Mendel University in Brno
Faculty of Business and Economics

The impact of international trade on Slovak economy

Bachelor Thesis

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Abstract

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The bachelor thesis provides an overview of the international trade of Slovakia and its impact on the economic growth. It determines the relationship between Slovak export and import on the GDP and studies if these variables influence each other. This investigation is made according to the econometric analysis measured in programme Gretl. It also describes how the Euro adoption in year 2009 affected the trade and the GDP and in what dimensions. Afterwards, it analyses the trade from the commodity and territorial point of view.

Keywords

International trade, Euro, GDP, export, import, Slovakia

Abstrakt

Voleková, Z, Vplyv zahraničného obchodu na Slovenskú ekonomiku. Bakalárska práca. Brno: Mendelova univerzita v Brne, 2017.

Bakalárska práca podáva prehľad o zahraničnom obchode Slovenska a jeho vplyve na ekonomický rast. Určuje vzťah medzi Slovenským dovozom a vývozom na HDP krajiny a či tieto premenné sa navzájom ovplyvňujú. Tento predpoklad je testovaný za pomoci ekonometrickej analýzy v programe Gretl. Taktiež opisuje ako prijatie Eura v roku 2009 ovplyvnilo obchodovanie a HDP krajiny. V neposlednej rade analyzuje obchod z teritoriálneho a štruktuálneho hľadiska.

Kľúčové slová

Medzinárodný obchod, Euro, HDP, export, import, Slovensko.

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1 Introduction

Slovakia is a country with the small open economy which creates large possibilities for trading as it possesses strategic location and easy access to other countries. Slovakia has become a country depending on international trade.

1st May 2004 was the date when Slovakia entered the European Union, and afterwards in year 2009 it adopted Euro as a common currency which brings many benefits for the country. By entering to the EU, Slovakia received the changes in the macroeconomic aspects namely decrease in costs from borrowing, stabilization of the currency and as well the huge economic growth which was even higher than the average in Eurozone. However this ideal situation did not last for a long time. In 2009 the global crisis started to influence the world´s economies and Slovakia was not and exception.

There have been many discussions dealing with the fact how Euro adoption can influence the national economies and by how many percentage it can boost the trade. Especially, lots of studies were made to predict how the Slovak economy will be affected from Euro adoption as it happened during the period of the world crisis. Unfortunately, it can be seen after some years as the macroeconomic indicators will not show the effect immediately. Till now, there was a problem with data availability and short period of time; however it has already been 7 years since the Euro adoption for Slovakia, so some signs can be already investigated about the movement of the economy and trade.

As international trade is based on the division of labour and comparative advantage, some countries can be more influenced by its export or others from the imported goods and services. According to the new available data I will be investigating what and in what term affects more the Slovak GDP and how the Euro adoption affected the trade during global crises in Slovakia.

1.1 Aim of the thesis

The main aim of this thesis is to empirically examine the relationship between export and economic growth in a multivariate framework with the introduction of an additional relevant variable, imports. This study will be tested by the econometric program Gretl. The same methodology was used for Tunisia in year 2015, so it can be considered as a current issue.

In the reviewed literature it will be clarified how the Euro adoption during the world crisis affected the trade and if it was a good move of Slovakia to accept it during this period. Afterwards, the related topic with the international trade of Slovakia will be explained from the commodity and territorial point of view.

1.2 Structure of the thesis

The content of my study will be divided into five main chapters. The first main chapter, literature overview will be describing international trade, related stud-

ies about monetary union in general and impact of monetary union on Slovakia as well as the empirical studies about influence of international trade. In the second chapter the methodology and steps needed for my research will be in detail analyzed. The third part will give an overview about the development of Slovak economy including the effects of Euro adoption, world financial crisis and the entrance to the EU showed on macroeconomic indicators as these indicators characterize the growth of the economies. For the most important ones are considered the GDP, unemployment rate, the inflation rate and balance of payments. Macroeconomic indicators are the statistics indicating the actual status of the economy of the state depending on certain area of the economy such as industry, market place, trading etc. These indicators are regularly published by the Government offices and private agency. Macroeconomics studies the economy as a complex, it analysis its total level, level of the national product, employment, prices and international trade. It deals with the research of the total trends in our export and import, compares the indicators and events and studies its future development. It is very important for the state and its economy, because on the basis of this, the country is able to influence its economic activity. All macroeconomic phenomena are mutually dependent upon each other.

The following chapter will be analyzing the trade from the commodity and territory point of view. The commodity part will be analyzed by the Standard International Trade Classification revealing the structure of SITC classes for the year 2015 and the most significant commodities for this year. For better overview of the development of commodity history it will be included the comparison of the SITC structure in years: 1997 the year when Slovakia was an independent state with its own currency (Slovak crown), 2004 when Slovakia became a member state of the EU and therefore is not an independent state in making all the decisions about the economy but on the other hand received many advantages from the EU including the four free movements, 2009 when it adopted the common currency Euro and 2015 the current available data to the period of this thesis. In the territorial point of view the key trading partners for Slovakia in 2015 will be showed. Both parts, the commodity view and territory view will contain the overview of the import and export structure.

The last chapter will be the empirical one, in which the relationship between Slovak export and import on the GDP will be examined by the econometric program Gretl.

2 Literature overview

2.1 International trade in general

International trade is the result of international division of labour. Practically, today every country is dependent on international division of labour which occurs in specializing and cooperating in production process. These economic relations result into economic interdependency in which the main emphasis is on the mutual dependence of states in economic cooperation. Another result of international division of labour is integration – connecting of parts into higher stage. International economic integration is the process of continuous reciprocal connecting, adapting and convergence of single national economies into regional economical complex. International trade includes the exchange of goods and services within the group of countries in international economic configuration, for example European Union or CEFTA – Central European Free Trade Agreement.

International trade is the most important part of the international economic relations. The significance from the national economy point of view can be seen mainly in the areas where international trade provides the import of those goods, services and capital which the country cannot produce from certain reasons. Therefore country can engage largely in international division of labour and by this can specialize in production for which it possesses the best conditions. By gaining the knowledge about goods and services produced abroad, it gives the opportunity to compare the level of the own production with the world one. International trade enlarges the market place and thanks to the international trade, the consumer possibilities of the country can expand during having the same factors of production, which results from the theory of comparative advantage.

While trading the goods and services globally, consumers and countries are given the possibility to be surrounded by products that are not accessible in their countries. The global trade creates the opportunity to use the resources of the countries more efficiency and thus they can sell it at lower prices than other countries. In other words if a country cannot produce the goods efficiently, it can gain it through the trade from another country. This process is called specialization. The country which is able to create more products or better goods and services than anyone else has so called absolute advantage.

On the other hand, the countries might receive the benefit also by the comparative advantage referring to the capability of producing the goods and services by lower opportunity cost, but it does not have to be necessarily with higher volume. This theory of comparative advantage is assigned to English economist David Ricardo.

Despite the benefits from higher efficiency in production, the countries from trading globally have possibility of encouragement of foreign direct investment representing the amount of money that are invested into foreign

firms and other assets. It is a way how foreign currency and expert knowledge can step in the country and the economies theoretically may grow more efficiently, become competitive on the economic market and result into increase in employment, growth of the GDP and create higher revenues.

2.1.1   EU position in the trade

In the global sphere of international trade, the EU is in the main role as its openness of the trade means that the European Union is the largest layer on the global area remaining a good distinct to do a business with. The strong position was mainly acquired by being one voice rather than operating as 28 individual trade strategies. Its deep integration into world´s markets became by the ease of modern transportation and communication systems which make it easier to produce the goods and services, the buying and selling of it around the world, thus it creates the possibilities to trade within the third countries for the European businesses of every size. The EU trade policy tries to enlarge the possibilities for trading and investing with the countries also outside the EU which would increase the economic growth and jobs opportunities.

According to the Directorate General of Trade (2010) the EU is the biggest actor in international trade, accounting for 17% of global imports and exports and it is a top trading partner for 80 countries, which comparing to the United States is by 20 countries lower.

The study by Sousa N. et al. (2012) examined the relationship between employment and trade of the EU taking into account exports to the third countries including also the upstream businesses which provides the components for production process of exported goods and services, they founded out that exports provided to the third countries supported 25 million jobs in the EU in 2007. In year 2000, the number of jobs was lower by 3 million. To take a closer look at Slovakia, in this research, in year 2000 it had 280,000 jobs supported by Extra-EU exports and in year 2007 it declined to number of 108 000 jobs.

In this research they also examined in what industries the jobs were mostly involved. The export of manufactured products in 2007 has the largest share of the jobs around 16 million with 64% share of total, followed by exports of other services (such as hotel and restaurant services, land transport, travel agency services, telecommunication services, pension funding, etc.) with 5.6 million of jobs and trade and repairing services with 2.9 million of jobs. Comparing the years 2000 and 2007, there was an increase of manufactured products by 6.6%, in the export of services, the increase was by 34.8% and contrary, the decline by 18.2% was in export of agricultural, fishing and mining products.

2.2   Impact of Euro

The introduction of the common currency Euro in 1999 was a historical situation and opened many opportunities for studying and examining the potential

impact on the economies. The most important argument was that it would lead to reducing the foreign exchange rate risk which firms in the EU can benefit from and corporations with more significant trade and investments as well.

Intensive discussion about impact of monetary union on the international trade was discussed in the article of Andrew Rose (2000). In his research he used the quantification of the impact of membership in monetary union by the so called gravitation model of the bilateral trade and he came to the conclusion that single currency can lead to the triple increase of international trade. This result was the impulse for many more studies as the trade effect of monetary union was unbelievably high. The increase in international trade as a result of integration into monetary block in the economy literature is used as Rose´s effect.

Several other studies deal with the concrete effect of implementing the single currency Euro for the development of international trade. Micco et al. (2003) analyzed the impact of Eurozone on the sample of 22 industrial countries and came to conclusion that international trade of member states of Eurozone increased thanks to the single currency from 5 to the 20 %.

Barr et al. (2003) investigated the impact of membership in Eurozone to the increase by 29%. Authors in both cases included into control variables also volatility of the Exchange rate. Their results are therefore bind on the unit introduction of the single currency, regarding the effect which will occur by decreasing the volatility of Exchange rate. The estimated increase of trade can be ascribed to the entirely deepening of the trade relations.

Empirical testing of the impact of monetary integration contributed to the defining other criteria for optimal monetary area which were suggested by Baldwin and Taglioni (2004). They added so traditional economic criteria as the openness of the economy, mobility on the labour market and diversification of the export. The results of the testing approved that the rate of integrity of the countries with monetary union influences positively the development of mutual trade. Increase of bilateral trade between new members and monetary union is stronger by how much their relations were before their integration. Secondly, they found out that membership in the monetary union increases bilateral trade in sectors where the rate of competition is relatively low. This detection is directly related to the effect of price transparency.

2.3   Impact of Euro for Slovak international trade

According to Fidrmuc J. and Worgotter (2013) Slovakia with its entry into the Euro area experienced a significant change in the macroeconomic framework for a small, catching up economy. The interactions between the Euro adoption and the crisis worked both ways.

In this chapter the main advantages and disadvantages of the Euro adoption are described and to fulfil the satisfying effect of Euro currency, the pros must oversize the cons.

It is needed to take also into account that during the adopting process of the Euro, the situation of global financial crisis occurred and started hitting the world's economies, and Slovakia was not an exception, it received declined in the GDP by 4.9% and export fell by 15% causing the strong recession. The attempts of recovery were mainly by trying to export more and providing the investments. Unfortunately with its GDP growth which was one of the strongest in OECD member countries (Organization for Economic Co-operation and Development), employment remains high.

2.3.1   Advantages of adopting Euro

Removal of transaction costs for Euro transactions: transaction costs arising during the Exchange rate operations can be divided into financial and administrative costs. The financial costs include the difference between the buying and selling price, called spread, and other payments connecting for the exchange. On banking market this difference represents the highest share of all transaction costs. As Slovakia entered the EU in 2004, the annual volume of Exchange rate transactions leads to the repeating increase of financial transaction costs connected with Euro operations. For calculation of financial spreads, only half of the founded spread is taken, so for the realized costs it is considered only the change in between the middle point of Exchange rate and buying/selling Exchange rate. According to the research of National Bank of Slovakia the Euro adoption leaded to the savings of 0.3% of the GDP from the removal of transaction costs. In the studies worked out by European Commission (1990) transactional costs in small open economies can reach around 8 times of the financial transaction costs in big countries, for example in Germany and France the financial transaction costs before their Euro adoption represented 0.11% of the GDP.

Removal of transaction costs in administration and accounting: while dealing with the financial transaction costs, there becomes an occurrence of foreign Exchange transaction costs in the administrative costs. These costs are called in-house costs including extra costs made by businesses for securing the human and capital resources needed for realization of the foreign Exchange operations (for example costs for managing the currencies, costs for additional reporting, costs for delay of payments, and so on). Studies by Ernst and Young (1990) were estimating in-house cost in present Eurozone countries to be approximately 0.1% of the export to the countries of the EU before Euro adoption. For the first three quarters of the entrance to the EU, Slovakia exported to the EU countries goods and services in amount of 611 billion of Slovak crowns (the GDP was 1 056 bill. Of Slovak Crowns) which predicted the saving in administrative transaction costs in the amount of 0.06% of the GDP.

Removal of Exchange rate risk: by adopting the Euro currency, Slovakia managed to remove the risk between the Slovak crown and Euro. Another effect is the slightly decrease of Exchange rate risk towards other world important currencies. The volatility of the Exchange rate represents for the firms

and inhabitants the exchange rate risks. Decisions made about the buying or selling of the goods and services in Euro currency comes to the risk of the negative development of the rate, some trade operations for this reason do not have to be even realized. The National Bank of Slovakia calculated on the basis of the estimation of the Exchange rate risk price and the volume of the resources exposed to the risk of the amount 0.02% of the GDP, while the above level of the estimate is 0.08% and the below 0.01% of the GDP.

Higher transparency of prices: immediate effect of the Euro adoption is direct comparison of prices on the domestic market and the markets in Eurozone. Transparency of the consumer prices enables inhabitants' better orientation in price levels within the country and abroad. In business sector this will lead to increasing competition which puts pressure on prices and protects their increase. The Euro adoption pointed out the differences in prices of member states within Eurozone which were to the certain level hidden as they were expressed in different national currencies. It was expected to put emphasis on the competition and lead to regionally balancing of the prices. The study by Tabellini (2004) showed that the intensive price convergence occurred in the EU in the first half of 90ties years as a result of creation of single market. By De Nederlandsche Bank (2004) the research in business sector pointed out that the increase in price transparency after Euro adoption was not accepted by all firms positively. Mainly the international corporations are limited by the opportunity of price differentiating practices and discrimination between countries which approves the advantage of the common currency.

2.3.2 Disadvantages of adopting Euro

Loss of independent monetary policy: monetary policy enables Central Bank to react on specific economic conditions, lowering shocks in economy and in the end creating the price stability for supporting the stability of real economy. Monetary policy acts on real economy by several channels. The traditional one is the interest channel – the change of nominal interest rates by Central Bank lead to the real interests' change which influences the aggregate demand and subsequently the inflation and the GDP. In Slovak case, more significant channel is the Exchange rate transmission of monetary policy – Central Bank obverts the nominal Exchange rate which influences relative prices of imported and exported goods and services, with direct impact on inflation and indirect on aggregate demand. Borghijs and Kuijs (2004) stated that from the macroeconomic stabilization, the costs and revenues from the loss of independency in monetary policy with flexible Exchange rate depend on character of shock and abilities of exchange rate risk to absorb these shocks. Flexible Exchange rate is useful on absorbing real shocks; however it does not help in case of monetary and financial shock. They found out that in case of Visegrad countries and Slovenia, the Exchange rate in the past served as unwanted circulation of monetary and financial shocks rather than useful tool for absorbing real shock. For the country it is a good move of Euro adoption when the economic

cycle is similar to the economic cycle of the remaining countries within the EU. According to study by Demyanyk a Volosovych (2004) the economic cycle of Slovak Republic is rather symmetric with the EU cycle, although the accessing countries are not enough synchronized as the member countries of EU.

One-time costs for adopting Euro: these one-time costs were reflected in bank sectors, business subjects but also in Government sectors as it had to be financed by every subject itself. Entities had to adapt new information systems, alignment of relations with employees, suppliers, subscribers and their own bank. From the most accepted analysis for calculation of one-time costs is used the internal estimate of costs worked out by Central Banks of Eurozone countries. Their estimates are around 0.3% - 0.8% from the GDP. Costs for Holland which were estimated by De Nederladsche Bank (central bank) were stated to be 0.7% of the GDP. For Slovak situation, it was a little bit different as there occurred specific factors for adoption of Euro which in Eurozone countries had not existed before and it is: different way of adoption of Euro in cash and non-cash circulation, stated as Big Bang scenario. It means that the long transition period was left out in Slovakia and the length of dual circulation was shortening to 16 days. Slovakia benefited the experience from countries that entered the Eurozone with system of Big Bang. It should be also taken into account that one third of the Slovak GDP is made of foreign direct investments, from which 67% was coming from Eurozone countries. As the parent companies of Slovakia in Eurozone experienced the Euro adoption, it helped to transfer the methods and approaches to businesses. On the basis of estimated savings the costs were set to be around 0.4% of the GDP.

Specific costs of banking sectors: instead of only one-time costs general for all entities, commercial banks are in partially different positions which results from their activities. It is mainly occurred in two areas which are related to its decisively status of intermediaries of financial flows in the economy. The first area contains the costs resulted from specific status of banks in system of cash circulation. The requirement of ensuring in short time free conversion from Slovak crown to Euro currency in cash payments. This activity caused increase in operation costs. In non-cash operations the position of banks as significant creditors or debtors reflected to higher costs needed on maintenance of information systems. It is important to state that also time needed for the change of information system created extra costs, as calculated by National Bank of Slovakia, in SAP applications the transmission on Euro took from 6 to 12 months. Second sphere are the structural balance changes in the structure of costs and revenues of banking sector connected to Exchange rate operation.

2.4   Empirical research about impact of international trade

These three main variables – import, export and the GDP have been the major issue for many studies, especially the relation between them. The analysis and studies between them may be divided into two lines. First one includes separate study and the influence of the export or import on the GDP. In the second one the export and import are analyzed collectively. Both lines can be provided by two methods of the examination. The simple regression as well as the multiple regression is the first method and the second one is causality technique. Lately, many analyses were focused on implementation of the Vector auto regression model and Vector error correction model with the co-integration approach.

2.4.1   Studies using simple or multiple regression method

In paper worked out by the authors Olson M. et al (2011), they used the simple and multiple regression for the examination of the relation in a variety of countries between the export and the GDP. They used the cross-country data which were related to trade with the result that in the year 2011 there was a positive relationship between the variables GDP and export. In their research they took into account the countries together as a whole for providing the general overview of how the export is affecting the GDP. Overall, their results approached the theory of export-led growth.

In another study supervised by Maneschiold P. (2009) the multiple regression was used. The examined variables GDP, export, import and investment were applied in the study to compare the information between Poland and Sweden. The obtained results differed in both countries. While in Poland its export affects negatively the GDP, in Sweden the export coefficient is positive. Sweden is the country well known for its capacity for the export and technological knowledge, while Poland possesses too many resources for the export and not enough knowledge and experience, so in the long run the exported products are more expensive than expected. This is the main reason for the different results of these two economies, one country which is under pressure of international competition and the other country which has recently entered the liberal economic market.

The analysis worked out by Pnadhi D. (2007) examined the relationship between exports and the GDP for four African countries, namely the Democratic Republic of the Congo, Guinea Bissau, Malawi and Nigeria by the usage of regression analysis. They added two more variables to the model and it was the investment and population. The results showed that there is a positive relationship between the export and the GDP for all countries expect Malawi, which had the negative coefficient. The investment variable was not statistically significant in all countries, while the population variable revealed the positive effect

for Nigeria and Malawi and negative sign for Democratic Republic of the Congo and Guinea Bissau.

The study by Mehmood S. (2012) examined the relationship between the export, import and the GDP in a more complex model having 13 variables by using the multiple regression. They compare the Pakistan and Bangladesh economy to identify which country is in better position. The analyzed variables were the GDP, gross national expenditure, final consumption expenditure, goods export and imports, services export and imports, external debt stocks, gross savings, FDI inflows, FDI outflows, gross domestic income, net income from abroad and workers' remittances and compensation of employees paid. The results for Pakistan demonstrated the positive effect of gross national expenditures, goods exports, gross savings and final consumption expenditure on the GDP and the negative effect of external debts, total stock and services export on the GDP. While in case of Bangladesh, the gross national expenditures, external debts stock total, goods imports and export have positive effect on the GDP of Bangladesh and the variable final consumption expenditure has the negative effect.

2.4.2   Studies using causality technique

Ullah et al (2009) used the causality technique, namely tests – Unit root test, Co-integration and Granger causality through Vector Error Correction model for Pakistan economy. The results of their analysis showed that export leads to economic growth of this country. The added examination included the study whether there is uni-directional or bidirectional causality between the variables of economic growth, real exports, real imports, real gross fixed capital and real income per capita. The traditional Granger causality test revealed the existence of unidirectional causality between economic growth, exports and imports. Contrary, Granger causality through VECM model was checked by the F-value and t-value to partially reconcile the traditional Granger causality test.

The empirical analysis worked out by Wong H. (2008) investigated the relationship between the export, domestic demand and the GDP in Indonesia, Malaysia, the Philippines, Singapore and Thailand before the Asia financial crisis. The results examined by the Granger causality showed the evidence of bidirectional causality between export and economic growth. However, a sustainable economic growth requires the growth in both exports and domestic demand as the economic growth increases the domestic demand and exports. There is just weak evidence that the export-led growth strategy is a main cause to Asia financial crisis.

Study by Ramos F. (2002) used the Granger causality to test the relation between exports, imports and economic growth in Portugal. The import variable has the role in the investigation of exported goods emphasized by the causality, which enables one to test for the direct causality, indirect causality and the spurious causality between export growth and output growth. The provided tests showed the feedback effect between exports output growth and imports output

growth. The expected unidirectional causality was not proved and as well no significant causality between the export and import was approved. The results seem to support the outcome that the growth of output in Portugal during period 1865-1998 revealed a shape associated with a small dual economy with quite limited transaction within the country´s industry.

Co-integration and Granger causality test were applied also in the research by Hussain M. (2014) examining the relation between exports and the GDP in Pakistan for period 1976-2011. The analysis included Augmented Dickey Fuller stationarity test with results of the variables being integrated at first order. The hypothesis tested the co-integration and causality between GDP and exports and whether there is a short-term causality or a long run. The Johansen test showed the long run relationship between these two variables. The findings indicated the unidirectional causality from GDP to exports.

Study provided by Yuhong Li, Zhongwen Chen and Changjian San (2010) did the research on the relationship between foreign trade and the GDP growth of East China. Empirical analysis was based on causality and modern economy.

Vohra (2001) tested the relationship between the export and growth in India, Pakistan, the Philippines, Malaysia, and Thailand for period 1973 and 1993. The empirical results indicated that when a country has achieved some level of economic development than the exports have a positive and significant impact on economic growth. The study also showed the importance of liberal market polices by pursuing export expansion strategies and by attracting foreign investments.

Hatemi (2002) studied causality between export growth and economic growth in Japan by performing augmented Granger-causality tests using the bootstrap simulation technique. The results show that the Granger-causality in bidirectional, which means the expansion of exports, is an integral part of the economic growth process in Japan. However, they point to a causal relationship between international trade and exports and economic growth.

3 Methodology of the thesis

The thesis provides an overview of the impact of international trade on the Slovak economy. In the literature overview the international trade is described in general, followed by the review of studies and research of the economists describing the issue connected to the effect of monetary policy on the economy and empirical studies about the impact of international trade on the economy. The impact of the Euro currency including the advantages and disadvantages is demonstrated by the studies and literature overview.

In the chapter called Development of Slovak economy, firstly will be analyzed the Intra-EU trade and Extra-EU trade, as after year 2004 when Slovakia entered the European Union, Slovak trade is divided into trade within the EU containing the four free movements of goods, services, people and capital and the Extra-EU trade – the trade with the third countries. The impact of the entrance to the EU and Euro adoption will be described on the macroeconomic indicators. Following chapter is describing the structure of trade from the commodity and territorial point of view.

The empirical part will be focused on the analysis of the relationship between the export and the GDP with additional variable import. There have been many arguments that both import and export have impact on economic growth of the countries carried by many scientists, however most of them were focused on mainly just how the export influences the GDP or the import influences the GDP. As these studies were not enough complex, an additional variable import will be included in the model to see the relationship of international trade on Slovak economy more precisely. It can be assumed that the tests provided by program Gretl will approve my expectation, that the export influences the GDP in a bigger way and it will be from the long-term orientation. The study is based on the research by Hussain M., Saaed A., (2015) in which they compared the same relationship but applied in Tunisia with the results that growth in Tunisia was led by a growth-led import strategy as well as export led import, thus imports are considered to be a source of economic growth in Tunisia.

It will be analyzed on the sample of the annual data in the period of 1995 – 2015 obtained by Eurostat, receiving 21 observations. For the research, the program Gretl will be used. All the data that are used in my work were the latest data available to the period of writing.

The dependent variable in the equation is the GDP and the independent variables are export and import in mil. €. The general form of the equation can be expressed following:

$$GDPt = f \, (export, \, import)$$

After trying various types of models, the log –log format had the best fit and can be specified and transformed to linear format as:

$$LnGDP_t = Ln\beta_0 + \beta_1 LnExport_t + \beta_2 LnImport_t + Ln\varepsilon_t$$

LnGDP = the gross domestic product in Slovakia, the economic growth

LnExport = the export of Slovakia

LnImport= the import of Slovakia

β = is a constant term

t = the time trade

ε = the random error term assumed to be normally distributed

β_1, β_2 = the slope and coefficient of regression, interpreting by how much % the dependent variable GDP will be changed if the export and import will change by one %.

As this analysis is estimated by time series using the causality technique, working with this data is different than in simple and multiple regression, so some tests need to be done to prevent the spurious regression and receive correct model.

For testing the unit root for the stationarity of the data will be used the Augmented Dickey-Fuller test (ADF) which can manage more complex models than the Dickey-Fuller test with the null hypothesis:

H_0: unit root = 1, time series are non-stationary

H_1: unit root < 1, time series are stationary

The Unit roots in the time series must be tested as it can cause unpredictable results and spurious regression. If the series are not stationary at the level, their first difference might be and therefore the stationary data will be acquired. In case that there will be still a problem with stationary, the Hodrick-Prescott filter will be used for removal of the cyclical component of the trend which may occur as the Slovak economy received some structural shocks during its development. The adjusted data are modified by lambda. Lambda is a constant, parameter of the filter which can be arbitrarily set up, as the lambda is higher, the smoothing is higher as well.

This study will also have to include testing of the co-integration. Co-integration is the situation in which there is no problem of the spurious regression and it happens when time series of X and Y are co-integrated. If time series Y and X have unit root but their linear combination is stationary, then Y and X are co-integrated and the original data can be used. The Engle-granger test is used for this analysis of co-integration in which firstly, all time series of first order are tested for the presence of unit root and afterwards its linear combination. If the data are no co-integrated, the adjusted variables by HP filter will be used, and if they are co-integrated the original data can be used.

Next step of my research include the creation of the model, in the case of co-integrated time series the VECM model (Vector error correction model) is applied and if the series are no co-integrated the VAR model (Vector auto regression model) which is the extension of the auto regression model testing the behavior of more than one variable. The VAR model can be extended to VECM model when there is an evidence of co-integration between the series and the model fits to the 1. differences of the non-stationary parameters, but a lagged error correction term will be added to the relation. The VAR and VECM model provides the overview of the variables and tests the relation between them as it creates for each variable an equation including the time lags. Thus, the example of an equation for export with four time lags is following:

Export (t) $= \beta + \beta_1*Export(t-1) + \beta_2*Export(t-2) + \beta_3*Export(t-3) + \beta_4*Export(t-4) + \beta_5*Import(t) + \beta_6*(t-1) + \beta_7*Import(t-2) + \beta_8*Import(t-3) + \beta_9*Import(t-4) + \beta_{10}*GDP(t) + \beta_{11}*GDP(t-1) + \beta_{12}*GDP(t-2) + \beta_{13}*GDP(t-3) + \beta_{14}*GDP(t-4)$

To test the significance of the coefficient in the models is used the T-test with the hypothesis:

H_0: $\beta = 0$

H_1: $\beta \neq 0$

The F-test will examine the model as a whole with the hypothesis:

H_0: vector β (β_0, β_1, β_3... β_{12}) $= 0$, the model is not significant

H_1: at least one coefficient of the vector $\neq 0$

For choosing the optimal length of the time lags and model as well, the approach of information criterion will be used. It is a measurement of the quality of the model and it calculates the information criterion for every model and chooses the one with the highest value. This method is the most used in models of time series as it also selects the optimal length of lags.
There can be possibility that the model will not be able to be statistically examined as Slovak economy experienced structural shocks and therefore the other models will be included with the same approach of examination.

In the following model two more variables Openness of the economy and real effective Exchange rate will be added to prevent the problem with missing variables in the model with the general form of equation:

$$GDP_t = f \text{ (export, import, openness, REER)}$$

Third model will include division of export and import into Extra-EU and Intra-EU trade giving more complex analysis of the relation among international trade and the GDP of Slovakia. The form of the equation is following:

GDPt = f (ExportExtraEU, ImportExtraEU, ExportIntraEU, ImportIntraEU)

And the last model will analyze the trade as a net export and its impact on the GDP of Slovakia including variables such as labour and gross capital:

GDPt = f (Labour, GrossCapital, Trade)

4 Development of Slovak economy

4.1 Impact of trade policy

International trade policy determines the significant tool on enlarging the economic growth without negative claims on public finance and international demand is at the same time the most important resource of the economic growth of the EU. After the entrance of Slovakia into the EU in 2004, the international trade policy of the Slovak Republic became the part of the common trade policy of the EU in which the competences are on the level of European Commission. From this year for Slovakia international trade is divided into Intra-EU trade and Extra-EU trade.

Table 1: Structure of trade in mil. € (Source: Eurstat)

	Structure of trade			
	ExportExtraEU	**ImportExtraEU**	**ExportIntraEU**	**ImportIntraEU**
2004	2853,63	5052,25	12242,64	10160
2005	3182,42	6133,12	12352,82	11411,18
2006	4233,36	8824,57	14515,21	14377,76
2007	5463,03	11166,27	18997,78	18204,98
2008	6864,34	13483,25	1960,37	19504,9
2009	5509,63	9970,28	17491,07	15153,76
2010	7447,73	13686,98	22032,06	19583,78
2011	8539,6	15291,6	25126,74	22417,12
2012	9952,86	15828,51	26344,71	23879,82
2013	11009,01	15815,38	26616,48	25185,62
2014	10171,76	14768,33	27588,24	26358,5
2015	9858,85	14110,17	29443,78	28871,85

The structure of the trade after year 2004 and its division into export and import to the countries within the EU and outside the EU can be seen in the table above showing that most of the share of the trade is obtained from countries within the EU.

4.1.1 Intra-EU trade

Intra-EU trade refers to the Exchange of goods and services between member states of the EU observed by statistical system called Intrastat. The main aim of it is to remove the barriers and create free movement of goods, people, services and capital between member states by which the Intra trade within the EU is created. Instead of this main principle of four free movements, it includes

principles and rules which ensure that competition within the Intra-EU trade is not disrupted and regulations of member states are united to the extent that is needed for functioning of Intra trade. Other important tasks are supporting policies for protection of environment, social policy and policy for unemployment.

The advantages that Slovakia received by the Intra-EU trade are: unlimited movement of goods produced in Slovakia to countries in the EU, cancelation of tariffs on imported products from the EU countries, removal of trade and technical barriers, removal of limitations for imported goods in non-trade contact for personal use and bigger range of products for consumers.

Receiving all this benefits and enlarging of the export opportunities, it can be claimed that also these factors were keeping Slovakia between the countries with highest openness in the EU which means how the country is interconnected with other markets and able to react on changes in it by using the possibility of exporting the goods and services or opening their market to other countries in the mean of import. In year 2013 according to the open market index announced annually by International Trade Chamber was Slovakia on the 9th place.

As Fojtíková L. (2009) said: the rate of the openness of the economy is one of the possibilities how to evaluate the trade policy of the concrete state. The increasing rate of openness determines the increasing international trade.

In the following graph it can be seen that the development of the openness of Slovakia proving that from the entering year 2004 into the EU, the Slovak openness of the economy started to rise fast reaching the value 185.2% in year 2015 which is compared to year 1993 when it was formed with value 114.8% increased by 60%.
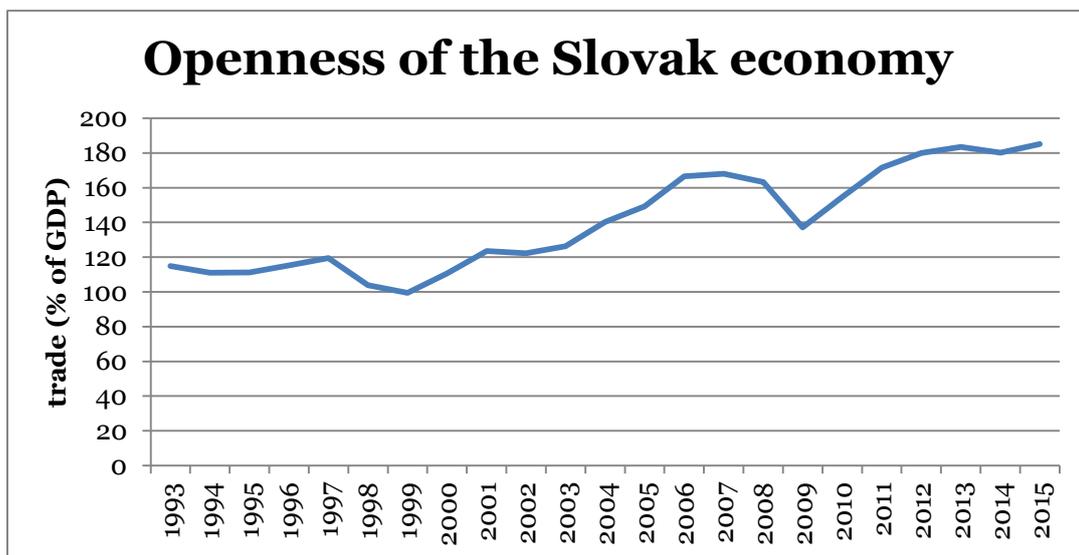
Figure 1: Openness of Slovak economy in % in 1993-2015(Source of data:Worldbank)

From the above stated benefits from the Intra-EU trade, the export increased mostly to member states. As described by Záborský J., Lehuta M. (2014), one of the very good examples of this trend can be development of international trade between the Czech Republic and Slovakia which after the separation of federation in 1993 were keeping the Custom Union providing freer movement of goods than in neighbouring countries. At the early 90ties, more than one third of Slovak export was directed to the Czech Republic, while in 1997 it was more than one fourth of Slovak exports. After 10 years this share was declined to the level of 14% of the total export and this level was steadily kept until now. The impulse of the change of this trend was the integration of countries into Intra-EU trade. The significant role in international trade of these two economies started to play Germany as it consequently was becoming its key trading partner.

4.1.2   Extra-EU trade

Extra-EU trade includes all the trade that is realized outside the EU with the third countries recorded in statistical system Extrastat. The common trade policy of the EU contains several multilaterally tools supporting the export focused on the increase of competition on domestic industry and the gain for the better access on the markets of the third countries. It is mainly about simplifying the trade outside the area of the EU by treatments about free trade and using other tools appearing from the rules of the World Trade Organization such as tariff quotas and suspension, the usage of tools for the trade protection (antidumping, subsidies, etc.). The EU created also tools for protection of the trade and access on the market to safeguard businesses within the EU. It helps developing countries to participate on the trading by lower tariffs and supporting programs. The EU every year tries to improve the common trade policy. For example in year 2015 the main goals of the common trade policy of the EU were focused on:

> ➢ deepening of the relations with the key strategic trading partners (by negotiations about the treatment of the free trade – mainly Japan, the USA, India or Investment agreement between the EU and China),

> ➢ creation of the advantageous conditions for the entrepreneurship (by agreements of the free trade, but also by specific initiatives of the European Commission such as the tool for opening the market of public acquisition in the third countries or increase of effectiveness and transparency tools for protection of trade),

> ➢ approval of contributions of the trade for the development (implementation of the new system of general preferences) and support of sustainable development.

International trade plays important role in the increase of life standards and the number of work opportunities in the EU. This contribution can be even

stronger if 90% of the future global economic growth will be generated outside the EU which still stays central pillar of the world economy. Nowadays, the EU has the biggest world trade and it is the most important trading partner for almost 80 countries. From these reasons, the EU must remain open and liberal economy for the entrepreneurs and continue in developing contributions from the international trade.

From the report worked out by Ministry of Economy of Slovakia (2015) it is obvious that total competitiveness of Slovak exporters after the entrance to the EU has increased, even oversize the share of competition by quality. However, from the structural point of view, the share of exports competing by quality was increasing only to countries of the EU 10. Exports directed to countries of EU 15 and third countries increased by price competition. Clearly, the free market for Slovak exporters enlarged within the EU area, but also in relation to third countries as the EU as a whole has better access to the markets of third countries. This leaded to flow of foreign direct investments to Slovakia.

As the competition of Slovak exporters to markets of the EU was increasing, in case of third countries markets has dropped down which was caused by lower export of automobiles mainly to the USA. According to data by Ministry of Economy in 2015, the share of export to the EU countries was created by 85.2 % and compared to year 2014 has increased by 6.3%. Even though, that the EU created beneficial conditions for member states for trading with third countries, Slovakia is dependent mainly on the export to the EU countries.

One of the main aims of the common trade policy of the EU was the acceptance of the common custom tariffs. According to Richard Outrata et al. (2002) by comparing the custom tariffs it turned out that Slovakia had slightly lower custom protection than the EU. Average level of Slovak tariffs was in year 2001 6.1% which was lower by 0.5 percentage point than in the EU. On agricultural products there was the tariffs around 11.8% which is 5.5 percentage point lower than in the EU and in the industry products it was 4.3%, again lower than in the EU by 0.2 percentage point. On the basis of this data it can be stated that the common custom tariff should have leaded to light increase of the average level of custom tariffs in Slovakia. It meant from the application point of view the continuance in the existing condition because it was applied on the same countries towards which Slovakia applied the imported contractual duties (Australia, New Zealand, the USA, Canada, Japan, Hong Kong, the Korean republic and Singapore) and the share which was relatively low around 4.3%. In the area of preference duties Slovakia had narrower territorial view, because it provided these conditions only to some countries. However, the EU applied these tariffs also to other countries such as to Mediterranean countries and the ACP countries – Africa, Caribbean and the Pacific. By this context, the common trade policy leaded on one hand to wider application of preference duties, but at the same time to the bigger participation on the benefits offered by the EU.

4.2 Macroeconomic indicators

4.2.1   Gross domestic product

This indicator (GDP) helps to calculate the efficiency of the economy of the concrete state. It determines the value of all final good and services produced and performed for the certain time period in the area of the concrete country.

It excludes the intermediate that is the merchandise which is set for the following processing or selling because it would cause multiply reckoning in calculation of the GDP.
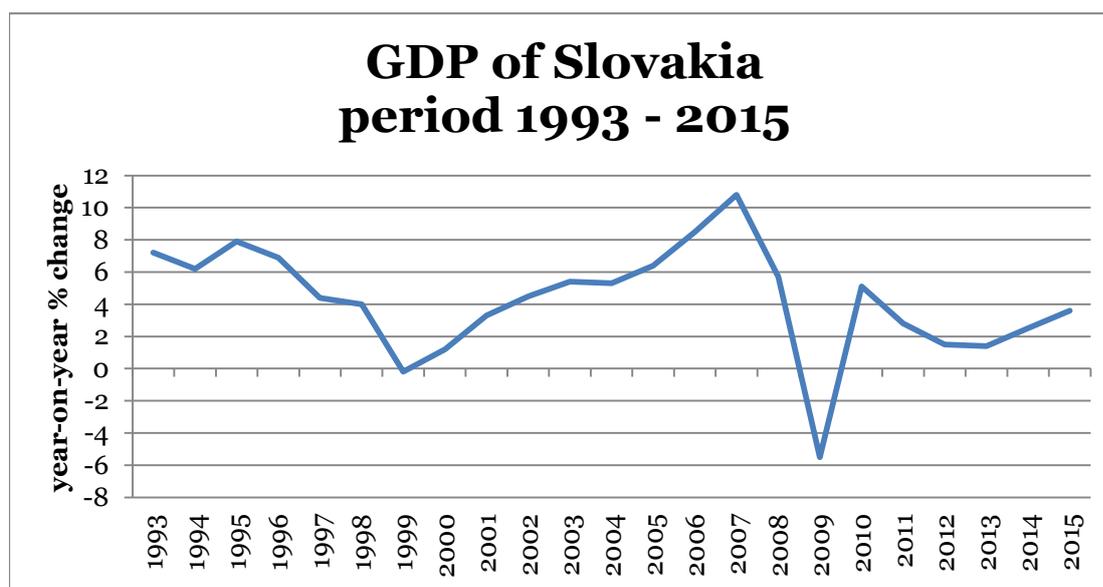
Figure 2: GDP in % change in 1993-2015 (Source of data: NBS)

In the graph above is described the GDP year-on-year percentage change for years 1993 – 2015. It can be seen that from year 1993 to 1998, the GDP was increasing slightly with small percentage changes, in year 1999 it declined by 0.2% from the previous year. After year 2005 Slovakia was annually reaching significant extent of increase of real GDP. In year 2005 it was 6.4% increase, in year 2006 it was 8.5% and in 2007 it reached the value of 10.8% change from previous year. This is the highest % change from the previous year in the whole period from the formation of the Slovak Republic till nowadays.

In year 2006 the increase of real as well the potential GDP was influenced by positive development of total productivity and enlargement of capital sources. This year Slovakia received foreign investments and sources from Eurofonds realized by the launch of production process in two automobile factories PSA Peugeot-Citroen and KIA Slovakia. These automobile industries leaded mainly to shift from national demand to international demand - export. The decline of national demand is caused by increasing interest rates.

In year 2007, Slovak economy with its highest growth has dynamical sustainable development without signs of overheating. Growth of the GDP is in balance, influenced by foreign and national demand. Export is oriented on automobile and electro-technic industry. The growth slows down in year 2008 under impact of global crisis to 5.7% change. In year 2009 the GDP was hit and fell by 5.5%. The decrease in Slovak GDP was bigger than in countries around, for example in the Czech Republic it was around 4.6% and in Poland 1.6%.This year was hit by two events. The first change in the Slovak Republic was the adoption of Euro currency with results in slow increase of prices during the whole year. Slovakia managed to create some actions to not increase prices rapidly. Second negative impact was the gas crisis which was solved in short period but left negative consequence in increasing inflation.

In 2010 Slovakia recovered from the crisis in relatively short time which can be seen in the increase of 5.1% from the previous year. This was caused by reforms realized by the Government namely: reforms of pension system, tax system and the Labour Code. Another recovery was maintained by so called scrappage contribution to inhabitants for their old cars in the amount of money to encourage the purchase of the new one to boost the automobile industry. Since this time the GDP has similar % changes from the previous years. In year 2015 it is at the level of 76,521 billion €.

4.2.2   Unemployment

Unemployment is a social-economic phenomenon, which represents the result of the unbalance on the labour market between the supply and demand. It is a serious economic problem because it represents the lost potential value of the whole economy. The consequence of the high unemployment is the large volume of unproduced or lost GDP.

On the graph below there is a description of the total development of the unemployment in Slovakia for the period 1998 – 2015. The highest unemployment rate was reached in years 2000 – 2002 and the number of the unemployed people was progressively declining until the year 2008. Till this year Slovakia possessed large foreign direct investments (FDI), but since the global crisis occurred, the FDI are becoming more significant for Slovakia, but unfortunately it created few extra opportunities for labour force and became the defense of already running operations in way of strong appreciation of Euro, new competition and worse perspective for Slovakia´s most exported goods (cars and flat screens) The foreign direct investments and employment rate are strongly related in the way that if FDI increasing, the employment rate increases as well and otherwise. In year 2009 the unemployment started to rise as the real Exchange rate depreciated and FDI inflows to Slovakia slow downed.

Unemployment rate of Slovakia
1998 - 2015
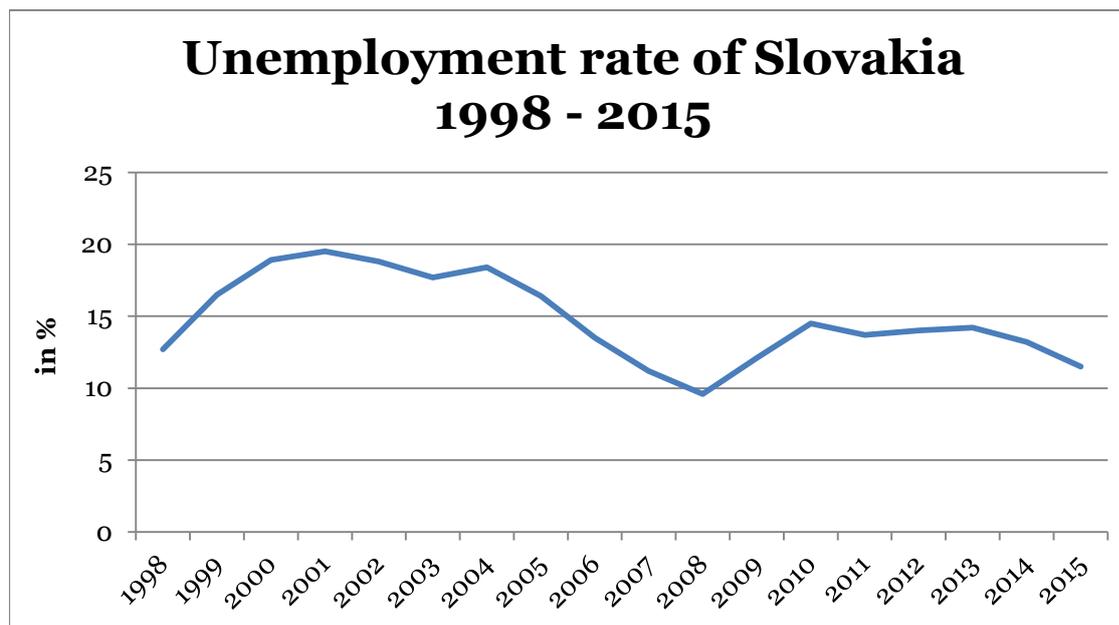
Figure 3: Unemployment in % in 1998-2015 (Source of data: Eurostat)

What can be also noticed is the fact that the unemployment started to increase a little bit later than the GDP recession shock occurred. Being influenced by outputs it decreases reaching the third largest number of the unemployment 14.5% in 2010. As it is known from the text above, Slovakia managed to bring the recovery of the GDP to the pre-crisis amount at the fast pace in 2011; which contributes to slow declining of the unemployment. In year 2015 it reached number 11.5% which is relatively low taking into consideration that the Slovak Republic has the long-term problem with the unemployment and it regularly places between countries with the worst results of this macroeconomic indicator.

As the general idea we can assume that for the decrease of the unemployed people we need to have a strong GDP of the country. This idea does not have to apply all the time, as we can see in the year 2012 when the unemployment increased a little bit while having still increasing the GDP. The main reasons are explained by Fidrmuc J. (2013, page 6):

➢ the pre-crisis level of employment did not fully represent the production capacity of the economy,

➢ flexibility in working hours played an important role in employment developments. When the GDP started to decline, employers were reluctant to lay off workers and decreased working hours instead. When demand picked up, working hours were increased sharply to exceed pre-crisis level at the end of 2009, compensating for a low level of hiring,

➢ productivity per hour worked increased at a relatively high pace by OECD standards. In 2009 the neighbouring countries experienced a significant devaluation of their currency, increasing the pressure on Slovak companies to keep costs low to maintain competitiveness,

➢ the fiscal consolidation led to layoffs in the public sector.

4.2.3   Inflation

It is a general increase in the level of prices of goods and services. It is a process realized by the disturbance in microeconomics and macroeconomics balance, in money sphere but also in the real economy. General increase of the prices must be understood as that not all prices are increasing, but some prices can stay stable, even in the total price decrease they might fall.

For calculating the inflation can be used the CPI index, consumer prices index, which belongs to the most important ones. It is used to calculate and express the impact on the price level changes of household's goods and expenses. It must include the typical household expenditures to give the adequate information. The main point is to choose the representative basket of goods and services which would be appreciated by the market prices of production in the base year. Inflation influences the whole national economy and life of every person by increasing the expenses and decreasing the life standard of inhabitants.
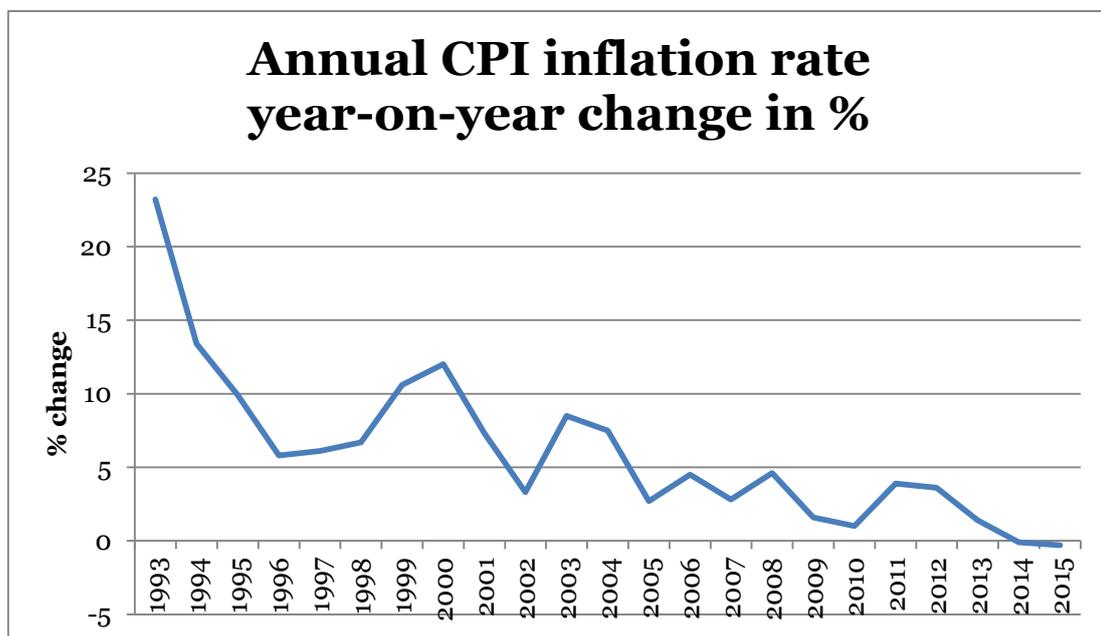
Figure 4: CPI inflation in % change in 1993-2015 (Source of data: NBS)

According to the data that were received from the National Bank of Slovakia during years 1993 – 2015 by measuring year-on-year change in % of CPI inflation rate, from the graph above it can be noticed that the inflation rate

was fluctuating all the time. The three highest peaks were in years 1993 when it reached very high number of 23.2% (the year of separating with the Czech Republic), 2000 of 12% and 2003 of 8.5%. Since adopting the Euro, inflation was one of the factors determining the real exchange rate movement; it expressed larger fluctuations around this season. Euro adoption ceased the appreciating of the nominal Exchange rate of the common currency and related decrease in the prices of imports; consequently pressures from the domestic inflationary were transformed into the rise of inflation in year 2008 in the second half to the amount of 4.6%. The financial crisis took place as well and in 2009 and 2010 put pressure downward on inflation to value 1%. Slovakia approached the countries of "effective" deflation, with no positive results for domestic demand. Till that period it was the lowest increase of price level of all goods and services in Slovakia. Negative consequences of the crisis started to be seen in years 2011 of value 3.9% and 2012 of 3.6%. These negative results are affected by the world crisis, but it must be considered that in year 2009 Slovakia came into Eurozone where all monetary decisions are made by European Central Bank. From year 2012 inflation rate started decreasing again until it reached negative value of 0.3%. It means that our inflation rate is very low and Slovakia cannot devaluate the Exchange rate to keep the price competition and gain the market share.

4.2.4   Balance of trade

Also called as a net export, is calculated by subtracting the total imports of the country from its total exports. The positive net exports occur when the volume by which the spending from abroad on a certain country´s goods and services overreach the country´s spending on foreign goods and services. It represents a trade surplus and on the other hand, there is a trade deficit. The balance of trade influences the macroeconomic indicator GDP, since this is one of the four calculation variables of it.
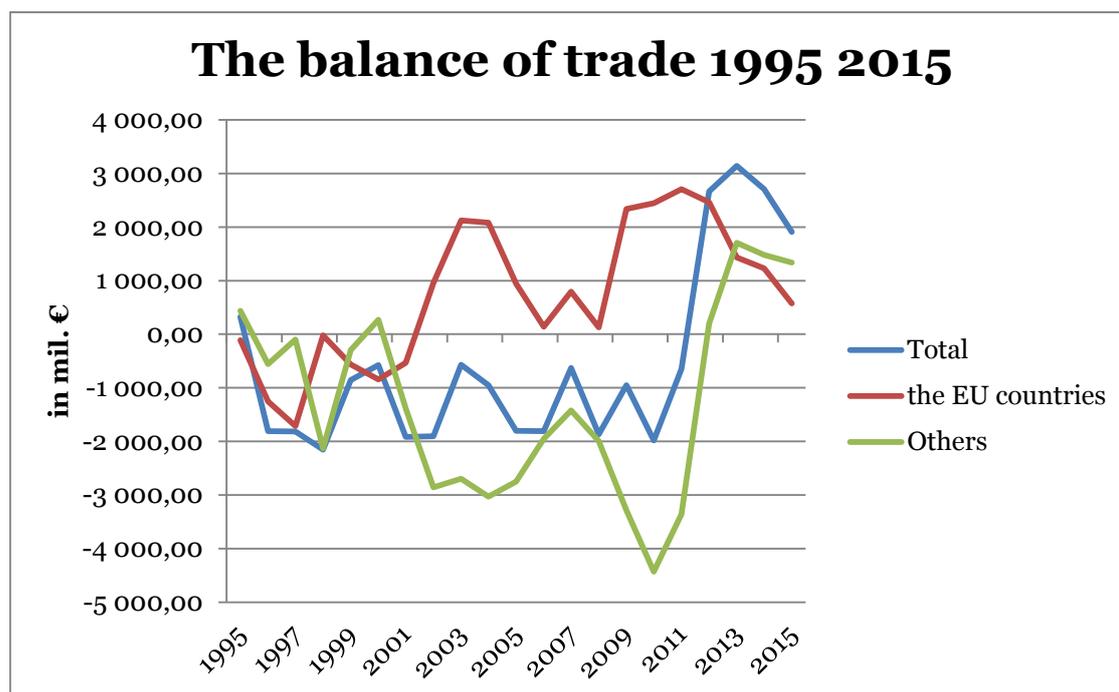
Figure 5: Balance of trade in mil. € in 1995-2015 (Source of data:Eurostat)

From the graph it is clear that total balance of trade of Slovakia was for many years in negative net export numbers and was fluctuating under 0 values in period 1996 - 2011, it means that Slovakia imported more than it exported. The world crisis hit the Slovak balance of trade in year 2009 when it dropped by approximately 1000 mil €. During this period, the Slovak trade is influenced also by Germany and other member states of Eurozone as their slowdown of growth is transformed to Slovakia through lower trading. As the Euro area weakens in economic operations so does the exports of Slovakia and new member states which must do the compensation and try to export to fast growing countries outside the EU. Thus, Slovak balance of trade has strong dependence on demands mainly from Germany and the EU member states. In years 2008 and 2009 as Slovakia have mostly business cycle industries, the demand were focused on car production, iron & steel and building materials. But in year 2012 the balance of trade turned into positive net export number of 2665.6 million € which can be also caused by the decrease of costs connected with transactions and stabilization of the exchange rate risk. In 2013 it reached its highest value of 3 140 mil. €.

Dividing the total balance of trade into countries of the EU and others, it can be seen that net export to the EU countries was from year 2002 all the time in positive numbers. In years 2008, 2009, 2010 and 2011 there is the biggest difference in trade balance between the EU member states

and countries outside the EU. It is obvious that Slovak balance of trade is positively influenced mostly by the EU countries.

4.2.5   Real effective Exchange rate

Real effective Exchange rate (REER) determines the weighted average of relative prices (for example measured by consumer price index, parity price index, manufacturing price index or unity level costs of labour, in national economy and neighbouring countries expressed in one currency. REER serves in National Bank of Slovakia for evaluating the development of competition of national producers in relation to their key trading partners. For securing the objective and actual view for certain development it is needed that the effective Exchange rate takes into consideration the changes in territorial structure of international trade resulting from sequent transformation of Slovak economy and its incorporation into the EU and European monetary union and also from process of globalization.

According to Marston (1998) there can be two kinds of Exchange rate volatility, one is the volatility described as day-to-day, month-to-month variability of Exchange rate and then misalignment which is a contrast and includes persistent departure of an Exchange rate from its long run competitive level. The REER influences the direct investments into the country, trade flows, output and so on.

The expression of REER can be described following: competition can be reached in case that index of REER is bigger than the value of 100 points. The increase of REER leads to real depreciation, devaluation of the national currency, so the exported products are cheaper than the prices of imported products. This situation increasing the competition of the export, and contrary, the decline in REER appreciating the national currency of exporter, which means that the exported goods are more expensive in comparison with the prices of importers which decrease the competitiveness of exporter.
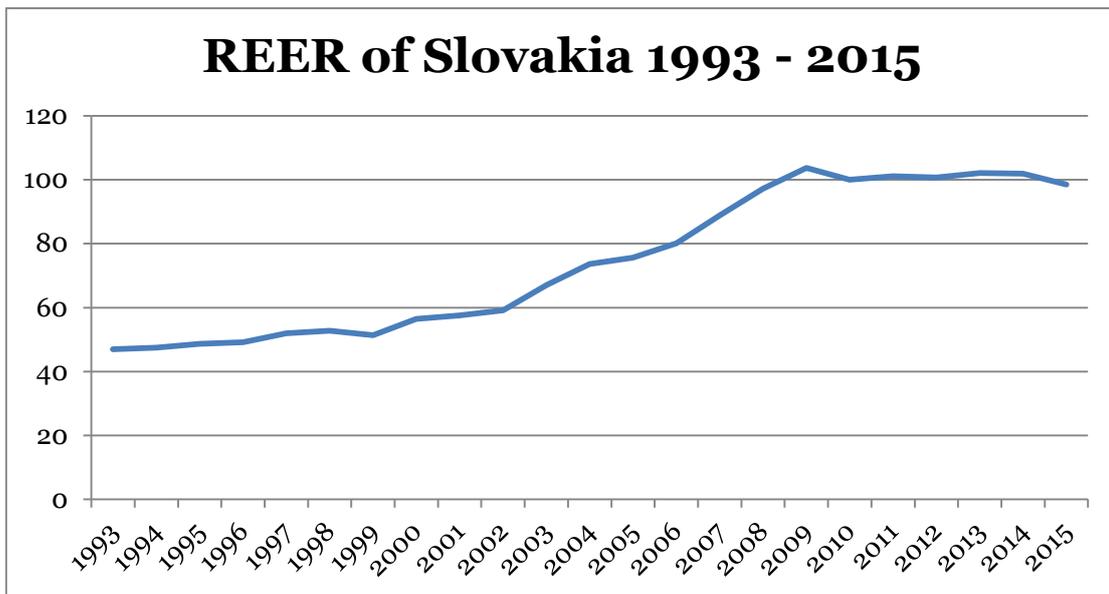
Figure 6: REER of Slovakia 1993-2015 (Source of data:Worldbank)

On the above graph with the index 2010=100 is described the development of REER in Slovakia. The value of REER was less than 100 points for all years till 2009 when real slowly appreciation of REER was contributed by adoption of Euro currency and since this year the value was above 100 points. In year 2015 it reached the value under 100 again containing 98.53 points.

4.2.6   Gross Capital

Gross fixed capital formation is a macroeconomic concept which describes the net capital accumulation for a certain country referring to additions of capital stock, for example equipment, transportation assets, tools and electricity. The production of the country decreases in case when a country is not able to replace capital goods that is why the country needs capital goods. In general, it can be assumed that as the capital formation is higher, the economy can faster grow its aggregate income. The occurred fluctuations in this macroeconomic indicator are seen to indicate something about future business activities and economic growth. In other words, during economic recession, business investments in fixed assets are decreasing, since it ties additional capital and on the other hand, during economic growth, fixed investments are growing as market expansion makes it profitable. Gross capital is a component of expenditure approach for calculation of the GDP and thus is expressed as a percentage of the GDP.

Gross Capital of Slovakia
1995 - 2015
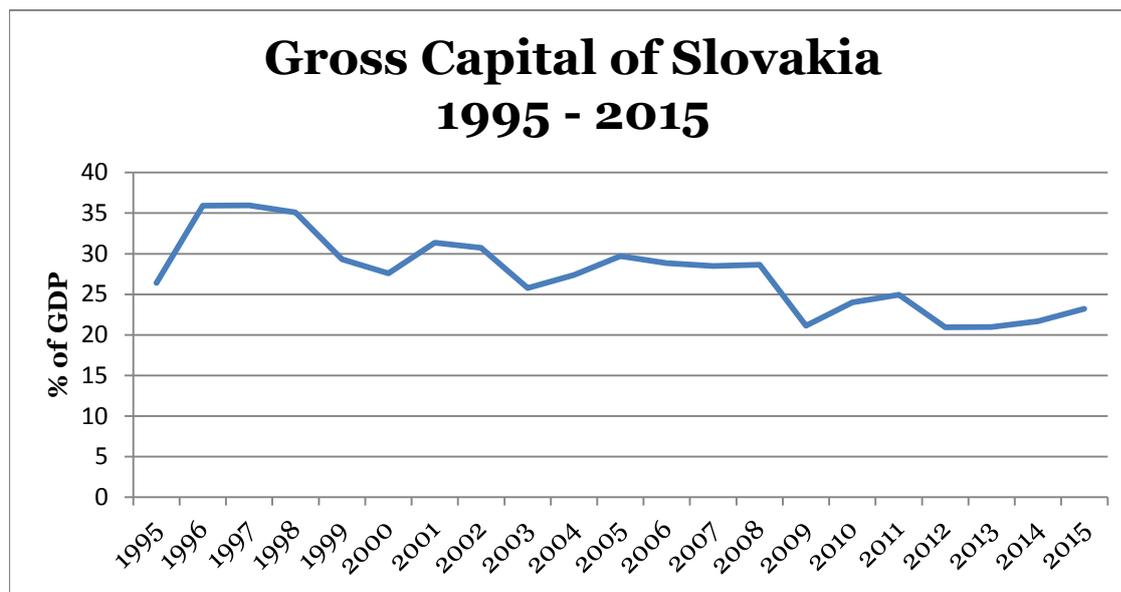
Figure 7: Gross capital in % in 1995-2015 (Source of data: Wordlbank)

In the graph above, it can be seen that the Slovak gross capital was fluctuating all the time. The average gross capital formation is 27.5% of the GDP. The rate of gross capital was moving from 26.42% in year 1995 to 35.98% in 1997. The highest rate was in year 1996 and 1997 which was caused by the expansive economic policy and the massive income of foreign capital. The lowest rate of gross capital formation was in year 2012 of 20.94% and the year 2009 with 21.12% rate which was caused by the world financial crisis and it made a decrease comparing to year 2008 by 9%. From year 2012 it slightly increases till now.

5 The trade from the territorial and commodity point of view

The Slovak Republic belongs to the group of countries where the international trade plays significant role. In this chapter the trade will be described from the commodity and territorial point of view.

5.1 Commodity structure

The commodity structure of the international trade reflects mainly the economic structure of the country. In the export part are dominated mainly products that the country produces and in the import there are final products or raw materials which the country lacks or respectively components produced within the international division of labour. The significant role during formation of the international trade structure plays the structure of the world industry production and its sectors differentiation in the main producing and processing countries. The world trade is in this case practically intermediary between the production country which are suppliers of the certain components and developing countries which are its processors and at the same time suppliers of the final products into wide area of the developed and developing countries.

In the case of the trade with the commodities is well established the classification of the harmonizing system called SITC – Standard international trade classification of goods which helps for standardizing the comparison towards other countries. This system is maintained by the United Nations. It contains these 10 groups of products which are announced by the United Nations Statistics Division (UN, 2016):

SITC 0 – food and live animals

SITC 1- beverages and tobacco

SITC 2- crude materials, inedible, except fuels

SITC 3- mineral fuels, lubricants and related materials

SITC 4- animal and vegetable oils, fats and waxes

SITC 5- chemicals and related products

SITC 6- manufactured goods

SITC 7- machinery and transport equipment

SITC 8- miscellaneous manufactured articles

SITC 9-commodities and transactions

Commodity structure of import based on SITC

As it is seen on the graph below, in the commodity structure of importing goods in 2015, most dominating category is in class SITC 7 (machinery and transport equipment) with 47% share, which includes items such as computer equipment, televisions and cars.

The second largest part with 15% is in class SITC 6 (manufactured goods) with products like paper, textiles, cement, iron & steel and copper. The third one is SITC 8 (miscellaneous manufactured articles) 13% – furniture, clothes, footwear, cameras, books and toys. The classes which received the value closest to 0 are: SITC 4 (animal and vegetable oils, fats and waxes) and SITC 9 (commodities and transactions).

From this results it can be said that Slovakia imports mostly products connected to manufactured industry, large part of it serves as semiconductors for the following processing such as for the car industry which is dominated in Slovakia.
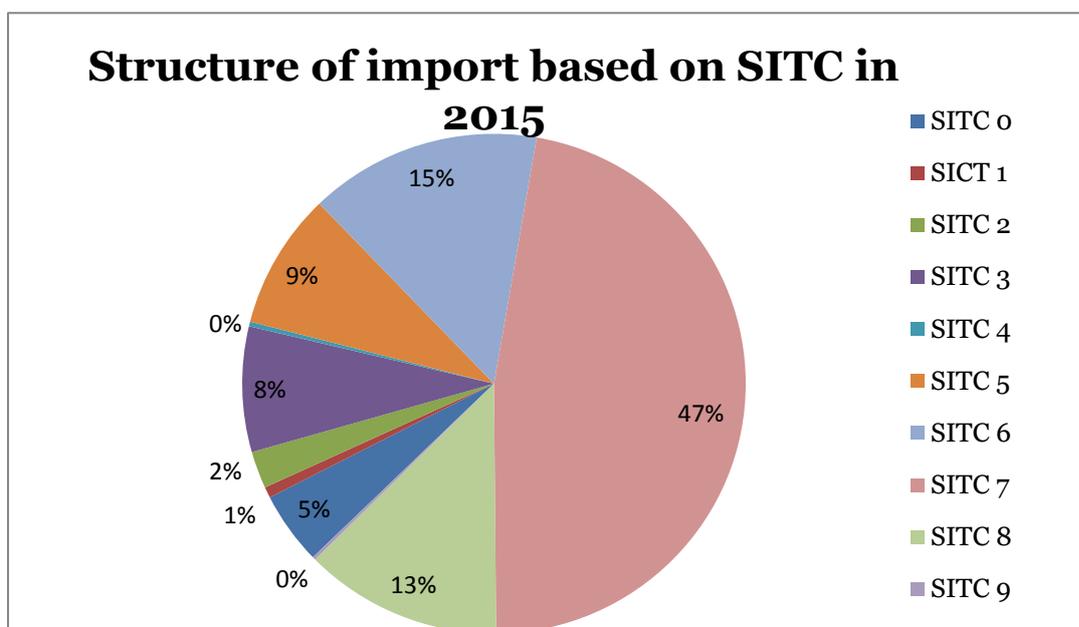
Figure 8: Structure of import in 2015 (Source of data:SlovakStatistics)

As it was pointed out in the graph above the most dominating SITC group of the Slovak import is SITC 7 with 47% share, this group includes items stated by United Nations such as: power generating machinery and equipment, specialized machinery, metal working machinery, other industrial machinery and parts, office machines and automatic data processing machines, telecommunication and sound recording apparatus, electrical machinery, apparatus and appliances, road vehicles and other transport equipment. For my study it will be interesting to reveal the most imported items, as the class SITC 7 with 47% share might contain the total share in few items and others

can be hidden with very low value, and contrary for example in class SITC 6 with 15% can be only one item contributing to the import. For better overview in the table below there is mentioned the description of the most 10 significant commodities stated in the analytical evaluation of the international trade of Slovakia worked out by Ministry of Economy (2015) to see how many items are there included from the class SITC 7 and from which classes is the rest of the most important commodities obtained:

Table 2: 10 most imported commodities in 2015 (Source: Slovak Ministry of Economy)

		In mil. €	Structure in %
Import in total		64 562,30	100
SITC 7	Electrical machinery	12 983,90	20,1
SITC 7	Road vehicles	9 262,80	14,3
SITC 7	Power-generating machines and equipment	7 914	12,3
SITC 3	Mineral fuels	5 281,20	8,2
SITC 5	Plastics and products from it	2 719,00	4,2
SITC 8	Optical and photographic equipment	2 555,80	4
SITC 6	Iron and Steel	1 880,60	2,9
SITC 6	Items from iron and steel	1 774,90	2,7
SITC 5	Pharmaceutical products	1 643,90	2,5
SICT 8	Furniture	1 328,80	2,1
Commodities in total		**43 559,60**	**73,3**

Taking a closer look at the development of import in Slovakia according to SITC division, it is compared the import structure in year 1997 when Slovakia was the independent state with its own currency Slovak crown, 2004 when it entered the EU, year 2009 when it adopted common currency Euro and 2015 the latest available data to the current period. The percentage share in classes is not in huge dimensions changed, some classes possess almost the same percentage in every year, it is for example SITC 0, SITC 1, SITC 4 and SITC 9. Some classes in year 2015 comparing to 1997 have smaller % share by half, it is class SITC 2 and SITC 3. The most dominating class in every year is SITC 7, which continuously was increasing and since 1997 till now it enlarged by 12%.

Table 3: Development of import in SITC structure (Source: SlovakStatistics)

	Import			
	1997	**2004**	**2009**	**2015**
SITC 0	5,6	4,1	5,6	4,7
SITC 1	1	0,7	0,8	0,7
SITC 2	4,4	3,7	2,6	2,4
SITC 3	15,7	12,5	11,8	8,1
SITC 4	0,2	0,2	0,4	0,3
SITC 5	11,6	9,8	9,5	8,8
SITC 6	16,5	19	15	14,9
SITC 7	36	39,5	42,4	47,1
SITC 8	8,9	10,4	11,4	12,7
SITC 9	0	0,1	0,4	0,2

Commodity structure of export based on SITC

The highest amount of export which Slovakia exported to other countries in 2015 is in the class SITC 7 (machinery & transport equipment). The second largest share is SITC 6 (manufactured goods) and the third one is SITC 8 (miscellaneous manufactures). It is certain that Slovakia mostly imports and exports the same classes in similar amounts. However, the class SITC 7 has higher percentage share in the export point of view. The lowest exported amounts for this period almost closest to 0 % share of all exported classes were in SITC 9 (commodities and transactions), SITC 1 (beverages and tobacco) and SITC 4 (animal and vegetable oils, fats and waxes)

To compare the export point of view with the import point, it is seen that the SITC classes in import graph are more proportionally spread, while in the export part the first three SITC categories are dominating by bigger share than the rest of the classes.
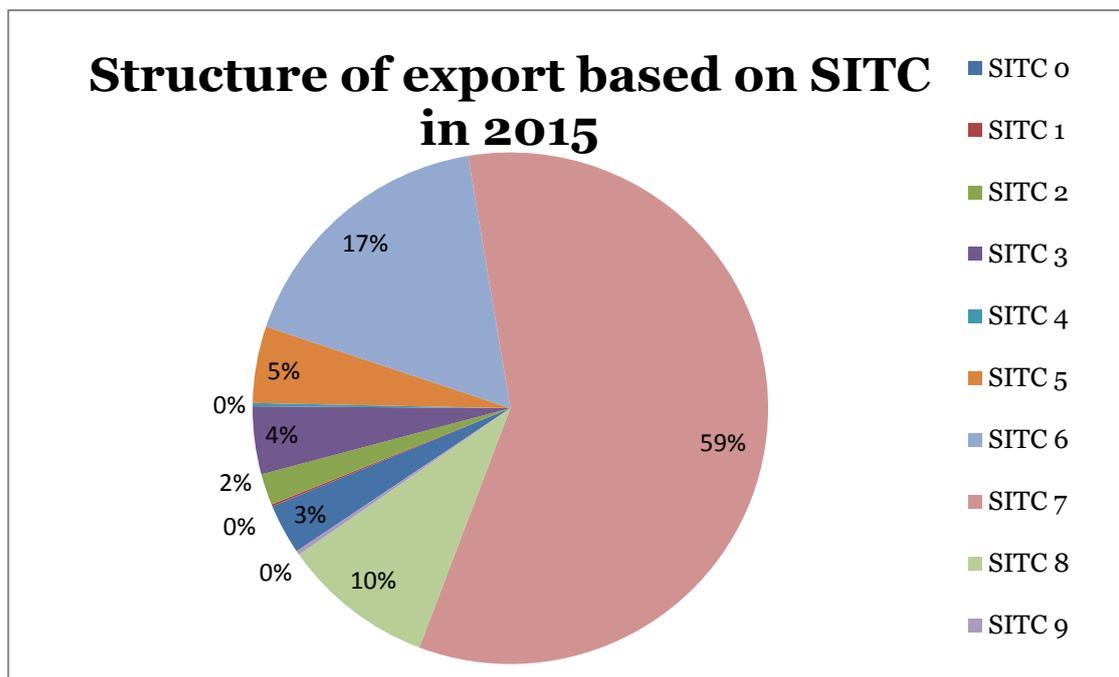
Figure 9: Structure of export in 2015 (Source of data:SlovakStatistics)

The top 10 exporters of Slovakia according to Slovak Register of Financial Statements and researched by TREND Analyses in year 2015 were ranged following:

- Volkswagen Slovakia, a.s., Bratislava,
- Kia Motors Slovakia, s.r.o., Teplička nad Váhom,
- Samsung Electronics Slovakia, s.r.o., Galanta,
- PCA Slovakia, s.r.o., Trnava,
- Slovnaft, a.s., Bratislava,
- Foxconn Slovakia, s.r.o., Nitra,
- Slovenské elektrárne, a.s., Bratislava,
- Schaeffler Slovensko, s.r.o., Kysucké Nové Mesto,
- Continental Matador Rubber, s.r.o., Púchov,
- Continental Matador Truck Tires, s.r.o., Púchov.

In the history development of export of Slovakia, again taking the same years as in the import structure, it is certain that there are bigger differences in the SITC structure. The class SITC 7 doubled since year 1997, first huge increase was in the year of entering the EU 2004, when it was higher by almost 18%, in year 2009 by adopting the Euro currency machinery and transport equipment was

forming almost half of the all exported products, and in year 2015 it was almost 60% share. The class SITC 4 has not changed at all and classes SITC 0, SITC 1 and SITC 9 also remained almost unchanged. In classes SITC 2, SITC 5 and SITC 6 the percentage share lowered by a half. Slovakia´s biggest share of exported products was in every year in class SITC 7, however by entrance in the EU and Euro adoption the exported products in this class are raising, making it dominating item comparing to other classes.

Table 4: Development of export in SITC structure (Source of data:SlovakStatistics)

	Export			
	1997	**2004**	**2009**	**2015**
SITC 0	3,4	3	3,8	3,4
SITC 1	0,7	0,3	0,2	0,2
SITC 2	4,2	2,9	2,3	1,8
SITC 3	4,6	6,4	4,6	3,7
SITC 4	0,2	0,2	0,2	0,2
SITC 5	10,8	5,3	4,5	4,7
SITC 6	34	24,8	18,7	16,7
SITC 7	28	45,8	54,8	59,4
SITC 8	13,7	11,1	10,5	9,8
SITC 9	0	0,1	0,3	0,2

5.2   Territorial structure

Territorial structure of the international trade of the countries is most often dependent on the historical bonds such as the relations between the formal metropolis and colonies. The significant role is mainly the geographic location of the country. Often, we trade with the countries that are territorially not so far but rather closer. The trades with the countries that are located closer do not burden the final price of the products by high transport costs. However, also the political orientation of the country influences the territorial structure of the trade. The correct, space proportional distribution of the territorial structure of the country has the economic and strategic significance for the economy. Its distribution reflects the advantages, disadvantages, development direction, level and intensity of the economic responsibilities.

As it was described in the article Slovakia in Eurozone by Peter Goliáš (2015, page 5) for Slovakia as a country which belongs to the Eurozone

from the territorial point of view one of the most important recommendations is that the key trading partners have Euro currency as well, if most of them do not have the Euro, Slovakia might face real Exchange rate volatility, mainly in economic shocks which would lead to adverse effects on its exports and employment. On the contrary, as the share of trade with Eurozone countries is higher, the real Exchange rate is more stable which positively results on the economy.

Territorial structure of import

In the following chart are showed the 10 most important trading countries from the import point of view of Slovakia for the period 2015. Listed 10 countries contribute to the total share of import by 66.3%. At first two places are Germany with value of 9 841.4 mil. € and the Czech Republic from which Slovakia imported goods and services of value 7 009,3 mil. €. Third place belong to China with 5429.6 million €. The rest of the countries have small difference in the imported amounts. So it can be validated that Germany is the key importing partner for the Slovak economy. It is obvious from the graph that only 6 most important importing partners are from the EU and only 3 countries (Germany, Italy and France) can benefit from the common currency Euro.
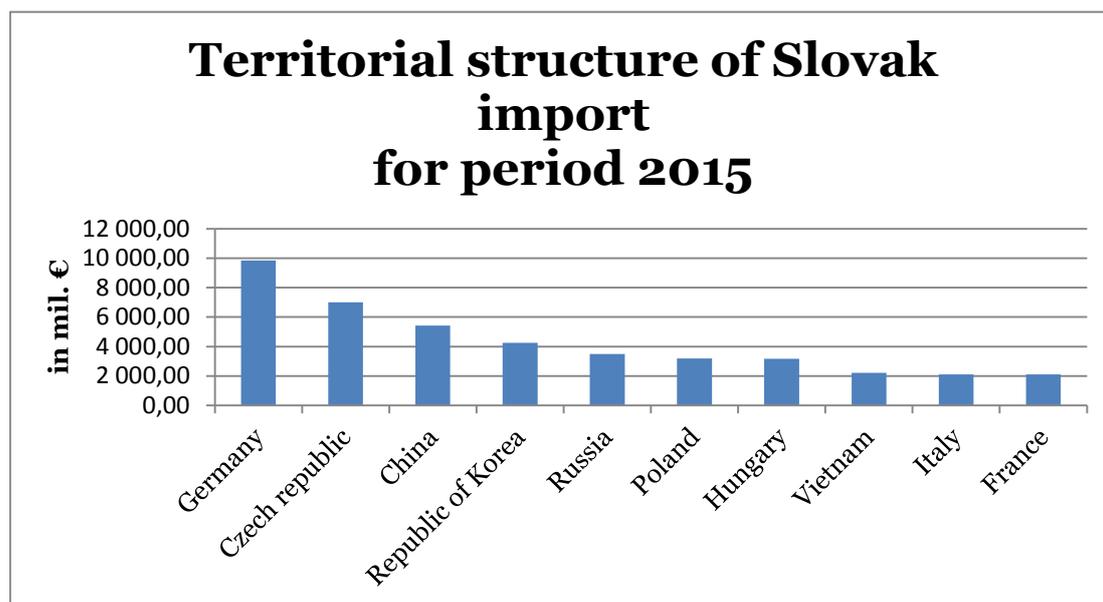
Figure 10: Territo rial structure of import in 2015 (Source od data: SlovakStatistics)

Territorial structure of the export

From this graph below it is clear that for the most significant exporting territories of Slovakia in year 2015 belong the biggest member states of the EU. Listed countries contribute to the total share of export by 75.6%.

Perpetually Germany remains the most important trading partner for Slovakia with the amount of 15 392.0 mil. €, while Slovakia imported goods and services only of 9 841.4 million € which results in positive net export between these two countries in year 2015. The second largest trading partner is the Czech Republic with the amount of 8 436.0 mil. €. The third one is Poland and to this country Slovakia exported goods and services in the amount of 5 621.0 mil. €. Germany overruns the rest of the countries in the graph by larger amount, so if Germany stopped the import from Slovakia, it would lead to strong decline in balance of trade which affects as well the GDP.

From all the top 10 countries to which Slovakia exported most of its products, 6 of them belong to the Eurozone, as described in the text above in the recommendation from Peter Goliáš (2015), 60% of the most important 10 trading partners where Slovakia exports its products have the same currency which should have positive effect on the economy.
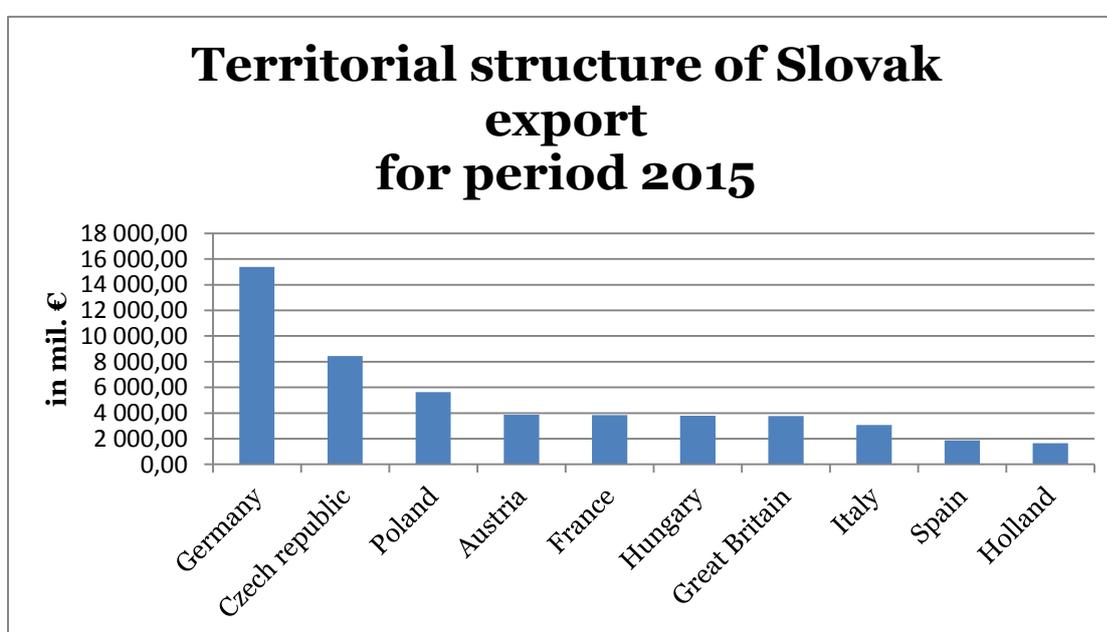
Figure 11: Territorial structure of export in 2015 (Source of data: SlovakStatistics)

6 Empirical analysis

Working with time series data, there can occur two problems:

➢ Times series of one variable can influence other variable with the time lag.

➢ If variables are no stationary, it can cause the problem of spurious regression, thus they should not be used in regression analysis. In this case they should be transformed to the form of stationary series which means that there is no relation with the previous value. The exception can be considered when the variables are co-integrated.

6.1 Original model

In this first original model according to the study by Hussain M., Saeed A. (2015) the export, import and the GDP will be tested to see the relationship between these variables and how they influence each other.

Firstly, the Augmented Dickey-Fuller test (ADF test) is run in the program to see if the series are stationary and can be used for further examination, or they are not stationary and have to be transformed.

From the table below, it can be seen that all variables in the level of Log-log format has the value over 0.05, so the null hypothesis is not rejected, there is a problem of non-stationarity. For removing this problem it is used the 1. difference, however in my case it did not solved the problem of non-stationary as it is described in the table, all values 0.9682, 0.09964 and 0.06159 are higher than 0.05.

Table 5: ADF test of original variables (Source: Gretl)

ADF test		
Variables	level	Δ
LGDP	0.9776	0.9682
Lexport	0.9843	0.09964
Limport	0.9708	0.06159

As still the problem of non-stationarity is not solved, the Hodrick-Prescott filter (HP filter) is used for adjusting the series, basically it transships by data the trend. Smoothing of this trend depends on the constant lambda, as it is higher, the smoothing is higher as well, and contrary as it is smaller, the transshipped curve is closer to the original. The deviations of this trend, also called as cyclic component, are now new variables showed in the following outputs from Gretl:
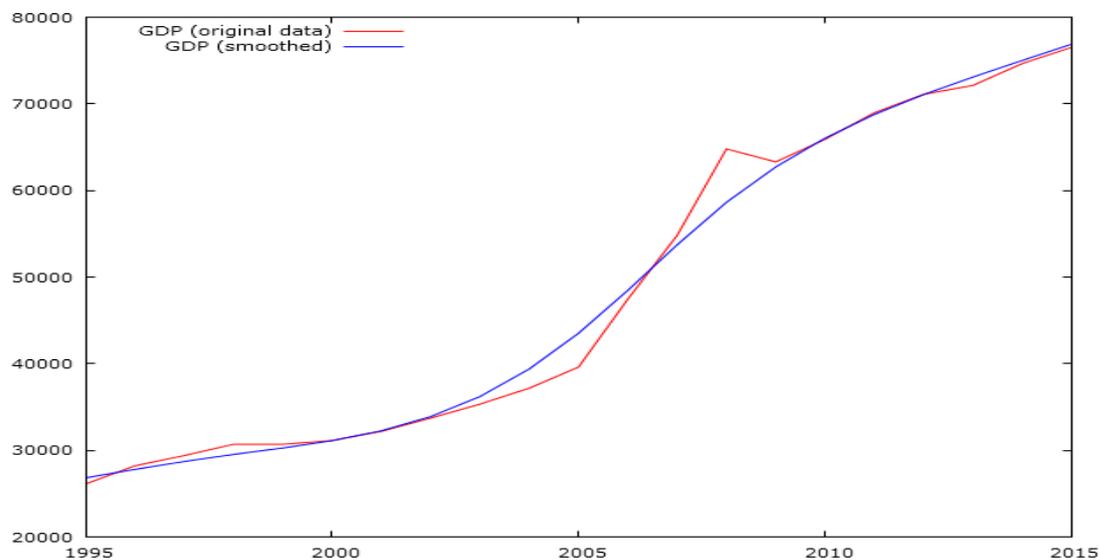
Figure 12: GDP adjusted by HP filter (Source: Gretl)
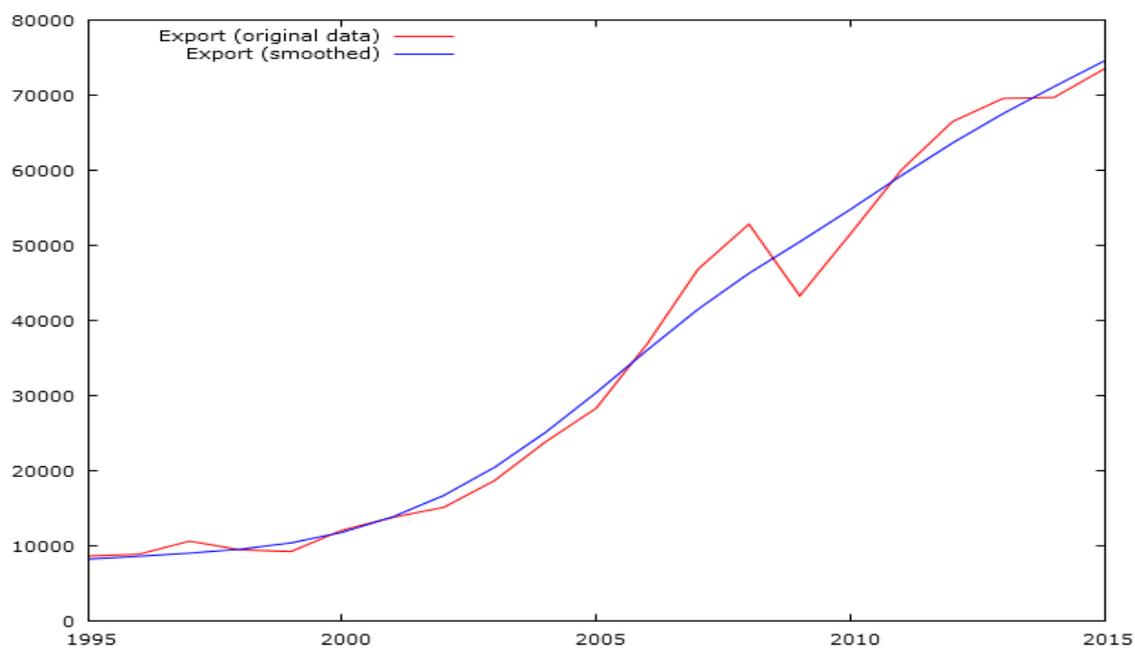
Figure 13: Export adjusted by HP filter (Source: Gretl)
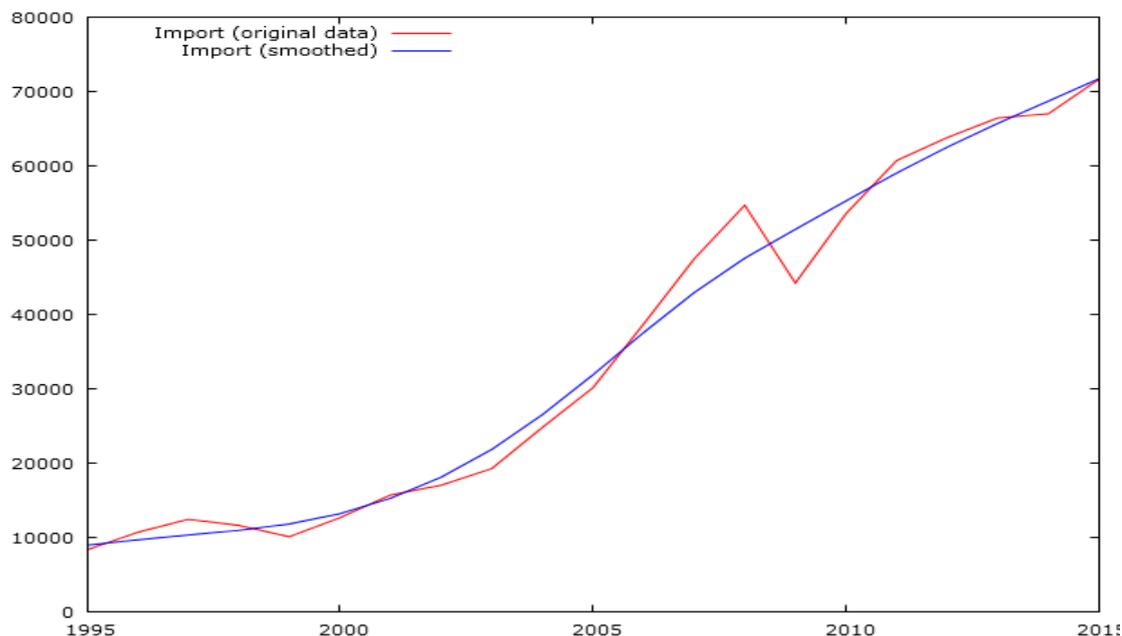
Figure 14: Import adjusted by HP filter (Source: Gretl)

Providing the ADF test also for this data, the obtained values are described in the table below. In this case all p-values are lower than 0.05% so the null hypothesis can be rejected, so the time series of all variables are stationary.

Table 6: ADF test of adjusted variables by HP filter (Source: Gretl)

ADF test	
Variables	level
hpGDP	1.221e-006
hpExport	0.01212
hpImport	0.0225

The second step needed before specifying the model is to test the co-integration, which means that the variables by itself are non-stationary, but together, in the linear combination, they are stationary. Thus, if the co-integration would be approved, it can be considered to work with the original data by special circumstances. To test the co-integration is used the Engel Granger test, which firstly tests the unit root in each original variables and afterwards, if the residuals of the Ordinary Least Square model, thus its linear combination, have the unit root. The original data for the unit root have been already tested by the ADF test in the text above, getting the results that there is unit root for individual varia-

bles and the null hypothesis is not rejected. Seeing the table below describing the co-integration regression – OLS, it is obvious that the p-value 0.2338 is higher than 0.05, so the null hypothesis is not rejected, the linear combination of the residuals of the variables is non-stationary. There would be co-integration in the case if the unit-root hypothesis is not rejected for individual variables, but for the residuals from the co-integration regression would be rejected. However, the unit root hypothesis of the residuals was not rejected, so there is no co-integration, the new variables created with HP filter will be used for the further testing of the model, so there will be no need to deal with the co-integration as there are stationary.

```
Cointegrating regression -
OLS, using observations 1995-2015 (T = 21)
Dependent variable: GDP

              coefficient    std. error    t-ratio    p-value
   ---------------------------------------------------------------
   const        19616.8        1504.90       13.04     1.32e-010 ***
   Export       -0.116174      0.458198     -0.2535    0.8027
   Import        0.926616      0.480204      1.930     0.0696      *

Mean dependent var    48281.86    S.D. dependent var    18524.80
Sum squared resid     1.36e+08    S.E. of regression    2745.502
R-squared             0.980231    Adjusted R-squared    0.978035
Log-likelihood       -194.4512    Akaike criterion      394.9025
Schwarz criterion     398.0360    Hannan-Quinn          395.5825
rho                   0.517942    Durbin-Watson         0.964011

Step 5: testing for a unit root in uhat

Augmented Dickey-Fuller test for uhat
including one lag of (1-L)uhat
(max was 5, criterion AIC)
sample size 19
unit-root null hypothesis: a = 1

  model: (1-L)y = (a-1)*y(-1) + ... + e
  estimated value of (a - 1): -0.666545
  test statistic: tau_c(3) = -3.01969
  asymptotic p-value 0.2338
  1st-order autocorrelation coeff. for e: -0.030
```

Figure 15: Co-integration test (Source: Gretl)

As there is no co-integration in the original variables, and for the analysis will be used the adjusted data by HP-filter, the Vector Auto regression model (VAR model) will be applied, as the Vector Error Correction model (VECM) can be used in case when there is co-integration between the variables. The VAR leg

selection test which is showed below chose how many lags of the variables
the VAR model should include. In this case with the 21 observations (1995 –
2015) it can test it for 4 time lags and all of them should be included in the mod-
el since the asterisks indicate the best (which is, minimized) values of the re-
spective information criteria, AIC = Akaike criterion, BIC = Schwarz Bayesian
criterion and HQC = Hannan-Quinn criterion.

lags	loglik	p(LR)	AIC	BIC	HQC
1	-430.95599		52.112469	52.700620	52.170932
2	-409.94922	0.00000	50.699908	51.729171	50.802219
3	-393.36442	0.00012	49.807579	51.277955	49.953737
4	-368.69238	0.00000	47.963809*	49.875299*	48.153815*

Figure 16: VAR lag selection (Source: Gretl)

The VAR model with the four time lags is described following in the tables be-
low. From the Gretl output three equations were created, for each variable
it made a model and tries to find some relations (that is calculation of coeffi-
cients). In other words, it is explaining one variable in time T and it is explained
by its four time lags and the rest of the two variables in time T with its four lags.
This is done for each variable. The following three OLS estimates of the models
show that none of the coefficient in each model is statistically significant.

Equation 1: hp_GDP

	coefficient	std. error	t-ratio	p-value
const	314.527	347.856	0.9042	0.4170
hp_GDP_1	-1.51981	0.738913	-2.057	0.1088
hp_GDP_2	1.08066	0.669042	1.615	0.1816
hp_GDP_3	-0.995675	1.31397	-0.7578	0.4908
hp_GDP_4	0.620371	0.950365	0.6528	0.5495
hp_Export_1	0.785096	1.45964	0.5379	0.6192
hp_Export_2	-1.17349	1.06337	-1.104	0.3317
hp_Export_3	1.88522	1.12255	1.679	0.1684
hp_Export_4	0.878595	1.06350	0.8261	0.4552
hp_Import_1	0.877868	1.19032	0.7375	0.5017
hp_Import_2	1.17287	1.33948	0.8756	0.4307
hp_Import_3	-0.778798	1.40146	-0.5557	0.6080
hp_Import_4	-0.614651	0.972476	-0.6320	0.5617

Mean dependent var	-91.65816	S.D. dependent var	1980.987
Sum squared resid	7055642	S.E. of regression	1328.123
R-squared	0.887629	Adjusted R-squared	0.550517
F(12, 4)	2.633039	P-value(F)	0.181152
rho	0.241103	Durbin-Watson	1.491676

Figure 17: VAR model for GDP variable (Source: Gretl)

```
Equation 2: hp_Export

                  coefficient    std. error    t-ratio     p-value
       ---------------------------------------------------------------
       const         238.337       599.662       0.3975     0.7113
       hp_GDP_1      -1.96417       1.27380      -1.542      0.1979
       hp_GDP_2       0.529854      1.15335       0.4594     0.6698
       hp_GDP_3      -1.45422       2.26514      -0.6420     0.5558
       hp_GDP_4       1.15145       1.63832       0.7028     0.5209
       hp_Export_1    1.09851       2.51624       0.4366     0.6850
       hp_Export_2   -2.59308       1.83313      -1.415      0.2301
       hp_Export_3    1.53634       1.93515       0.7939     0.4717
       hp_Export_4    0.573898      1.83335       0.3130     0.7699
       hp_Import_1    0.445048      2.05197       0.2169     0.8389
       hp_Import_2    2.35189       2.30911       1.019      0.3660
       hp_Import_3   -0.172557      2.41596      -0.07142    0.9465
       hp_Import_4   -0.406085      1.67643      -0.2422     0.8205

Mean dependent var    -128.7097    S.D. dependent var      3187.782
Sum squared resid     20967711     S.E. of regression      2289.526
R-squared             0.871040     Adjusted R-squared      0.484161
F(12, 4)              2.251454     P-value(F)               0.225317
rho                   0.019582     Durbin-Watson            1.954911
```

Figure 18: VAR model for Export variable (Source: Gretl)

```
Equation 3: hp_Import

                  coefficient    std. error    t-ratio     p-value
       ---------------------------------------------------------------
       const         307.587       729.630       0.4216     0.6950
       hp_GDP_1      -2.37175       1.54987      -1.530      0.2007
       hp_GDP_2       1.07864       1.40332       0.7686     0.4850
       hp_GDP_3      -1.23345       2.75607      -0.4475     0.6777
       hp_GDP_4       0.750722      1.99340       0.3766     0.7256
       hp_Export_1    1.74744       3.06160       0.5708     0.5987
       hp_Export_2   -2.26725       2.23043      -1.017      0.3669
       hp_Export_3    2.42802       2.35456       1.031      0.3607
       hp_Export_4    1.05936       2.23070       0.4749     0.6596
       hp_Import_1    0.0818174     2.49671       0.03277    0.9754
       hp_Import_2    1.91876       2.80958       0.6829     0.5322
       hp_Import_3   -1.12775       2.93958      -0.3836     0.7208
       hp_Import_4   -0.731209      2.03977      -0.3585     0.7381

Mean dependent var    -185.1391    S.D. dependent var      3084.342
Sum squared resid     31041524     S.E. of regression      2785.746
R-squared             0.796062     Adjusted R-squared      0.184248
F(12, 4)              1.301151     P-value(F)               0.434095
rho                   -0.007749    Durbin-Watson            2.003838
```

Figure 19: VAR model for import variable (Source: Gretl)

The T-test showed that in each model, every variable has p-value higher than 0.5, so the null hypothesis is not rejected, thus the coefficient is of null value and is not significant.

For the testing the model as a whole, is run the F-test with values in models 0.181152, 0.225317 and 0.434095, thus all of them are higher than 0.05 so the null hypothesis is not rejected. The vector β of coefficients is of 0 value, the model as a whole is not significant, and therefore the further step to continue with testing of the variables and followed by Granger Causality tests between the variables cannot be considered.

Unfortunately, according to the studies of HUSSAIN, M., SAAED A. (2015) with the approach applied for Tunisia, there was not proved any significant relation between the GDP, Export and Import in Slovakia with the data received from Eurostat for years 1995 - 2015 which were available for the period of this research.

6.2 Original model with additional variables

In the second model, two more variables were added to test if in the first model was not a problem with some missing variables and therefore the relation between variables could not be tested. The adjusted model will contain new variable Openness of the Slovak economy as this variable was added into research by Baldwin and Taglioni (2004) in which they approved integrity of countries with monetary union and its positive influence on trade. Another new added variable is the real effective exchange rate (REER) which was used in the study by Micco et al. (2003) and by Barr. et al (2003).

ADF test in this case proved that variables in the level and also at the first difference are not stationary.

Table 7: ADF test of original variables (Source: Gretl)

ADF test		
Variables	level	Δ
LGDP	0.9776	0.5261
Lexport	0.9843	0.1251
Limport	0.9708	0.4282
Lopenness	0.8689	0.6449
LREER	0.7713	0.06564

Before adjusting variables by HP filter, the co-integration test by Engle-granger test is estimated to see, if the original data are co-integrated. If they are, they could be used and there is no need to adjust them. The unit root in every varia-

ble is proven as it was tested in ADF test above, and the OLS estimate of the linear combination of the variables is described following:

```
Cointegrating regression -
OLS, using observations 1995-2015 (T = 21)
Dependent variable: GDP

              coefficient    std. error    t-ratio    p-value
     ---------------------------------------------------------------
     const      40177.9        3324.92        12.08     1.86e-09 ***
     Export         0.110026       0.173513     0.6341    0.5350
     Import         0.883895       0.207696     4.256     0.0006    ***
     Openness    -254.846        24.6397      -10.34     1.71e-08 ***
     REER         124.975        39.9882        3.125    0.0065    ***


Mean dependent var    48281.86    S.D. dependent var    18524.80
Sum squared resid     13746393    S.E. of regression    926.9032
R-squared             0.997997    Adjusted R-squared    0.997496
Log-likelihood       -170.4112    Akaike criterion      350.8225
Schwarz criterion     356.0451    Hannan-Quinn          351.9559
rho                  -0.170378    Durbin-Watson         2.335741


Step 7: testing for a unit root in uhat

Augmented Dickey-Fuller test for uhat
including 0 lags of (1-L)uhat
(max was 8, criterion AIC)
sample size 20
unit-root null hypothesis: a = 1

  model: (1-L)y = (a-1)*y(-1) + e
  estimated value of (a - 1): -1.17038
  test statistic: tau_c(5) = -5.17225
  p-value 0.04821
  1st-order autocorrelation coeff. for e: -0.041
```

Figure 20: Cointegration test (Source: Gretl)

The unit root hypothesis for the residuals from the co-integration regression with the p-value 0.04821 lower than 0.05 is rejected, which means that there is a co-integration evidence and the original data can be used. As there is co-integration, it will be applied the VECM model to see if there is a relationship between these five variables. It is possible to test this relationship with 1 time lag. The VECM model will create five equations for each variable as it was in the previous case.

```
Equation 1: d_GDP

                  coefficient      std. error     t-ratio     p-value
    ------------------------------------------------------------------
    const          10182.0         38955.5         0.2614      0.7982
    d_GDP_1          -0.142548         0.622017    -0.2292      0.8226
    d_Export_1        0.290752         0.596587     0.4874      0.6348
    d_Import_1       -0.0752972        0.972832    -0.07740     0.9396
    d_Openness_1      6.44838        194.026        0.03323     0.9740
    d_REER_1        240.850          339.660        0.7091      0.4918
    EC1              -0.184307         0.807740    -0.2282      0.8234

Mean dependent var    2542.947    S.D. dependent var     2839.587
Sum squared resid     1.13e+08    S.E. of regression     3070.229
R-squared             0.220637    Adjusted R-squared    -0.169044
rho                  -0.026563    Durbin-Watson          2.046992
```

Figure 21: VECM model for GDP variable (Source: Gretl)

```
Equation 2: d_Export

                  coefficient      std. error     t-ratio     p-value
    ------------------------------------------------------------------
    const          -5700.76        62889.5        -0.09065     0.9293
    d_GDP_1          -0.181411         1.00418     -0.1807      0.8597
    d_Export_1        0.742903         0.963125     0.7713      0.4554
    d_Import_1       -0.788403         1.57053     -0.5020      0.6248
    d_Openness_1    144.672          313.234        0.4619      0.6524
    d_REER_1        -75.8317         548.345       -0.1383      0.8923
    EC1               0.197654         1.30401      0.1516      0.8820

Mean dependent var    3404.111    S.D. dependent var     4483.163
Sum squared resid     2.95e+08    S.E. of regression     4956.553
R-squared             0.185109    Adjusted R-squared    -0.222336
rho                   0.128594    Durbin-Watson          1.736751
```

Figure 22: VECM model for export variable (Source: Gretl)

```
Equation 3: d_Import

                  coefficient    std. error   t-ratio    p-value
    -------------------------------------------------------------
    const          -31972.9        63589.4     -0.5028    0.6242
    d_GDP_1         -0.267422       1.01536     -0.2634    0.7967
    d_Export_1       0.564399       0.973844     0.5796    0.5729
    d_Import_1      -0.275457       1.58801     -0.1735    0.8652
    d_Openness_1    69.1602        316.721       0.2184    0.8308
    d_REER_1        -35.1960       554.448      -0.06348   0.9504
    EC1              0.738239       1.31852      0.5599    0.5858

Mean dependent var    3208.447   S.D. dependent var    4597.986
Sum squared resid     3.01e+08   S.E. of regression    5011.716
R-squared             0.207961   Adjusted R-squared   -0.188058
rho                   0.088013   Durbin-Watson         1.802258
```

Figure 23: VECM model for import variable (Source: Gretl)

```
Equation 4: d_Openness

                  coefficient    std. error   t-ratio    p-value
    -------------------------------------------------------------
    const          -75.7562       134.607      -0.5628    0.5839
    d_GDP_1         -0.00219660     0.00214933  -1.022     0.3269
    d_Export_1       0.000814614    0.00206146   0.3952    0.6997
    d_Import_1       0.000310318    0.00336154   0.09231   0.9280
    d_Openness_1     0.0484093      0.670442     0.07221   0.9436
    d_REER_1        -0.369991       1.17367     -0.3152    0.7580
    EC1              0.00174924     0.00279108   0.6267    0.5426

Mean dependent var    3.684211   S.D. dependent var    11.38758
Sum squared resid     1350.590   S.E. of regression    10.60892
R-squared             0.421387   Adjusted R-squared    0.132081
rho                   0.165536   Durbin-Watson         1.661496
```

Figure 24: VECM model for openness variable (Source: Gretl)

```
Equation 5: d_REER

                    coefficient      std. error      t-ratio    p-value
          --------------------------------------------------------------
          const          -58.6589         41.8249       -1.402     0.1861
          d_GDP_1          0.000706439      0.000667834    1.058     0.3110
          d_Export_1       0.000124728      0.000640531    0.1947    0.8489
          d_Import_1       0.000826882      0.00104449     0.7917    0.4439
          d_Openness_1    -0.143748         0.208318      -0.6900    0.5033
          d_REER_1        -0.115452         0.364680      -0.3166    0.7570
          EC1              0.00121819       0.000867238    1.405     0.1855

Mean dependent var     2.596842    S.D. dependent var     3.800677
Sum squared resid    130.3934      S.E. of regression     3.296379
R-squared              0.498511    Adjusted R-squared     0.247767
rho                    0.106614    Durbin-Watson          1.632122
```

Figure 25: VECM model for REER variable (Source: Gretl)

Adding two more variables did not solve the problem and all variables in each equation are not statistically significant, thus there cannot be proved any relationship between the variables the GDP, export, import, openness of the economy and REER.

6.3   Model with division into Extra-EU and Intra-EU trade

In this model the export and import will be divided into Extra-EU (export of Slovakia that led to the countries outside the EU, and import from the countries outside the EU to Slovakia) and Intra-EU trade (import from countries within the EU to Slovakia, and export from Slovakia to the EU countries). In this case it can be considered that there can be some partial relations as the trade is further divided and as it was described in chapter 6, mostly Slovakia trade with countries within the EU. The model was most fitted by Log-log format with 15 observations for years 2000 – 2015.

After testing the variables with the ADF test, it was found that they are no stationary, even the first difference did not solve the problems with stationary for all variables, and the Engle-granger test with p-value 0.3538 showed that there is no co-integration and the data will have to be adjusted by HP filter by which the problem is solved and stationary variables are received:

Table 8: ADF test of adjusted variables (Source: Gretl)

ADF test	
Variables	**level**
hpGDP	0.04593
hpExportExtraEU	0.001371
hpImportExtraEU	0.01546
hpExportIntraEU	0.04524
hpImportIntraEU	0.005616

As the new adjusted variables are stationary and thus there is no need to deal with co-integration, the VAR model is used to examine the relationship between these variables by OLS receiving five equations for each variable:

```
Equation 1: hp_GDP

                        coefficient   std. error   t-ratio   p-value
         ---------------------------------------------------------------
  const                112.599       360.933       0.3120    0.7622
  hp_GDP_1              -0.138412     0.301137     -0.4596    0.6567
  hp_ExportExtra~_1     -1.45496      1.33762      -1.088     0.3050
  hp_ImportExtra~_1     -1.80141      1.67043      -1.078     0.3089
  hp_ExportIntra~_1     -0.898016     0.845225     -1.062     0.3157
  hp_ImportIntra~_1      3.29182      1.49874       2.196     0.0557   *

Mean dependent var   -38.51792     S.D. dependent var    1599.590
Sum squared resid     16969475     S.E. of regression    1373.134
R-squared            0.526279      Adjusted R-squared    0.263100
F(5, 9)              1.999701      P-value(F)            0.172758
rho                  0.005921      Durbin-Watson         1.976716
```

Figure 26: VAR model for GDP variable (Source: Gretl)

In the first model, there is only one variable significant – ImportIntraEU and on the level 0.10 is positively influencing the GDP.

```
Equation 2: hp_ExportExtraEU

                        coefficient  std. error  t-ratio   p-value
  --------------------------------------------------------------------
  const                  -4.61665    121.176     -0.03810  0.9704
  hp_GDP_1               -0.208096     0.101101  -2.058    0.0697   *
  hp_ExportExtra~_1      -0.518788     0.449081  -1.155    0.2777
  hp_ImportExtra~_1       0.254369     0.560813   0.4536   0.6609
  hp_ExportIntra~_1       0.372787     0.283768   1.314    0.2214
  hp_ImportIntra~_1      -0.114632     0.503173  -0.2278   0.8249

Mean dependent var    -14.48867    S.D. dependent var     525.4912
Sum squared resid      1912715     S.E. of regression     461.0032
R-squared                0.505244  Adjusted R-squared       0.230379
F(5, 9)                  1.838153  P-value(F)               0.201424
rho                     -0.119660  Durbin-Watson            2.146021
```

Figure 27: VAR model for ExportExtraEU variable (Source: Gretl)

As well as in the first model, only one variable – the GDP is significant on level 0.1 and can be considered to influence the export outside the EU negatively with one time lag.

```
Equation 3: hp_ImportExtraEU

                        coefficient  std. error  t-ratio   p-value
  --------------------------------------------------------------------
  const                 53.7078      202.193      0.2656   0.7965
  hp_GDP_1              -0.463845      0.168696   -2.750    0.0225  **
  hp_ExportExtra~_1     -1.37174       0.749330   -1.831    0.1004
  hp_ImportExtra~_1     -0.0297329     0.935765   -0.03177  0.9753
  hp_ExportIntra~_1     -0.0179090     0.473491   -0.03782  0.9707
  hp_ImportIntra~_1      0.811966      0.839586    0.9671   0.3588

Mean dependent var     -5.080445   S.D. dependent var     985.0647
Sum squared resid       5325340    S.E. of regression     769.2233
R-squared                0.607997  Adjusted R-squared       0.390217
F(5, 9)                  2.791797  P-value(F)               0.085887
rho                      0.053233  Durbin-Watson            1.787182
```

Figure 28: VAR model for ImportExtraEU variable (Source: Gretl)

This model estimated the GDP as a significant variable on level 0.5 with p-value 0.0225 and it can be investigated, that the GDP with one time lag influence the

import from countries outside the EU. The coefficient is negative, so there is negative relation between these two variables. If the GDP increases, next year it will have negative impact on import from countries outside the EU. This results logically from the calculation of the GDP, where if import increases, the GDP decreases and otherwise.

```
Equation 4: hp_ExportIntraEU

                    coefficient  std. error  t-ratio   p-value
    ------------------------------------------------------------
    const               12.8842    241.492    0.05335   0.9586
    hp_GDP_1          -0.431404    0.201484  -2.141     0.0609   *
    hp_ExportExtra~_1  -2.23456    0.894973  -2.497     0.0340   **
    hp_ImportExtra~_1   1.60983    1.11764    1.440     0.1836
    hp_ExportIntra~_1   0.323015   0.565521   0.5712    0.5819
    hp_ImportIntra~_1  -0.522093   1.00277   -0.5206    0.6152

Mean dependent var   -4.878496   S.D. dependent var    1093.857
Sum squared resid     7596633    S.E. of regression     918.7330
R-squared             0.546506   Adjusted R-squared     0.294564
F(5, 9)               2.169178   P-value(F)             0.147654
rho                  -0.158500   Durbin-Watson          2.288701
```

Figure 29: VAR model for ExportIntraEU variable (Source: Gretl)

In equation 4 there is the GDP significant only on level 0.10, but on level 0.05 the export from countries outside the EU is statistically significant. It can be seen that export from the countries outside the EU with one time lag is in negative relation with export from the EU countries. In other words, if for example in year 2010 Slovakia exports more to the countries outside the EU, in year 2011 will export less to countries within the EU.

```
Equation 5: hp_ImportIntraEU

                      coefficient   std. error   t-ratio   p-value
  -----------------------------------------------------------------
  const                 55.6310       258.002      0.2156    0.8341
  hp_GDP_1              -0.605830      0.215259    -2.814     0.0202   **
  hp_ExportExtra~_1     -1.75256       0.956160    -1.833     0.1000
  hp_ImportExtra~_1      0.165688      1.19406      0.1388    0.8927
  hp_ExportIntra~_1     -0.164196      0.604185    -0.2718    0.7919
  hp_ImportIntra~_1      0.982512      1.07133      0.9171    0.3830

Mean dependent var   -11.17402   S.D. dependent var    1240.173
Sum squared resid      8670872   S.E. of regression    981.5448
R-squared             0.597311   Adjusted R-squared    0.373594
F(5, 9)               2.669948   P-value(F)            0.095094
rho                  -0.113991   Durbin-Watson         2.122063
```

Figure 30: VAR model for ImportIntraEU variable (Source: Gretl)

In equation 5, there was found negative relation between the GDP and import within the EU countries. The GDP influences negatively the ImportIntraEU which means that if the GDP increases, the import from the EU countries will fall with one time lag.

6.4   Adjusted Standard Solow model

In this model will be tested the Standard Solow model for Slovakia, but the technological progress was adjusted for trade variable (net export) as in my study the main purpose is to test the relationship between trade and the GDP. The variables are labour in %, Gross capital calculated as a % of trade and Balance of trade calculated subscribing import from export, with 19 observations for years 1997 - 2015.

Only the variable Labour was stationary at original data, so the other variables the GDP, GrossCapital and Trade will be adjusted with HP filter. The GDP, GrossCapital and Trade proved to be stationary by ADF test after using the HP filter and the co-integration is not proven, so the adjusted data by HP filter will be applied for further investigation. The VAR model was able to describe two time lags:

```
Equation 1: Labour

                          coefficient    std. error    t-ratio     p-value
  ------------------------------------------------------------------------
  const                  11.8499         18.9188        0.6264      0.5485
  Labour_1                1.12639         0.462474       2.436      0.0408   **
  Labour_2               -0.307275        0.399380      -0.7694     0.4638
  hp_GDP_1               -0.000385806     0.000248480   -1.553      0.1591
  hp_GDP_2               -9.18386e-05     0.000299096   -0.3071     0.7666
  hp_GrossCapital_1       0.191097        0.309133       0.6182     0.5537
  hp_GrossCapital_2      -0.142591        0.305397      -0.4669     0.6530
  hp_Trade_1              0.000457672      0.000611864   0.7480     0.4759
  hp_Trade_2              4.68878e-05      0.000611758   0.07664    0.9408

Mean dependent var    65.31176    S.D. dependent var     1.526795
Sum squared resid     10.67104    S.E. of regression     1.154937
R-squared              0.713895   Adjusted R-squared     0.427790
F(8, 8)                2.495220   P-value(F)             0.108739
rho                   -0.146899   Durbin-Watson          1.839815
```

Figure 31: VAR model for labour variable (Source: Gretl)

In this equation there is only one variable significant and it is Labour with one time lag, basically it means that for example labour in year 2000 will have positive effect on labour in year 2001.

```
Equation 2: hp_GDP

                          coefficient    std. error    t-ratio     p-value
  ------------------------------------------------------------------------
  const                 -41223.6        30360.2        -1.358      0.2116
  Labour_1               443.398          742.160        0.5974     0.5667
  Labour_2               187.157          640.909        0.2920     0.7777
  hp_GDP_1                -0.0212657       0.398751      -0.05333   0.9588
  hp_GDP_2                -0.0481585       0.479978      -0.1003    0.9225
  hp_GrossCapital_1      483.340          496.084        0.9743     0.3584
  hp_GrossCapital_2     -353.517          490.089       -0.7213     0.4912
  hp_Trade_1               1.19160         0.981895      1.214      0.2595
  hp_Trade_2              -0.979420        0.981725     -0.9977     0.3477

Mean dependent var   -39.22201    S.D. dependent var     1675.533
Sum squared resid     27480675    S.E. of regression     1853.398
R-squared              0.388211   Adjusted R-squared    -0.223578
F(8, 8)                0.634551   P-value(F)             0.732677
rho                    0.099165   Durbin-Watson          1.756254
```

Figure 32: VAR model for GDP variable (Source: Gretl)

In this equation there is no significant variable and that is why no relation between these variables can be investigated in this case.

```
Equation 3: hp_GrossCapital

                      coefficient    std. error   t-ratio   p-value
  ------------------------------------------------------------------
  const               -23.0503        24.4189      -0.9440   0.3728
  Labour_1              0.896016        0.596925     1.501    0.1717
  Labour_2             -0.545255        0.515488    -1.058    0.3211
  hp_GDP_1             -0.000467827     0.000320719 -1.459    0.1828
  hp_GDP_2              0.000147084     0.000386050  0.3810   0.7131
  hp_GrossCapital_1    -0.297048        0.399004    -0.7445   0.4779
  hp_GrossCapital_2    -1.01800         0.394182    -2.583    0.0325   **
  hp_Trade_1            0.000404235     0.000789746  0.5119   0.6226
  hp_Trade_2           -0.000811203     0.000789609 -1.027    0.3343

Mean dependent var   -0.137436    S.D. dependent var    1.876509
Sum squared resid    17.77755     S.E. of regression    1.490702
R-squared             0.684463    Adjusted R-squared    0.368926
F(8, 8)               2.169198    P-value(F)            0.147069
rho                   0.143229    Durbin-Watson         1.663218
```

Figure 33: VAR model for gross capital variable (Source: Gretl)

There is only one significant variable and it is gross capital with two time lags, which can be interpreted that the gross capital in year 2000 will have negative impact on gross capital in year 2002.

```
Equation 4: hp_Trade

                      coefficient    std. error   t-ratio   p-value
  ------------------------------------------------------------------
  const                9723.54        9752.65       0.9970   0.3480
  Labour_1             -335.947        238.405      -1.409    0.1965
  Labour_2              187.656        205.880       0.9115   0.3887
  hp_GDP_1               0.141044       0.128092     1.101    0.3029
  hp_GDP_2              -0.297967       0.154184    -1.933    0.0894   *
  hp_GrossCapital_1     146.535        159.358       0.9195   0.3847
  hp_GrossCapital_2     229.222        157.432       1.456    0.1835
  hp_Trade_1             0.221442       0.315416     0.7021   0.5026
  hp_Trade_2            -0.298998       0.315361    -0.9481   0.3708

Mean dependent var   32.88664     S.D. dependent var    793.7374
Sum squared resid    2835725      S.E. of regression    595.3702
R-squared             0.718687    Adjusted R-squared    0.437373
F(8, 8)               2.554754    P-value(F)            0.103109
rho                  -0.009785    Durbin-Watson         1.927842
```

Figure 34: VAR model for trade variable (Source: Gretl)

Equation 4 investigated the variable GDP with two time lags significance on trade, but only on level 0.10 and on this level can be considered that the GDP will have negative effect on trade with two time lags.

7   Discussion

Based on the main aim of my thesis, the causality technique was most suitable as it creates more complex analysis and studies each variable separately with the time lags. The models were tested to see if there is a relationship between the export, import and the GDP and to analyze how these variables influence each other.

The first original model created was based on the study worked out by Hussain M., Saaed A. (2015) in which they came to the results that Tunisian economy is influenced by growth-led import strategy as well as export led strategy. Imports were thus seen as the source of economic growth in Tunisia. However, in the model applied for Slovakia with the same approach the conclusion was, that all variables in the model are not statistically significant and therefore according to this approach there cannot be proven any relationship. The steps required for this research were to firstly remove the problem with no stationarity of the variables as it can cause the problem of spurious regression, thus the ADF test was applied and revealed that the variables at its level and even first difference are not stationary. The HP filter was used with the constant lambda to remove this problem. Afterwards the co-integration Engle granger test was run in the program Gretl to see if the variables together in the linear combination are stationary and that is why the original data could be used. The co-integration was not proved; the data adjusted by HP filter were applied to create a VAR model. The VAR model could test the relation between the variables for four time lags, but none of the variables was statistically significant and to see which variable affects another was not able to be examined in this model.

The second model was added by two more variables – Openness of the Slovak economy and the REER to prevent the problem in the model with missing variables and to examine if Slovak GDP can be influenced by these variables, as Slovakia belongs to countries with highest openness and as it entered the Eurozone, it mostly exports its goods and services to countries with Euro currency, this variable might influence positively the GDP and trade. In this case even though the variables are no stationary, but in their linear combination they are, the first difference of the original data is applied in the VECM model. Unfortunately, also in this model none of the variables is statistically significant and no relationship and impact between these variables can be proved.

The third model contains more complex analysis of the trade as the import and export is divided into the IntraEU and ExtraEU which means, the import within the EU countries and to the third countries and export as well. The data had to be adjusted by HP filter and analyzed with the VAR model which revealed some results. The VAR model created for each variable an equation and examined relations, how the variables impact each other with one time lag.

In the first equation only one variable was significant – ImportIntraEU, but it was on level 0.10, and on this level it can be said that the import within the EU will positively influence the GDP with one time lag.

The second equation includes one significant variable on level 0.10 – GDP and it negatively influences the export outside the EU with one time lag.

The third equation revealed the negative impact of the GDP on the import outside the EU on the level 0.05 with one time lag.

The fourth equation had two statistically variables. The GDP on the level 0.10 influences negatively the export within the EU countries with one time lag. The ExportExtraEU on level 0.05 negatively influences the export within the EU countries, as in other words can be expressed: for example in year 2010 if Slovakia exports more to the third countries, in year 2011 will export less to countries within the EU.

The last equation has the GDP significant on level 0.10 and it influences negatively the import within the EU with one time lag.

The fourth model which was examined is based on the Sollow model in which the technical progress was replaced by the trade – net export. The stationarity was received by the HP filter and VAR model applied as there was no co-integration. Few partial results were received. In the first equation labour on level 0.05 positively influences labour with one time lag.

The second equation has none of the variables statistically significant.

The following equation had variable gross capital on level 0.05 significant and is in negative relation with gross capital with two time lag.

The last equation includes the GDP on level 0.10 as a significant variable and it negatively impacts the trade with two time lag.

The analysis and models applied for Slovak economy unfortunately did not behave or possess more complex results and cannot analyze further how the international trade influences the Slovak economy. The studies mentioned in the literature overview with the same approach – causality technique by Ullah et al. (2009), Wong H. (2008), Ramos F. (2002) and Hussain M. (2014) enabled the detailed results. However, Slovak economy behaves differently, and it was formed as a separate state in 1993, and since that year it received many structural shocks in the economic indicators. The macroeconomic indicators influence each other mutually, and if one is fluctuating, the others are influenced as well. For example, if the GDP growths, the economy should be able to produce more products, jobs and the unemployment should decrease. The key situations that left behind the structural changes on these indicators are mainly the entrance to the EU, adoption of the Euro currency, the global financial crisis, the gas crisis, and the reforms by the Government.

Fidrmuc J. et al. (2013), in their paper analyzed that Slovakia joined the Eurozone after a period of unprecedented real appreciation, which resulted as a threat for competitiveness of its export-oriented manufacturing industry. The response combined internal devaluation with productivity increasing measures, including capital deepening and laying off low productivity workers. While this strategy was successfully restoring an external equilibrium, its con-

sequences for domestic demand and employment are less positive and therefore the economic indicators obtained the structural shocks.

Moreover, also the obtained data can differ in some way, and as my data were received from the EUROSTAT database, from other dataset, slightly different data could be obtained.

To conclude, Slovakia as an independent state is quite young, and received many structural shocks which influenced the economy, and that is why, only in model where the trade was divided into ExtraEU and IntraEU and the adjusted Sollow model some partial results were obtained. For further analysis, it will probably require some time with more data availability and more complex studies with different approach, but to this period with the data which are available and the approach used in my study was not possible to analyze the impact of international trade more precisely.

8 Conclusion

The goal of this thesis was to analyze how the international trade influences the Slovak economy. It is obvious that Slovakia is a country possessing one of the highest openness of the economy in the EU with its rather export oriented strategy making it dependent on the international trade. In year 2015 it reached the value 185.2% of the openness of the economy which is compared to year 1993 higher by 60%. As an independent state from the year 1993 it had to manage many situations influencing its economy, namely the world financial crisis, entering the EU, adopting the common currency, reforms by Government, gas crisis and so on. All the events caused the fluctuations in the macroeconomic indicators.

The GDP of Slovakia was rising from 1993 slightly with small percentage changes from previous years, in year 2006 Slovakia received foreign investments, development of total productivity and enlargement of capital sources - two automobile factories (PSA Peugeot-Citroen, KIA Slovakia) were launched which even enlarged the international demand on export. The year 2007 Slovak economy had the highest growth which lasted only one year as in year 2008 the global crisis hit the economy. Slovak GDP decreased more than in countries around, but in year 2009 it adopted Euro which many economists consider as a good move as the Slovak GDP was recovered fast in year 2010.

The unemployment indicator is strongly connected with the GDP, when the GDP increases it creates more job opportunities. However the recovery of the unemployment during the financial crisis and Euro adoption took more time, even though the GDP was recovered fast.

Inflation became after Euro adoption one of the factors determining the real exchange rate movements, but since this period all monetary decisions are made by European Central Bank and Slovakia cannot devaluate the Exchange rate for keeping the price competition and gain the market share when needed.

The balance of trade, which is one of the calculating variables of the GDP, was for many years in negative numbers. After being hit by the world crisis in 2009, Slovak trade had strong dependence on demands from Germany and the EU member states with the focused demand on car production, iron & steel and building materials. The net exports came into positive numbers in year 2012 with highest value in year 2013. However, what is interesting is the fact that when the net export is divided into the EU member states and others, it was from year 2002 all the time in positive numbers, so Slovakia exported more to the EU countries than it imported from them.

Indicator REER describes when the competition can be reached, and in case it is over 100 points, it can be and the export products are cheaper than the prices of the imported products. In Slovak situation, the value was above 100 points since year 2009 when the Slovakia adopted the common currency.

The Euro adoption in 2009 for Slovakia meant the removal of transaction costs for Euro transactions which was calculated to the amount of 0.3% of the GDP, next the removal of transaction costs in administration and accounting predicted the savings of 0.06% of the GDP. The Exchange rate risk between Slovak crown and Euro and towards other world important currencies was removed as well, and it was 0.02% of the GDP, while the above level of the estimate was 0.08%. The prices are now easily comparable on the domestic market and the markets in Eurozone which leads to better orientation in prices levels for inhabitants and competition which faces the pressure on prices to protect their increase.

On the other hand, Slovakia lost the dependency in monetary policy, had to deal with one-time costs for adopting Euro estimated to be around 0.4% of the GDP, specific costs for banking sectors to ensure free conversion from Slovak crown to Euro currency and maintaining the information systems.

For having the benefit from Euro currency and not facing the real Exchange rate volatility, Slovakia should have most key trading partners with Euro currency. The statistics for year 2015 revealed that from the import point of view, the three main key trading partners are Germany, the Czech Republic and China. Only three countries from the most ten importing countries have the Euro currency.

Contrary, taking into account the export point of view for year 2015, first three countries are Germany, the Czech Republic and Poland. 60% of the most important ten trading partners where Slovakia exported most of the goods and services are in Eurozone and can benefit from the common currency.

Thus, the key trading partner for Slovakia is Germany, both in import and export point of view.

Analyzing more complexly the commodity structure of Slovak trade into export and import point of view and dividing it into years – 1997 when Slovakia was independent state with its own currency Slovak crown, 2004 when it entered to the EU, 2009 when it adopted the Euro currency and latest available data to this period 2015 revealed than in year 2015 Slovakia imported mostly electrical machinery, road vehicles and power-generating machines and equipment all included in class SITC 7 which was for each period most dominating, but compared to the year 1997, it increased by 11.1%. Other classes stayed unchanged or with small change except the class SITC 3 (mineral fuels, lubricants and related materials) which was declined in the structure by almost half.

The export structure for year 2015 had on 4 top places of exporters the firms namely: the Volkswagen Slovakia, Kia Motors Slovakia, Samsung Electronics Slovakia and PCA Slovakia. The most dominating class is as well in import structure SITC 7 which doubled from year 1997 having in 2015 the 59.4 percentage share in all exported products.

In the empirical analysis examining the relationship between the export, import and the GDP four models were created on the basis of the causality technique which is able to analyze how the variables influence each other and with time lags. When the basic model according to the study by Hussain M,

Saaed A. were created, no variables were statistically significant, even when the openness of the economy and REER variables were added to prevent the problem with possible missing variables. After dividing the export and import into the Extra-EU and Intra-EU, some partial results were revealed, however they were not enough complex for further analysis of the influences of the Slovak GDP. Even though in the last model, where the trade was examined as a net export adding labour and gross capital variable, it did not help for having closer analysis and complex results.

There are many studies about the impact of international trade on the economies and countries, most of them with reliable results, however for Slovak case according to causality technique and the available data it was not able to examine the impact of these variables. This could be caused also by the structural shocks in the main indicators and not enough data as Slovakia as an independent state is since 1993.

To conclude, even though the empirical analysis were not able to reveal complex results, from the macroeconomic indicators, commodity and territorial analysis it is obvious that Slovak economic is open with dominating export mainly from class SITC 7 and its key trading partner Germany. The entrance to the EU and Eurozone opened more options for Slovakia to export its products as it received four free movements and benefits from the common currency. Even though the global crisis hit the economy, during this period Slovakia adopted the Euro, and managed to recover from this recession in relatively short period of time. Thus Slovak economy can be considered as being dependent on the international trade and mainly the car industry with a noticeable help by entering to the EU and Euro adoption for its economy as it can be seen on the macroeconomic indicators and fast recovery from financial crisis.

9 References

ANWER, M. S., SAMPATH, R. K. *Export and Economic Growth*. 1997. Availabe at: http://ageconsearch.umn.edu/bitstream/35938/1/waeasp70.pdf

BALDWIN, R .E., TAGLIONI, D. *Positive OCA Criteria: Microfundations for the Rose effect*. Discussion Paper Series No. 34, 2004. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=936732

BALKO, L., *Než k nám príde Euro*. Epos:2006. ISBN: 8080576610

BÁRÁŇOVÁ-ČIDEROVÁ, D. , LIBERČAN, A. *Euro, výhody a riziká*. Prešov: Vydavateľstvo Michala Vaška, Námestie Kráľovnej pokoja 3, Prešov pre Centrum pre európsku politiku – Edícia Ekonomika, 2007. ISBN 978-80-7165-604-3

BARR, D. et al. *Life on the outside: economic conditions and prospects outside Euroland*. 2003. Available at:
http://economicpolicy.oxfordjournals.org/content/18/37/573

DODARO, S. (1993). *Exports and Growth: A Reconsideration of causality*. The journal of Developing areas, 1993. Available at:
https://www.jstor.org/stable/4192203?seq=1#page_scan_tab_contents

FEDER, G. *On export and economic growth*. Journal of development economics, 1983. Available at:
http://documents.worldbank.org/curated/en/195171468314696616/On-exports-and-economic-growth

FIDRMUC, J., KLEIN, C., et al.. *Slovakia: A Catching Up Euro Area Member In and Out of the Crisis*, Institute for the Study of Labor Policy Paper No. 55: Bonn, 2013. Available at:
http://econpapers.repec.org/paper/izaizapps/pp55.htm

FLAM, H., NORDSTROM, H. *The Euro and Single Market Impact on Trade and FDI*. Institute for International Economic Studies: Stockholm University, 2007. Available at:
https://www.researchgate.net/publication/228346216_The_euro_and_Single_Market_impact_on_trade_and_FDI

HANČLOVÁ, J.: 2012, *Ekonometrické modelování*: klasické přístupy s aplika-cemi. Praha: Professional Publishing, 2012. ISBN 978-80-7431-088-1

HATEMI, J. A. *Export Performance and Economic Growth Nexus in Japan: A Bootstrap Approach.* Japan and the World Economy: 2002. Available at: http://econpapers.repec.org/article/eeejapwor/v_3a14_3ay_3a2002_3ai_3a1_3ap_3a25-33.htm

HUFNER, F., KOSKE, I. (2008). *The Euro Changeover in the Slovak republic: Implications for Inflation and Interest rates.* OECD Publishing: Economics de-partment working papers, 2008. Doi: 10.1787/240631807010. Available at: https://www.oecd.org/slovakia/41029725.pdf

HUSSAIN, M. *Export and GDP in Pakistan: Evidence from Causality and Cointegration Analysis.* International Journal of Management Cases (IJMC): 2014. Available at: http://www.ewp.rpi.edu/jbdn/jbdnv1302

HUSSAIN, M., SAAED, A. *Relationship between Exports, imports, and eco-nomic growth in Saudi Arabia:* 1990-2011. Journal of Emerging Trends in Eco-nomics and Management Sciences, 2015. ISSN 2141-7024. Availabe at: http://jetems.scholarlinkresearch.com/

HUŠEK, R. *Ekonometrická analýza.* 1. edition Praha: EKOPRESS, 1999. ISBM 80-86119-19X

JONES, W. R., KENEN, P. B. *Handbook of International Economics.* Amster-dam: North-Holland, 2014. ISBN: 978-0-444-54314-1

LEWER, J., VAN DEN BERG, H. *How large is international trade´s effect on economic growth?.* Journal of economic surveys: Blackwell Publishing Ltd, 2003. Vol. 17. DOI: 0950-0804/03/03 0363-34. Available at: https://ideas.repec.org/a/bla/jecsur/v17y2003i3p363-396.html

LIPKOVÁ Ľ. *Europska únia.* Sprint dva: 2011. ISBN: 978808939336

MANESCHIOLD, P. *Causual Relationship between export and economic growth. The poland and Sweden case.* Aytac Taspinar: 2009. Available at: http://www.diva-portal.se/smash/get/diva2:305398/FULLTEXT01

MARSH, D. *Euro-Boj o osud nové globální meny*. Centrum pro studium demokracie a kultury:2012. ISBN: 9788073252779

MEHMOOD, S. *Effect of different factors on gross domestic product: a comparative study of Pakistan and Bangladesh*. Resource Mentors (Pvt): 2012. Availabe at: http://aocrj.org/wp-content/uploads/2013/04/AOCRJ-V1I1P2-Effect-of-Different-Factors-on-Gross-Domestic-Product

MICCO, A. et al. *The currency union effect on trade: Early evidence from EMU*. Inter-American development bank: 2003. Available at: https://publications.iadb.org/bitstream/handle/11319/1474/The%20Currency%20Union%20Effect%20on%20Trade:%20Early%20Evidence%20from%20EMU.pdf?sequence=1

OLSON, M. et al. *Empirical analysis of the Relationship between exports and GDP*. 2011. Available at: https://smartech.gatech.edu/bitstream/handle/1853/51636/final

OUTRATA, R. et al. *Ekonomické a sociálne súvislosti vstupu Slovenskej republiky do Europskej únie (prínosy a riziká)*. Ústav slovenskej a svetovej ekonomiky SAV, 2. Vydanie: *Bratislava*, 2002. ISBN: 80-7144-125-2. Available at: http://ekonom.sav.sk/

PANDHI, D. *The relationship between export and growth in select African nations*. The Ohio State University: 2007. Available at: http://citeseerx.ist.psu.edu

PANFIL, T. *Európska únia*. Belinex: 2003. ISBN: 8089083412

PEČINKOVÁ, I. et al. *Euro versus koruna, Rizika a přínosy jednotné evropské meny pro ČR*. Brno: Centrum pro studium demokracie a kultury, 2008. ISBN: 978-80-7325-138-3

RAMOS, F. *Exports, imports, and economic growth in Portugal: evidence from causality and cointegration analysis*. Economic Modeling: 2002. Available at: https://plagiarism.repec.org/amiri-gerdtham/amiri-gerdtham3

ROSE, A. K., FRANKEL, J. A. *Estimating the effect of currency unions on trade and output*. Working paper 7857: National bureau of economic reasearch, 2000. Available at: http://www.nber.org/papers/w7857.pdf

SAMUELSON, P. A., NORDHAUS, W. D. *Ekonómia I.* Bratislava: Bradlo, 1992. ISBN: 80-7127-030-X.

SARKAR, P. *Trade openness and growth: is there any link?.* Munich Personal RePEc Archive, 2007. DOI: 10.2139/ssrn.952151. Available at:
http://mpra.ub.uni-muenchen.de/4997/

SOUSA, N. et all. *Extra – EU export and employment .* Chief economist note: 2012. ISSN: 2034-9815. Available at:
http://trade.ec.europa.eu/doclib/docs/2012/may/tradoc_149511.%202_24.05.2012.pdf

STOCK, J. H:, WATSON, M. W. *Introduction to Econometrics.* Third edition Boston: Pearson Education, 2003. ISBN 978-0-13-800900-7.

TNS Opinion & Social. *Survey requested by Directorate General of Trade.* International trade: 2010. Available at:
http://ec.europa.eu/public_opinion/archives/ebs/ebs_357_sum_en.pdf

TULEJA, P., MAJEROVÁ, I., NEVZAL, P. *Základy makroekonomie.* Brno: Computer Press, 2006. ISBN: 80-251-0952-6

ULLAH Z., et al. *Cointegration and Causality between Exports and Economic growth in Pakistan.* European Journal of Social Sciences – Volume 10, Number 2: 2009. Available at:
https://www.researchgate.net/publication/201203152_Cointegration_and_Causality_between_Exports_and_Economic_Growth_in_Pakistan

VOHRA, R. *Export and Economic Growth: Futher Time Series Evidence from Less Developed international affairs and global strategy. 2001. ISSN 2224-8951.*

WONG, H. *Exports and Domestic Demand: Some Empirical evidence in Asean.* 2008. Available at:
https://www.researchgate.net/publication/237723578_Exports_and_domestic_demand_some_empirical_evidence_in_ASEAN_5

YUHONG, L., ZHONGWEN, C. *Research on the Relationship between Foreing Trade and the GDP Growth of East China – Empirical Analysis based on Causality.* Business School: 2010. Available at:
http://file.scirp.org/pdf/ME20100200006_98712335.pdf

ZÁBORSKÝ,, J., LEHUTA, M. *Desaťročie prerodu*. In. Trend: 2014. Available at: http://www.etrend.sk/