</td>
</tr>
<tr>
<td>Latvia</td>
<td>0.975</td>
<td>0.598</td>
<td>0.879</td>
</tr>
<tr>
<td>Lithuania</td>
<td>0.976</td>
<td>0.593</td>
<td>0.697</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.714</td>
<td>0.389</td>
<td>0.533</td>
</tr>
<tr>
<td>Poland</td>
<td>0.982</td>
<td>0.362</td>
<td>0.102</td>
</tr>
<tr>
<td>Slovenia</td>
<td>0.881</td>
<td>0.856</td>
<td>0.710</td>
</tr>
<tr>
<td>Slovakia</td>
<td>0.740</td>
<td>0.077</td>
<td>0.609</td>
</tr>
<tr>
<td>EU sample</td>
<td>0.566</td>
<td>0.431</td>
<td>0.524</td>
</tr>
</tbody>
</table>

**Table 19:** Long-term correlation in different time frames between GDP per capita in Euro and road transport volumes in thousand tonnes (Own figure; based on European Commission, 2017; European Commission, 2016a).

In table 19 the results of the correlation calculations are shown. Between 2004 and 2007 a strong correlation can be seen when linking the GDP per capita and the road transport volumes. Six out of eight countries show a strong correlation. Only Czech Republic and Slovakia show a negative correlation. It is likely that the discrepancy of these two countries is a result of national circumstances. Due to the focus of this research no further research is done regarding these discrepancies.

Also between 2008 and 2011 correlations between the GDP per capita and the road transport volumes can be seen. The correlations are less strong but this is a possible result of the financial crisis of 2008. The financial crisis can be a reason for a downfall in production due to a lower international demand. Furthermore, a long-term decline of growth, sudden drop in external demand and periods with growth that flattens can influence the correlation as a result of the crisis (Afonso and Alves, 2015). Whereas no national circumstances are taken into account, further research should be done in the future regarding the discrepancy compared to the period between 2004 and 2007.

Between 2012 and 2015, the results show a stronger correlation than in the period from 2008 to 2011. During these years, many countries started to recover from the financial crisis. As in the period from 2004 to 2007, most countries show a strong correlation.
between the GDP per capita and road transport volumes. The differences can be a result of the time that countries needed to recover from the financial crisis or due to national circumstances influencing the results but this research does not go into national details.

Using a cross-case study, the EU sample can be analysed. Based on the results a weak to moderate positive correlation can be seen. In the period 2004-2007 a moderate correlation is seen and the same results are shown in the period 2012-2015. Between 2008 and 2011 a weaker correlation is seen, which is a possible result from the financial crisis. When looking at the complete period of 2004-2015, since the countries entered the EU, a moderate correlation is seen. Based on the results it is clear to say that there is a correlation between the GDP per capita and the road transport volumes, even though some countries have national discrepancies in some periods compared to the outcome of the total sample group.

The statistical significance on the long-term shows varying numbers (table 20). Out of the eight sample countries; Estonia, Lithuania and Slovenia meet the requirements of the statistical level that is set at 0.05. The other countries do not show a sufficient statistical level. These results are more trustworthy compared to the short-term results whereas more countries meet the significance level. Those that do not meet the requirements on the long-term, are closer to meet the requirement of 0.05 than the short-term results show. When focusing on the EU sample, the significance level is not met either way. With a significance level of approximately 0.17 the EU sample does not show a trustworthy result on the long-term even though it is closer to the 0.05 significance level than the short-term result. Due to the small sample group and the limited available data, the results can be influenced by these factors. Further research should be done to create a more detailed overview of national circumstances to see if that influenced the results.

<table>
<thead>
<tr>
<th>Geo/Time</th>
<th>2004-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>0.6669</td>
</tr>
<tr>
<td>Estonia</td>
<td>0.0010</td>
</tr>
<tr>
<td>Lithuania</td>
<td>0.0052</td>
</tr>
<tr>
<td>Poland</td>
<td>0.1397</td>
</tr>
<tr>
<td>Slovakia</td>
<td>0.2201</td>
</tr>
<tr>
<td>Latvia</td>
<td>0.0837</td>
</tr>
<tr>
<td>Hungary</td>
<td>0.2859</td>
</tr>
<tr>
<td>Slovenia</td>
<td>0.0336</td>
</tr>
<tr>
<td>EU sample</td>
<td>0.1795</td>
</tr>
</tbody>
</table>

*Table 20-Significance level 2004-2015 (European Commission 2016a and European Commission, 2017).*
5.2.3 Czech Republic

Since Czech Republic entered the EU 12 years ago, there have been several jumps and drops. Based on the long-term numbers related to the GDP per capita of Czech Republic the 12 year period divided into three periods show different numbers. It started with a high increase of the GDP per capita but the financial crisis of 2008 led to a drop in the period 2008-2011. Also in the period 2012-2015 the GDP per capita did not increase much. But looking at the total period from 2004 to 2015 the GDP per capita grew with approximately 68%. In 2016, Czech Republic had the highest ever GDP per capita of 15,800 Euro (figure 8; European Commission, 2016a).

The road transport volumes did not experience much effect from entering the EU. The first eight years after entering the EU negative growth numbers can be seen. In the period 2012-2015 a sharp increase is experienced of 28.8% over this period of time. Overall a negative growth number over the period 2004-2015 is seen of -6.2% (figure 10; European Commission, 2017).

The investment in road infrastructure. From 2004 till 2008 there has been a sharp increase but after 2008 the investments dropped each year. This drop only stabilized in 2014 (figure 11; OECD, 2017).

From this it is possible to see that on the long-term the benefits of the EU for Czech Republic are questionable. The GDP per capita has increased but there has not been a stable growth over the whole period of time. Furthermore, road transport volumes till recently showed negative growth numbers and looking at the long-term period a negative growth is seen. Once it comes to road transport infrastructure the investments have been increasing but after 2008 the investments plummeted. Overall it is difficult to assess whether the EU affected Czech Republic in a positive way (table 21). The crisis in 2008 had a hit on most countries and thus the benefits from the EU cannot be adequately measured (Afonso and Alves, 2015; European Commission, 2015).

<table>
<thead>
<tr>
<th>GEO/TIME</th>
<th>Measure</th>
<th>Period 1</th>
<th>Period 2</th>
<th>Period 3</th>
<th>Period 4</th>
<th>Period 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Czech Republic</td>
<td>GDP per Capita</td>
<td>32.3%</td>
<td>42.6%</td>
<td>1.3%</td>
<td>1.3%</td>
<td>68.1%</td>
</tr>
<tr>
<td></td>
<td>Road Transport Volume</td>
<td>-2.68</td>
<td>-19.12</td>
<td>28.82</td>
<td>-6.20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investment to Road Infrastructure</td>
<td>102.67</td>
<td>44.73</td>
<td>-36.70</td>
<td>-31.07</td>
<td>-41.46</td>
</tr>
</tbody>
</table>

*Table 21-Overview of growth GDP per capita, road transport volume and road infrastructure investments between 2000 and 2015 (Own figure; based on European Commission, 2016a; European Commission, 2017; OECD, 2017).*
5.2.4 Estonia

In the 12 years after Estonia entered the EU there have been several jumps and drops. The biggest increase in GDP per capita is seen in the period 2004-2007 with an increase of more than 70% (table 22). In the following period of four years the GDP per capita stayed the same as a result of the financial crisis of 2008. Since 2012 the GDP per capita grew again and over the long-term a sharp increase is seen (European Commission, 2016a). Regarding the road transport volumes a similar pattern is seen. After entering the EU, a sharp increase is experienced with a massive drop between 2008 and 2011 and a recovery phase from 2012. In the end an increase of approximately 8% over the period from 2004 to 2015 is experienced (table 22; European Commission, 2017).

Differently than the GDP per capita, the investment in road infrastructure had seen a high increase. Only a drop from 2008 till 2009 can be seen. The investments after 2009 have been increasing and between 2013-2014 have been the highest in Estonia’s history (figure 17; OECD, 2017).

From this it is possible to see that on the long-term the benefits from the EU for Estonia are vast. The GDP per capita was not increasing for two years which can be linked to the financial crisis of 2008. Road transport volumes showed mixed growth numbers, but there has been an overall growth. Once it comes to road transport infrastructure the investments have been increasing except for a period from 2008 to 2009 (figure 17). This shows that Estonians road transport industry and road infrastructure have benefited from entering the EU (table 22). The financial crisis in 2008 had a big effect on Estonia and only recently the GDP per capita came back to the same level as before the crisis. But it is still nearly double of the level Estonia had before entering the EU.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Estonia</td>
<td>GDP per Capita</td>
<td>43.2%</td>
<td>70.4%</td>
<td>1.6%</td>
<td>23.2%</td>
<td>116.9%</td>
</tr>
<tr>
<td></td>
<td>Road Transport Volume</td>
<td></td>
<td>53.19</td>
<td></td>
<td>-22.21</td>
<td>-10.09</td>
</tr>
<tr>
<td></td>
<td>Investment to Road Infrastructure</td>
<td>118,18</td>
<td>125,00</td>
<td>11,27</td>
<td>0,00</td>
<td>182,14</td>
</tr>
</tbody>
</table>

Table 22: Overview of growth GDP per capita, road transport volume and road infrastructure investments between 2000 and 2015 (Own figure; based on European Commission, 2016a; European Commission, 2017; OECD, 2017).
5.2.5 Hungary

Since Hungary entered the EU 12 years ago there have generally been stable growth numbers. Hungary had a GDP per capita growth of 21.7% in the first four years after entering the EU which was half of the growth number of the period 2000-2003 (table 23). In the period 2008-2011 the growth was even negative but started to recover again after 2012. Overall between 2004 and 2015 a growth percentage of 33.7% is experienced (table 23, European Commission, 2016a). Between 2004 and 2008 Hungary also had a strong growth of road transport volumes but the financial crisis of 2008 affected this growth. Between 2008 and 2012 the road transport volumes decreased strongly but are recovering since 2013. In the period 2004-2015 a negative growth rate of 6.8% is seen but looking at the growth numbers after 2012 a positive growth is seen and this is expected to continue in the future (table 23; European Commission, 2017). Even though the road transport volumes are negative over the long-term, the GDP per capita has a positive growth.

Differently than the GDP per capita, the investment in road infrastructure seems to follow a similar pattern as road transportation volumes. Initially, there has been an increase in the investment of road transport, but from 2009 till 2012 there has been a massive drop. In 2013 there was an increase, followed by a decrease in 2014 (figure 21; OECD, 2017).

From this it is difficult to assess whether Hungary benefited on the long-term from the EU. The GDP per capita has seen positive numbers in general but slowed down since Hungary entered the EU. Also, the road transport volumes have decreased when looking at the long-term. Once it comes to road transport infrastructure the investments have been decreasing after 2009 (figure 21). Overall, the GDP per capita increased which is positive. But the road transport growth was generally negatively affected and investment in road infrastructure have been high initially, but plummeted after 2009. This decrease can be linked to financial crisis of 2008 and to increased competition coming from the single market (Allen, 1998; European Commission, 2015). Overall no positive effect can be seen when looking at the outcomes of Hungary after entering the EU (table 23).
The effect of entering the EU on road transport of the member states

5.2.6 Latvia

In the 12 years after Latvia entered the EU generally there have been high growth numbers. From the analysed countries, the GDP per capita grew the fastest in Latvia. Between 2004 and 2007 the growth percentage was 98.1% and from 2004 till 2015 this growth number was even higher with 136.5% even though it experienced a drop in the period 2008-2011 (table 24; European Commission, 2016a). Also, the road transport volumes show positive numbers (European Commission, 2017). On the short-term a growth of almost 34% was experienced by Latvia and on the long-term the growth percentage was 34.7% with a drop in the period 2008-2011 (table 24).

Investments in road transport followed the same pattern as the GDP per capita. Initially, there has been an increase in the investment of road transport, but from 2008 till 2010 there has been a massive drop. In 2010, there has been an increase and the same level stayed till 2014 (figure 26; OECD, 2017).

Based on the results it can be concluded that Latvia benefit from entering the EU. The GDP per capita was increasing for most of the time that Latvia has been a member of the EU. Road transport volumes have also increased with approximately 35% (table 24). Once it comes to road transport infrastructure the investments decreased in 2009, but started to increase again after 2010. Overall, it is possible to see that the GDP per capita have been benefited by the EU. The road transport growth was generally positively affected and investments in road infrastructure have been quite high overall (table 24). The decreases can be linked to the financial crisis of 2008 (Afonso and Alves, 2015).
5.2.7 Lithuania

Since entering the EU in 2004, Lithuania seems to be affected positively. The GDP per capita shows positive numbers with a growth rate of 66.7% on the short-term and 138.9% on the long-term (table 25; European Commission, 2016a). Also, the road transport volumes on the short and long-term show positive outcomes with respectively 20.8% and 13.9% even though a strong drop took place between 2008 and 2012 (table 25; European Commission, 2017).

Investment in road transport infrastructure followed the same pattern as the GDP per capita. Initially, there has been an increase in the investment of road transport infrastructure, but from 2008 till 2010 there has been a massive drop. In 2010, there has been an increase and the same level stayed till 2014 (figure 31; OECD, 2017).

From this it is possible to see that on the long-term Lithuania benefited from the EU. The GDP per capita was increasing for most of the time that Lithuania is a part of the EU. Road transport volumes showed positive growth numbers for most of the 12 year period. Once it comes to road transport infrastructure the investments have been decreasing after 2008. Overall, it is possible to see that the GDP per capita have been benefited by the EU. The road transport growth was positively affected and investment in road infrastructure have been quite high overall. Altogether, it can be seen that all of the three factors have been positively influenced by the EU (table 25). The decreases can be linked to the financial crisis of 2008 (Afonso and Alves, 2015).

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Lithuania</td>
<td>GDP per Capita</td>
<td>36.1%</td>
<td>66.7%</td>
<td>1.0%</td>
<td>25.2%</td>
<td>138.9%</td>
</tr>
<tr>
<td></td>
<td>Road Transport Volume</td>
<td></td>
<td>20.7%</td>
<td>-22.5%</td>
<td>21.01%</td>
<td>13.89%</td>
</tr>
<tr>
<td></td>
<td>Investment to Road Infrastructure</td>
<td>30.28%</td>
<td>127.74%</td>
<td>-21.51%</td>
<td>-7.82%</td>
<td>63.50%</td>
</tr>
</tbody>
</table>

Table 25: Overview of growth GDP per capita, road transport volume and road infrastructure investments between 2000 and 2015 (Own figure; based on European Commission, 2016a; European Commission, 2017; OECD, 2017).

5.2.8 Poland

Poland has experienced a positive GDP per capita since entering the EU. Between 2004 and 2007 the GDP per capita grew with 51.9% and on the long-term a stronger growth is seen of 107.4% from 2004 till 2015 (European Commission, 2016a). During the period 2004-2015, Poland has seen the strongest increase of the road transport volumes.
The effect of entering the EU on road transport of the member states (European Commission, 2017). On the short-term the volumes grew with 34,4% and on the long-term with 72,8% (table 26).

Investments in road transport followed a similar pattern as the GDP per capita. There has been an increase in the investments in road transport till 2011, but after that the numbers continuously dropped (figure 36; OECD, 2017).

From the results it is possible to see that on the long-term Poland benefited from the EU. The GDP per capita was increasing throughout all years Poland has been a member state. Road transport volumes showed positive growth numbers but in the previous years started to show a slowdown. Once it comes to road transport infrastructure the investments have been decreasing after 2011 but a high increase is experienced on the long-term. Overall, it is possible to see that the GDP per capita has benefited from the EU. Investments in road infrastructure have been quite high overall. It can be concluded that Poland benefited from the EU and it is the only country in this sample group that did not experience an economic drop (table 26).

<table>
<thead>
<tr>
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<th>Measure</th>
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<th>Period 2</th>
<th>Period 3</th>
<th>Period 4</th>
<th>Period 5</th>
</tr>
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<td>107,4%</td>
</tr>
<tr>
<td></td>
<td>Road Transport Volume</td>
<td>34,45</td>
<td>20,93</td>
<td>1,60</td>
<td>72,80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investment to Road Infrastructure</td>
<td>-0,89</td>
<td>178,40</td>
<td>84,53</td>
<td>-43,76</td>
<td>99,26</td>
</tr>
</tbody>
</table>

Table 26-Overview of growth GDP per capita, road transport volume and road infrastructure investments between 2000 and 2015 (Own figure; based on European Commission, 2016a; European Commission, 2017; OECD, 2017).

5.2.9 Slovakia

There have been generally high GDP per capita growth numbers since Slovakia entered the EU 12 years ago. Between 2004 and 2007 a growth of 62,5% can be seen and this number is even higher looking at long-term numbers. Between 2004 and 2015 the GDP per capita grew by approximately 127% (European Commission, 2016a). The road transport volumes on the short-term only grew with 0,7% and on the long-term a decrease of 17,3% is experienced (European Commission, 2017). This is a result of a big drop after the financial crisis of 2008 (European Commission, 2015). Based on the GDP per capita a positive influence is seen of entering the EU whereas the road transport volumes are fluctuating. But looking at the period from 2004 to 2008 a growth was seen, which is likely a result of entering the EU (table 27).
Investments in road infrastructure do not seem to follow any other patterns seen in Slovakia. From 2004 till 2008 there has been a massive increase in investments but from there till 2013 there has been a continued drop followed by an increase in 2014 (figure 41; OECD, 2017).

From this it is possible to see that on the long-term Slovakia benefited from the EU. The GDP per capita was increasing for most of the time that Slovakia has been part of the EU. Road transport volumes showed negative growth numbers and road transport volumes are lower than before entering the EU even though positive growth is experienced since 2012. Once it comes to road transport infrastructure the investments have been decreasing after 2013. Overall, it is possible to see that the GDP per capita have benefited from the EU. The road transport growth was generally negatively affected and investments in road infrastructure have been quite high overall. The decreases can be linked to the financial crisis of 2008 (European Commission, 2015).

To sum up, Slovakia has benefited from entering the EU, but the road transport of Slovakia did not (table 27).

<table>
<thead>
<tr>
<th>GEO/TIME</th>
<th>Measure</th>
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<th>Period 2</th>
<th>Period 3</th>
<th>Period 4</th>
<th>Period 5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GDP per Capita</td>
<td>36,6%</td>
<td>62,5%</td>
<td>7,4%</td>
<td>10,7%</td>
<td>126,6%</td>
</tr>
<tr>
<td>Slovakia</td>
<td>Road Transport Volume</td>
<td>0,72</td>
<td>-33,47</td>
<td>11,31</td>
<td>-17,35</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investment to Road Infrastructure</td>
<td>-7,49</td>
<td>116,67</td>
<td>-23,81</td>
<td>76,85</td>
<td>129,17</td>
</tr>
</tbody>
</table>

Table 27—Overview of growth GDP per capita, road transport volume and road infrastructure investments between 2000 and 2015 (Own figure; based on European Commission, 2016a; European Commission, 2017; OECD, 2017).

5.2.10 Slovenia

Between 2004 and 2007 Slovenia experienced a positive growth of the GDP per capita. It grew with 25,2% and on the long-term it increased to 34,5% between 2004 and 2015 (European Commission, 2016a). Regarding the road transport, the volume grew strongly between 2004 and 2007 with 21% (European Commission, 2017). But on the long-term a negative growth rate of -4,2% is experienced due to a big drop since the crisis in 2008. Even though a long-term negative growth of road transport volumes is seen, the GDP per capita has shown a strong increase and the EU seems to have a positive effect on Slovenia (table 28).

Investments in road infrastructure does not seem to follow any other patterns seen in Slovenia. From 2004 till 2007 there has been a massive increase in investments but
The effect of entering the EU on road transport of the member states

From there till 2013 there has been a continuously drop followed by an increase in 2014 (figure 46; OECD, 2017).

From this it is possible to see that on the long-term the benefits of the EU for Slovenia are questionable. The GDP per capita grew with 34,5% over the 12 year period which is positive for Slovenia but the GDP per capita has been fluctuating. Road transport volumes showed negative growth numbers over the long-term, which is mainly a result of the period between 2008 and 2011 as a potential result of the financial crisis of 2008. Once it comes to road transport infrastructure the investments have been increasing, but after 2008 the investments plummeted. Overall it is difficult to assess whether the EU affected Slovenia in a positive way on the long-term (table 28). The financial crisis in 2008 had a hit on most countries and thus the benefits from the EU cannot be adequately measured (Afonso and Alves, 2015; European Commission, 2015).

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Slovenia</td>
<td>GDP per Capital</td>
<td>20,0%</td>
<td>25,2%</td>
<td>-4,3%</td>
<td>3,9%</td>
<td>34,5%</td>
</tr>
<tr>
<td></td>
<td>Road Transport Volume</td>
<td>21,01</td>
<td>-17,12</td>
<td>12,35</td>
<td>-4,17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investment to Road Infrastructure</td>
<td>26,34</td>
<td>34,27</td>
<td>-83,86</td>
<td>36,27</td>
<td>-71,98</td>
</tr>
</tbody>
</table>

Table 28-Overview of growth GDP per capita, road transport volume and road infrastructure investments between 2000 and 2015 (Own figure; based on European Commission, 2016a; European Commission, 2017; OECD, 2017).

5.2.11 EU Study

In chapter 5.2.2 the correlation between the GDP per capita and road transport volumes on the long-term has been proven. In chapters 5.2.3 till 5.2.10 the long-term effects have been analysed on a country base level. In table 29 the growth numbers of the GDP per capita are given. In the period 2000-2003 strong positive growth numbers can be seen. But after entering the EU in 2004, the growth numbers increased substantially when comparing the period before and after entering the EU. Seven out of eight countries had a faster increase of GDP per capita between 2004 and 2007 compared to the period 2000-2003 with an average increase of 48,8% compared to 29% of the period before entering the EU. In the following period of four years (2008-2011) the GDP per capita slowed down or even decreased on a country base level and focused on the sample a decrease of 1,1% is experienced (European Commission, 2016a). The main reason for the change is the financial crisis of 2008. In period 4, 2012-2015, the GDP per capita increased again. Looking at the EU sample the GDP per capita increased with 12,7%. Besides the period of the financial crisis an increase of GDP per capita is seen and
comparing the period of four years before entering the EU to the twelve years after entering the EU, a positive effect is seen whereas the GDP per capita of the EU sample grew with 54,1% (table 31).

When focusing on the road transport volumes between 2004 and 2015, fluctuating numbers are seen (European Commission, 2017). The main reason for these results is the financial crisis of 2008. Many countries experienced a strong decrease in road transport volumes between 2008 and 2012 and many countries have not managed to get back to the level they had before the crisis. But the countries show positive growth numbers in the past few years so it is expected to see the road transport volumes grow along with the GDP per capita in the future. Based on the numbers, we can conclude that the EU had a positive influence on the member states when entering the union (table 29 and table 30).

To analyse the long-term effects of entering the EU, it can be seen that the road transport volumes grew with 11,8% since 2004 and the GDP per capita increased with approximately 54%. Based on the growth of GDP per capita and road transport volume growth a positive effect of entering the EU can be seen (table 31) even with fluctuating number in the period 2007-2011 when Europe had to deal with the consequences of the financial crisis (European Commission, 2015).

<table>
<thead>
<tr>
<th>GEO/TIME</th>
<th>Period 1</th>
<th>Period 2</th>
<th>Period 3</th>
<th>Period 4</th>
<th>Period 5</th>
<th>Period 5 - Period 1</th>
</tr>
</thead>
<tbody>
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<td>Czech Republic</td>
<td>32,3%</td>
<td>42,6%</td>
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<td>1,3%</td>
<td>68,1%</td>
<td>35,8%</td>
</tr>
<tr>
<td>Estonia</td>
<td>43,2%</td>
<td>70,4%</td>
<td>1,6%</td>
<td>23,2%</td>
<td>116,9%</td>
<td>73,7%</td>
</tr>
<tr>
<td>Latvia</td>
<td>27,8%</td>
<td>98,1%</td>
<td>-12,5%</td>
<td>25,5%</td>
<td>136,5%</td>
<td>108,8%</td>
</tr>
<tr>
<td>Lithuania</td>
<td>36,1%</td>
<td>66,7%</td>
<td>1,0%</td>
<td>25,2%</td>
<td>138,9%</td>
<td>102,8%</td>
</tr>
<tr>
<td>Hungary</td>
<td>48,0%</td>
<td>21,7%</td>
<td>-5,6%</td>
<td>9,9%</td>
<td>33,7%</td>
<td>-14,3%</td>
</tr>
<tr>
<td>Poland</td>
<td>2,0%</td>
<td>51,9%</td>
<td>3,1%</td>
<td>13,1%</td>
<td>107,4%</td>
<td>105,4%</td>
</tr>
<tr>
<td>Slovenia</td>
<td>20,0%</td>
<td>25,2%</td>
<td>-4,3%</td>
<td>3,9%</td>
<td>34,5%</td>
<td>14,5%</td>
</tr>
<tr>
<td>Slovakia</td>
<td>36,6%</td>
<td>62,5%</td>
<td>7,4%</td>
<td>10,7%</td>
<td>126,6%</td>
<td>90,0%</td>
</tr>
<tr>
<td>EU sample</td>
<td>29,0%</td>
<td>48,8%</td>
<td>-1,1%</td>
<td>12,7%</td>
<td>83,1%</td>
<td>54,1%</td>
</tr>
</tbody>
</table>

Table 29-Growth in % of GDP per capita between 2000-2003 and 2004-2015 (Own figure; based on European Commission, 2016a).
The effect of entering the EU on road transport of the member states

5.3 What Legal Effects Regarding Road Transport Did Member States Experience from Entering the EU?

The legislations created by the EU are there to create a single market. To enter the EU and the associated single market, several barriers are seen which include physical barriers, technical barriers, tax barriers, natural barriers and legislative barriers (European Economic Social Committee, 2012). Focusing on the road transport legislation, the technical, legislative and tax barriers are connected to the single market.

To create a single market, technical standards have to be the same. Therefore, laws are created to control the working hours to have equal working days and to improve the safety for i.e. drivers to prevent driving too many hours a day or too many hours without breaks. Besides the working time, speed limitations are created to increase the safety of the driver and the environment. Furthermore, the technical legislations include unified vehicle sizes. These laws are setup to increase the safety and to keep the market competitive. When vehicles registered in different countries are able to drive with different sizes of trucks, an unfair advantage can be established (European Economic Social Committee, 2012).

Like the technical directives, the legislative directives have the main focus on safety. Directives 2002/15/EC, 2006/22/EC and EC 561/2006 are for example all focused on...
the working hours (EUR-Lex, 2017). There is a high importance that drivers are not driving more than a maximum number of hours a day or week and there should be enough breaks in between. The aim of all directives is to keep the drivers focused and alert to improve personal safety and safety of the environment. Furthermore, the legislative directives are focused on the documentation. Vehicle and driver certifications have to be arranged and to get these documents, certain standards have to be met. Also, these directives come back to safety, whereas a driver needs to do tests to show the European standards are met before driving in public. The mutual recognition of certifications ensures that the free movement of people within the EU single market is necessary. To ensure mutual recognitions allows businesses operating in the EU single market to source cheaper labour that reduces cost and to freely work in the whole EU without geographical barriers which can reduce time and cost (European Economic Social Committee, 2012).

Lastly, directives in road transport are related to tax laws. Since the EU has a single market, each member state is allowed to impose road tolls in any way that is beneficial to the state. Other member states can benefit from it since in some member states there are no road tolls what reduces the costs. There are no duties or import taxes within the EU. This way the bureaucracy related to importing and exporting goods is reduced and goods can be transported cheaper and faster (European Economic Social Committee, 2012).

As mentioned earlier, the legal effects of entering the EU regarding road transport are in particular about the EU single market. Laws regarding technical standards need to be followed by the member states as well as the regulations for the people involved. For all legislation it is most important to standardize documents and processes to save time. Subsequently, the EU controls the tax laws for trading between member states in order to reduce costs.

The directives created by the EU are focusing on the free market to improve time efficiency when transporting goods and to set standards regarding safety. The legislations have been set up regarding driving time and rest periods, enforcement, working time, procedures and the use of the tachograph. By having a unified framework and common accepted legislation, the time of transporting goods decreases a lot.
whereas a control at every border to check all information is not needed (Dionori, et al., 2014).

Due to the established legislation that are connected to road transport, the free movement has let to positive effects on the road transport sector. In the past years, the road transport sector benefited and transport volumes have been growing (European Commission, 2012). The free movement and mutual recognition led to the situation that cross-border is not more costly than intra-national freight (Sun and Pelkmans, 1995). The EU opened the market, uniform technical standards have improved the trans-European network and intelligent transport systems have increased the use of infrastructure (European Commission, 2012). Due to the common framework and the free movement, the time to cross borders has decreased as well as the cost of checking vehicles because not every vehicle has to be checked at every border (Sun and Pelkmans, 1995).
6. Conclusion

In the conclusion, the main research question will be answered based on the analyses of the three sub-questions. Subsequently, recommendations are given regarding the research topic. Finally, a critical review and the limitations of the research will be explained as well as possible further research.

6.1 Findings and Research Contribution

<table>
<thead>
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<th>Period 3</th>
<th>Period 4</th>
<th>Period 5</th>
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<td>25.5%</td>
<td>136.5%</td>
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<tr>
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<td>Investment to Road Infrastructure</td>
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<td>320.00</td>
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</tr>
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<td>66.7%</td>
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<td>25.2%</td>
<td>138.9%</td>
</tr>
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<td>127.74</td>
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<td>107.4%</td>
</tr>
<tr>
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<td>178.40</td>
<td>84.53</td>
<td>-43.75</td>
<td>99.26</td>
</tr>
<tr>
<td></td>
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<td>20.95</td>
<td>1.60</td>
<td>72.80</td>
<td></td>
</tr>
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<td>25.2%</td>
<td>-3.8%</td>
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<td>33.4%</td>
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<tr>
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<td>-17.12</td>
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<td>-4.17</td>
<td></td>
</tr>
<tr>
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<td>Investment to Road Infrastructure</td>
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<td>34.27</td>
<td>-83.86</td>
<td>36.27</td>
<td>-71.98</td>
</tr>
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<td>62.5%</td>
<td>7.4%</td>
<td>10.7%</td>
<td>126.6%</td>
</tr>
<tr>
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<td>Road Transport Volume</td>
<td>0.72</td>
<td>-33.47</td>
<td>11.51</td>
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<td>116.67</td>
<td>-23.81</td>
<td>76.85</td>
<td>129.17</td>
</tr>
<tr>
<td>EU sample</td>
<td>GDP per Capita</td>
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<td>48.8%</td>
<td>-1.1%</td>
<td>12.7%</td>
<td>83.1%</td>
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<tr>
<td></td>
<td>Road Transport Volume</td>
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<td>-1.57</td>
<td>9.18</td>
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<td>Investment to Road Infrastructure</td>
<td>24.60</td>
<td>58.92</td>
<td>15.92</td>
<td>-81.16</td>
<td>-46.76</td>
</tr>
</tbody>
</table>

Table 32-Summary of numerical findings % of growth in analysed periods (Own figure; based on European Commission, 2016a; OECD, 2017; European Commission, 2017).

Road transport logistics are highly influenced by economic uncertainty. The logistics industry where the road transport logistics are part of suffer from decreased load factors and capacity surplus when economic uncertainty rises. This means that any kind of financial crisis has a big negative influence on road transport (European Commission, 2015). By entering the single market, physical borders between member states disappear, standardisation of transport procedures and other legal barriers are made possible, taxation barriers vanish and general discriminatory barriers do not longer exist.
which should be benefits for member states (DeGroote, 2009). The free movement of goods and people and the vanished barriers have a positive impact on the social aspects of the EU member state.

In this research, eight member states that entered the EU have been analysed based on the GDP per capita and road transport volumes. The link between both variables have been proved by calculating the correlation and decoupling point.

Focusing on the GDP per capita on the short-term, generally a positive effect of entering the EU is experienced. Seven out of eight analysed countries had a strong increase of GDP per capita in the first four years after entering the EU compared to the four years before entering the EU (table 32). When looking at the EU sample as a whole, the GDP per capita grew from 29% to approximately 49%. Besides the positive effect seen on GDP per capita, the road transport volumes show positive results. Seven out of eight countries had a positive growth of road transport volumes. Only Czech Republic shows a weak negative growth but looking at the EU sample a growth of more than 18% is experienced. This can be a result of the positive numbers of investments from the countries in road infrastructure. Looking at the EU sample, the investments in road infrastructure doubled in the period 2004-2007 compared to 2000-2003.

The long-term analysis shows varying numbers over the 12 year period. In this research, the 12 year period is divided into three smaller segments of four years each to see if certain periods strongly influence the long-term outcome (table 32). In the period from 2004 till 2015 generally a positive outcome is seen on the GDP per capita and road transport volumes. The GDP per capita grew with approximately 83% over the time period, which is a strong increase. Also, the road transport volumes increased with almost 27%. When looking at the different time segments, the outcomes of period 2008-2011 show a strong difference. Many negative growth numbers are seen in this period as a result of the financial crisis. A sharp decrease in GDP per capita, road transport volume and road infrastructure investment was experienced in this period. From 2012, most of the outcomes show positive numbers again and are expected to grow in the future.
In this research, the significance level of 0.05 is not met when looking at the EU sample. Also on a country base level this level is often not met. Based on the significance level the results are not completely trustworthy and further research should be done with a larger sample group and focusing on national circumstances influencing the variables.

By focusing on the research question “what economic and legal effects from entering the EU have member states experienced related to road transport?” the following can be concluded.

By being a part of the EU and its associated single market, many barriers disappeared and should have a positive influence on the member states and its road transport industry. Technical, legislative and tax barriers are the three main barriers that have been influenced when entering the EU. Common standards are applied for the member states to increase the trade. Due to the established legislation that are connected to road transport, the free movement has let to positive effects on the road transport sector. The directives created by the EU are focusing on the free market to improve time efficiency when transporting good, to set standards regarding safety and to improve cost efficiency.

Focusing on the outcome of this research, short-term and long-term positive effects have been experienced by the EU sample. On the short-term a sharper increase of GDP per capita is experienced after entering the EU compared to the period before being a member state. The investment in road transport increased and the road transport volumes increased. Also on the long-term the GDP per capita and road transport volumes increased, even though negative numbers are seen in the period 2007-2011 as a result of the financial crisis.
6.2 Critical Review, Limitations and Further Research

This research only focused on eight out of 28 EU member states. In order to evaluate the effect of the EU on road transport the research should look into all member states with an evaluation based on the same criteria as in this research.

This research used the GDP per capita and considered that the only effect on it was the EU. None of the member states’ national circumstances were evaluated. Further research could incorporate the evaluation circumstances on a national level. This would especially be useful since some countries from the sample did not follow the general trend. In addition, the significance level for some of the countries was not met, meaning that the data is not trustworthy. Further research and increased quality of data might improve the reliability of the results.

The evaluation of the member states in this research only briefly analysed the economical focus. This means that there was no analysis on what the countries manufacture and how this potentially might affect the road transport industry.

The data used in this research is from valid and credible sources. Whereas data about road transport volumes before 2004 was not available no comparison could be made between volume changes before and after entering the EU. Further research can focus on acquiring this historical data and to improve the comparison.

Finally, the laws connected to the EU single market and road transport were superficially analysed. A more in depth analysis would be useful taking into account historical data from each member state.
References


The effect of entering the EU on road transport of the member states


Appendices

Appendix I – Data

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Table 33-Road transport volumes in thousand tonnes (European Commission, 2017).

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Table 34 GDP-per capita in Euro (European Commission, 2016a).