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The Impact of EU Accession on Trade

The case of Poland, Romania and Croatia

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Abstract

One of the main reasons to why a membership in the European Union (EU) is so attractive for prospect countries are the free trade agreements the membership entails. The free trade agreements mean that the whole EU opens up as one big market, where tariffs and tolls are no longer an obstacle to trade for its members. Therefore, this thesis analyses whether EU membership actually yields a positive effect on member's trade. The time series analysis is based on a three-country sample consisting of Poland, Romania, and Croatia during the time period from 2001 to 2018. By applying multiple and Chow's breakpoint tests, and country-wise and a pooled cross-section analysis model, we examine if the accession to EU impacts each country's trade volumes. The results indicate that becoming a member of the European Union does not necessarily have a significant effect on Poland's, Romania's, or Croatia's trade even if it is positive.

TABLE OF CONTENTS

1 INTRODUCTION 1

2 LITERATURE REVIEW 3

3 INSTITUTIONAL BACKGROUND 6

3.1 European Union 6

3.2 Member countries of choice 6

3.3 Economic integration of the European Union 7

4 DATA 9

5 EMPIRICAL ANALYSIS AND RESULTS 12

5.1 Graphical analysis 12

5.2 Augmented Dickey-Fuller 14

5.3 Structural break analysis 15

5.3.1 Multiple breakpoint test 15

5.3.2 Chow's breakpoint test 16

5.4 Effects of an EU entry 17

5.4.1 Country-wise analysis 17

5.4.2 Pooled cross-section analysis 21

5.5 Composition of trade 23

5.6 Limitations 24

6 CONCLUSIONS 25

7 REFERENCES 26

APPENDIX IV

TABLES

TABLE 1. DESCRIPTIVE STATISTICS. POLAND 11

TABLE 2. DESCRIPTIVE STATISTICS. ROMANIA 11

TABLE 3. DESCRIPTIVE STATISTICS. CROATIA 11

TABLE 4. STATIONARITY TESTS FOR EXPLAINED AND EXPLANATORY VARIABLES, 1ST DIFFERENCE VALUES. ALL VARIABLES ARE OF NATURAL LOG FORM AND FIRST-DIFFERENCE. 14

TABLE 5. OUTPUT RESULTS TESTING THE 3 COUNTRIES' ΔLNEX AND ΔLNIM INDIVIDUALLY FOR THE PERIOD 2001-2018, USING THE SEQUENTIAL STRUCTURAL BREAK ANALYSIS 16

TABLE 6. OUTPUT RESULTS TESTING FOR A STRUCTURAL BREAK IN THE 3 COUNTRIES' ΔLNEX AND ΔLNIM INDIVIDUALLY IN THEIR RESPECTIVE ACCESSION YEAR 2004, 2007, 2013, USING THE CHOW TEST 17

TABLE 7. COEFFICIENTS OF CONTROL VARIABLES FROM SEQUENTIAL REGRESSIONS ON POLAND'S EXPORTS. ALL VALUES IN PARENTHESES ARE NOTED AS T-STATISTICS. DATA IS OF THE FIRST DIFFERENCE AND IN A NATURAL LOGARITHM FORM. 18

TABLE 8. COEFFICIENTS OF CONTROL VARIABLES FROM SEQUENTIAL REGRESSIONS ON POLAND'S IMPORTS. ALL VALUES IN PARENTHESES ARE NOTED AS T-STATISTICS. DATA IS OF THE FIRST DIFFERENCE AND IN A NATURAL LOGARITHM FORM. 19

TABLE 9. COEFFICIENTS OF CONTROL VARIABLES FROM SEQUENTIAL REGRESSIONS ON ROMANIA'S EXPORTS. ALL VALUES IN PARENTHESES ARE NOTED AS T-STATISTICS. DATA IS OF THE FIRST DIFFERENCE AND IN A NATURAL LOGARITHM FORM. 19

TABLE 10. COEFFICIENTS OF CONTROL VARIABLES FROM SEQUENTIAL REGRESSIONS ON ROMANIA'S IMPORTS. ALL VALUES IN PARENTHESES ARE NOTED AS T-STATISTICS. DATA IS OF THE FIRST DIFFERENCE AND IN A NATURAL LOGARITHM FORM. 20

TABLE 11. COEFFICIENTS OF CONTROL VARIABLES FROM SEQUENTIAL REGRESSIONS ON CROATIA'S EXPORTS. ALL VALUES IN PARENTHESES ARE NOTED AS T-STATISTICS. DATA IS OF THE FIRST DIFFERENCE AND IN A NATURAL LOGARITHM FORM. 20

TABLE 12. COEFFICIENTS OF CONTROL VARIABLES FROM SEQUENTIAL REGRESSIONS ON CROATIA'S IMPORTS. ALL VALUES IN PARENTHESES ARE NOTED AS T-STATISTICS. DATA IS OF THE FIRST DIFFERENCE AND IN A NATURAL LOGARITHM FORM. 21

TABLE 13. POOLED CROSS-SECTION ANALYSIS ON EXPORTS AND IMPORTS. DATA IS OF THE FIRST DIFFERENCE AND IN A NATURAL LOGARITHM FORM. 22

FIGURES

FIGURE 1. EXPORTS AND IMPORTS FOR POLAND (A), ROMANIA (B), AND CROATIA (C), IN MILLION USD (2001-2018) 12

FIGURE 2. EXPORTS (A) AND IMPORTS (B) FOR POLAND (BLUE), ROMANIA (ORANGE), AND CROATIA (GREY) IN MILLION USD (2001-2018) 13

APPENDIX

ROBUSTNESS CHECK FOR EXPORTS AND IMPORTS WITH EU27 AND EU28 IV

STATIONARITY TEST ON EXPLAINED AND EXPLANATORY VARIABLES VI

COMPOSITION OF TRADE VI

1 Introduction

Throughout the years more and more countries have joined the Union. One of the main reasons to why a membership in the European Union (EU) is so attractive for prospect countries are the free trade agreements the membership entails. The free trade agreements mean that the whole EU opens up as one big market, where tariffs and tolls are no longer an obstacle to trade for its members. Current and new members of EU benefit greatly from being a part of this single market and joining the union: it is measured to yield 3 times more trade exchanges between old and new member states and around 5 times more among all new members (European Council, 2020).

Having such significant economic impact for the member countries, the benefits of joining EU is also expected to grow further. Free trade agreements in general are known to have several benefits, such as boosted economic growth after joining, dynamic business climate, where the previously protected domestic industries can be motivated enough to become a part of global competition. After joining the agreements most governmental subsidies can be removed, which lowers the government spending and relocate the funds for a better use; and the country joining simply becomes more attractive, which yields in an increase of investors and inflows of FDI, making the local businesses expand with the help of the added capital. Furthermore, a single market stimulates trade after free access to markets occur, and lower prices together with lower costs of production due to economies of scale results once again, in an increased competition. Some of the more general advantages of the EU membership include stimulus to Gross Domestic Product growth, growing internal market and domestic demand, free movement of labour, goods, services and capital, and free access to more than 400 million customers (Hungarian Chamber of Commerce and Industry, n.d.).

With this being said, the specific field of interest for this study is trade since it is one of the most essential aspects to why new countries want to join the EU. The purpose of this thesis is to analyse the trade effects of joining the EU during different years between 2001 and 2018, and to study the trade growth of Poland, Romania, and Croatia. To put it differently, the research question is: *Does the accession to EU have a positive effect on trade?* To answer the question, a graphical analysis, structural break analysis and pooled cross-section analysis is going to be conducted using a time-series data for the period from 2001 to 2018. As an additional step to the analysis, the composition of trade, i.e. the top five trade partners of each country, is going to be analysed, in order to support our findings from the first part of empirical analysis. The main focus and the majority of the analysis however is related mainly on the EU effect on each country's trade. The countries that are reviewed in the study are Poland who joined EU in 2004, Romania, joined in 2007, and Croatia that joined latest in 2013. Analysing the trade volumes data, we are aiming to see what effect EU membership has on a country's trade levels during the time of their accession.

We put the focus in this study on the trade effects of EU enlargement. Unlike other studies which mainly put the emphasis on the European Monetary Union (EMU, as a following step after EU, is also expected to increase trade further), our research rather analyses European Union member's trade flows, regardless if they are also a part of the currency union or not. We use an expanded time period (adding more years before and after the accession) to be able to compare each country's trade flows after the accession. We expect to find a positive and significant growth of trade, as most of the literature suggest, after the country enters EU. Together with that we try to emphasize on what factors after joining the EU drives the trade, and even if the accession redirects trade towards EU. In our research, we find that the effect on trade given by the accession to EU is not so significant as we expected beforehand – becoming a member country in EU does not necessarily yield some positive growth in country's trade. The anticipated result was that EU entry and the accessing country's trade volumes would have a significantly positive relationship, but our findings state quite otherwise, the analysis results show specifically that the relationship is not significant.

The next section covers the previous studies done regarding the topic, and section 3 presents the institutional background for this thesis. In section 4, data and the variables used in the analysis are presented, which is followed by the empirical analysis part in section 5, including the empirical framework and the gotten results. Finally, section 6 covers the conclusions and main findings of this study. It also presents the suggestions that could be followed in future research on this topic.

2 Literature review

Some of the previous research that studied the relationship between the EU, as well as the EMU and trade, aims attention at the general effects that the unions have on trade. Even though some empirical literature implies that EU membership should have positive effect on trade, most of the studies emphasize the EMU as a main factor increasing trade. Anyhow, it is still not agreed on the results regarding the magnitude of the impact. Some studies imply that both unions lead to quite significant increase in trade, while others disagree and claim that EMU has positive, but much smaller, effect (Rose, 2000; Micco et al., 2003; de Nardis and Vicarelli, 2003; Bun and Klaassen, 2007). Our thesis uses previous studies based on both EMU and EU but focuses on EU effects since it is the first step that should yield an effect on trade.

The majority of the literature about trade effects of the EU apply an augmented gravity model and have found some evidence that the accession to EU yields positive trade effects. Many previous studies covered the trade effects of a single market by studying individual country's trade effects, which is also the way that this research is conducted, by analysing three individual countries, and overall trade effect of a single market membership, EU in particular. Papazoglou et al. (2006) conducted a research on the impact of EU enlargement on trade using a gravity model and including bilateral observations for 26 countries (EU15 and their trading partners) between the years 1992-2003, as well as making some predictions from the results for the year 2006. They discovered that all accession economies see a large rise in exports and imports, having a bigger increase in imports than exports, with some interesting different individual changes, meaning least integrated countries experience the biggest changes after entering the single market. Additionally, intra-EU trade increases, while trade with the rest of the world has a decrease. The researchers come to a few more conclusions such as that accession not only generates more trade flows but also re-directs it, which is due to an occurrence of more international competition. And also, more countries accessing the single market are potentially beneficial for both domestic and accession producers and consumers. Since elimination of tariff barriers increases gross trade, exports of already existing EU economies may increase as prices fall, while products for new economies are available at a lower price (Papazoglou et al., 2006). Buch and Piazolo (2001) had similar conclusions after simulations using a gravity model, estimating that countries joining EU will tend to import more goods from other EU partner countries than from those countries which are not members of the union. Additionally, Buch and Piazolo (2001) concludes that the impact from joining the EU appears to be more significant than adapting the Euro as a currency.

In contrast to many researches, we choose not to follow the augmented gravity model but rather take a different approach and use several models, such as structural break and pooled cross-section analyses. The inspiration for the structural break analysis is drawn from the research based on time-series analysis of structural break time in the macroeconomic variables in Ethiopia written by Allaro et al. (2011). The research focuses on imports, exports, and GDP of Ethiopia during the years 1974-2009. The endogenous shock affecting the country's economy is different policy changes of the country in this paper. The study uses Chow's structural break analysis to test if the policy changes has an impact on the structural stability, as in if it has any effect on the macroeconomic variables. The study concludes that the specific years when the change was implemented yields no significant results, meaning that neither exports, imports nor GDP is highly affected by the policy change.

Furthermore, studies that choose to follow the gravity model approach are as well useful for this research when incorporating many small details that we follow, such as explanatory control variables and dummies of accession. Such a study where we have taken inspiration is written by Bussiere et al. (2008), who also conducted a research using the augmented gravity model approach, but also followed Micco et al. (2003) and included the real exchange rate to control for feasible valuation effects and dummy variables for other additional factors influencing bilateral trade, such as common border, common language, having been part of the same country or multinational federation, and having membership in free trade areas. The article mostly focuses on the trade integration between Central and South Eastern

European countries (CSEEC) and the EU between 1993 and 2003, where most of the countries are in transition process to join EU in the future. Countries analysed have significant share of trade with EU countries, mostly due to geographical proximity and their GDP levels (Bussiere et al., 2008). The results suggest that the trade levels of the countries were relatively low in the beginning of the transition, but because of the great growth of these countries and importance between the EU members, it reached a more normal, i.e. average values more similar to the ones for the old EU member's, level over time. The same conclusion is made for those countries who are not in transition but rather already had entered EU recently – low trade levels normalize after the accession. Even though while measuring the degree of trading integration it has some methodological issues, the results show that the trade integration between the newest EU members and the euro area (in this study held as already existing EU) is already fairly advanced, while the remaining part of the CSEEC's have important extent to strengthen their trade links with the euro area (Bussiere et al., 2008).

Regardless of the differences in the magnitudes of the positive trade effects of a single market, all studies come to the same conclusions that EU positively affects trade in member countries. Following such studies and the conclusions they come to, we formulate our research question and hypotheses with an expectation we get the same results. For instance, Micco et al. (2003) made an observation that the impact of EMU on trade could be compared to the one that EU membership has already had on trade. A more recent article by Glick (2017), which is an extension of earlier papers, comes to a conclusion that both EU and EMU boosts exports. In the article, Glick (2017) discusses the impact of the date for when the country joins both the EMU and EU. In particular, joining EU earlier increases trade starting by 70%, and that newer members have experienced even higher trade as a result of the accession, which could lead up to 300% increase. However, for EMU, he concludes that there is a significantly larger impact for the "earlier joining" countries in comparison to the more recent members. Additionally, Glick argues that the economic structure of the new and old members is significantly different. This may help explain why the differences between in experienced growth for old and new members are so widely spread especially for EU, but also for the EMU.

As balance of trade is one of the main components in the economy's gross domestic product equation, there are many studies that research not only countries' trade flows, but also GDP to be able to answer if trade agreements and single market have a positive effect on the growth of economy. This corresponds with the results from the sequential regression output in this thesis, where it is clearly shown that the GDP almost always has a significant impact on both imports and exports no matter how many other control variables the regression includes. These are the reasons for which we may say that GDP is one of the main control variables for this study. Keuschnigg and Hohler (1996) argues that Austria's access to EU increased their import variety and the benefits of having a full membership has outweighed the costs of it, after the accession the economy had a 1.2% net annual GDP gain. Weyerstrass and Neck (2008) has come to a conclusion where Slovenia's EMU accession brings temporarily higher real GDP growth and permanently higher GDP level. Simulations of Croatia's accession made by Lejour et al. (2008) shows that if the prediction of Croatia's accession in 2009 would become true, economy could expect a welfare increase which would account for less than 0.1% of GDP and GDP itself could increase by about 9% if country would enter the internal market and improve its institutions to other member's level.

On the other hand, a decent amount of studies finds that the positive effects of EU and/or EMU are rather temporary, short lived or not significant at all. A paper written by Mancini-Griffoli and Pauwels (2006) on the euro effects on trade applying end-of-sample structural break tests for panel data suggests that the found break is not long lasting. Unlike other researches, they have used a bigger time dimension including quarterly data from beginning of 1980 to the end of 2004, due to the estimation requirements, and a sample size of 15 EU countries, splitting it into four testing groups. The results seem to match other findings, for instance, GDP in the long-run being positive and significant, and exchange rate being negative and close to being insignificant, but unlike earlier researches, the durance of the break in trade is tested and it appears to be short-lived lasting only two and a half years, concluding that there is no

significant break in trade in any of the researched groups. A more recent study by Mika and Zymek (2018) “re-visit” the findings about trade benefits that EMU gives, including and focusing on countries who joined the Union more recently. One of the first conclusions gives an idea that effect on trade flows among early euro adopters is non-existent. While further performed pseudo out-of-sample forecast on recently joined countries based on the expectations of positive effects, suggests that accessing countries should not expect a significant increase in trade as well. These and other similar papers support our findings that even though accession to EU gives somewhat positive effects on trade, they are hardly significant.

3 Institutional background

The institutional background consists of two major parts, where the first part covers a brief background of EU as well as each of the three countries. The second subsection explains the economic integration process for a country that an accession to the EU entails.

3.1 European Union

EU, being founded in 1993, is a large-scale world trading power, which operates as a single market currently consisting of 27 countries. The member countries follow common social, security, and economic policies. The purpose of the union is to increase its competitiveness in the global market. Together with that, it must keep the balance between the needs of union's fiscal and political members. The economic policy of the union is focused on job creation and growth boost by trying to make a smarter use of financial resources. It also strives toward having no obstacles for investment and trying to provide technical assistance and visibility to this kind of projects. Since EU is an undivided monetary and trade body, it allows for all border control removal between members, and this is where the interest point for this thesis lays. With having this type of trade bloc, a single market, allows for the majority of trade barriers for goods to be removed and it also gives freedom of movement of services, as well as factors and production.

By supporting the World Trade Organization (WTO), EU took part as a central role shaping the global trade system (European Parliament, 2019). A vast majority of total EU countries' trade (64%) is from bilateral trade with other bloc countries (EUROPA, 2020). EU has quite a big proportion of 15.6% global imports and exports with the rest of the world, if comparing it with EU having just almost 7% of the world's population. This is why we would expect to see how being an EU member contributes to member countries' trade. EU being one of the three largest in international trade, it also had the second largest share of global exports (15.6% of world's total) and imports (14.8% of world's total) of goods in 2016 (EUROPA, 2020). Within the EU, having an open economy brought and will be bringing great benefits to its members, keeping in mind that 30 million jobs in the EU are more or less dependent on external trade, and that around 90% of the economic growth is predicted to be created outside Europe in next 15 years. Even with the global financial crisis in 2007-08 and its effects, the negative burden on EU's economic performance was not as detrimental as for other industrialized economies and its share of global GDP declined less rapidly comparing to others. In terms of the total value of all goods and services produced (GDP), €15.3 trillion in 2017 or over 20% of global GDP, EU's economy is bigger than the US economy (EUROPA, 2020).

3.2 Member countries of choice

This thesis focuses on three member countries of the European Union, which are Poland, Romania, and Croatia. These three countries were chosen due to all three of them having different entry years yet not being too widespread over a longer period. These are two important aspects since they reduce the possibility of general current structures in the economy affecting the results of our study. In the upcoming three subsections a brief background of the three countries included in this study will be given.

Poland

Ever since 1989, a big political goal for Poland has been to join the EU and thereby become more integrated with western Europe. However, it took quite a few years until the government, led by Leszek Miller, in 2001 made it their primary goal to finally access the EU. In the next coming year, the discussions and negotiations accelerated and intensified, and by the end of 2002 it was as good as settled that an accession to the EU was confirmed (Taras 2003). Poland became an official member of the EU on the 1st of May in 2004. The Polish intra-EU trade accounts for about 80% of the total exports and 69% of their imports, which put further emphasis on the importance of the EU membership. As the

membership also implies the country should sooner or later also adapt the Euro as their currency. This is right now in discussion and preparation for Poland, but for now they still have their own currency Zloty (Europa, 2020).

Romania

The second of the three countries in our analysis to become a member of the EU, is Romania. The country first filed their application for the membership in 1995. And it can be considered that the big wave of EU enlargement in 2004, when several central and eastern European countries joined, paved the way for Romania's accession. The date of Romania joining was not known until September in 2006 when the accession was set to take place on the 1st of January in 2007 (Chiva and Phinnemore, 2009). As for Poland, also for Romania, when looking at the intra-EU trade volumes it becomes evident that a membership was a natural step. Romania's intra-EU exports accounts for 77% of their total, and for imports 75% are intra-EU. Croatia has also committed to adopting the Euro as their currency but before they can do so they must comply with some necessary conditions. Therefore, they are still using their own currency Romanian Leu (Europa, 2020).

Croatia

The last of the three countries in this thesis to become a member of the EU, is Croatia, whose membership became official on the 1st of July in 2013. However, they applied for the membership already in 2003, and was between 2005 to 2011 going through negotiations. In December 2011 the treaty was signed, and the accession date was set to the 1st. Likewise, for Croatia as for Poland and Romania, the intra-EU trade accounts for a great part of the total trade flows. As for exports, 68% are within EU, and for imports 78% are intra-EU. Croatia has also committed to adopting the Euro as their currency but must before they can do so comply with some necessary conditions. Therefore, they are still using their own currency Croatian Kuna (Europa, 2020).

3.3 Economic integration of the European Union

One of the main concepts motivating this thesis is the impacts of tariffs, or rather the absence of them, to trade and in a prolonging the economic wellbeing of a nation. Therefore, it is of high importance to examine the structural changes related to trade and trade patterns an accession to the EU may lead to for a nation. To further understand what effects the impact an accession to EU may have on an economy we fist must understand the underlying factors determining the magnitude of these effects. The EU is an economically integrated union, meaning that for the member countries most trade barriers have been removed to facilitate and unify internal and external trade of the union. Hence, this economic integration means that the member countries must agree on some shared fiscal policies. Furthermore, the EU can be viewed as a so-called single market, which implies that the union has some common policies and rules on product regulations and the movement for factors of production.

Positive effects of trade

Joining a free trade agreement (FTA) such as the one of the EU, expands the market of an exporter, and allows for a more efficient resource allocation, as well as attracting a higher flow of foreign capital. All these possibilities are, as known from the neoclassical theories of trade, factors of economic growth. The free movement for factors of production, labour and capital, are also contributing factors to a technological advancement for a nation.

Additionally, the absence of trade barriers may lead to reduced production, transaction, and transportation costs for products. This may also generate in an increase in so-called knowledge spill overs, which may help boost the productivity and development of an industry. Furthermore, the increased competition that an FTA brings with, can put pressure on the industries to increase productivity and efficiency. For instance, Baier and Bergstrand (2007) found that the effects from joining an FTA such as the EU, would yield five folded trade flows for the accessor. Additionally, they

found that, after 10 years of being a member of an FTA the bilateral trade with another member country almost doubled. Instability and uncertainty caused by the own government are other factors that may be reduced by being economically integrated at such a level. The accession to the EU means that all members have some unified laws and regulations, which may help industries in the domestic market to avoid instability and corruption caused by the own government. These possibilities are especially high for a smaller developing economy with otherwise relatively small power to make impact on the world market on its own.

Impediments to achieve growth from trade

By removing tariffs as a barrier to trade, other non-tariff barriers may arise instead and possibly hinder the increase in trade and economic growth. Although the growth and gain potential of joining an FTA is the greatest for a small developing economy it is not a guaranteed high success rate. Problems that may arise when joining an FTA could for instance be, conflicts between domestic market legislations and rules and the EU ones. It is also important to look at what the nation's already existing production and skills consist of, because although competition may lead to efficiency, it may also decrease the expected rise in exports. This can be explained by such as another member nation of the same FTA having a considerably stronger "made-in brand" in comparison to the one of the new accessor, and therefore the domestic exports do not experience a significant increase, since other nations still prefer the other country's product.

Another aspect to consider is the "changing-production cost" that your production may have to undergo to comply with EU legislation or due to an increased efficiency need. This may be too big of a barricade to overcome as a smaller economy. It could also be the case that a country's main export product prior to accession is a luxury good, for which demand may decrease if it becomes cheaper for the consumer, and hence there will be a less significant increase in exports. Other barriers that an accessor may have to face includes stricter rules on ingredients, labelling, and packaging of products. Post the accession, the complete products must comply with the EU directives and laws, which it may not have done prior to the accession. Thus, this could either lead to high costs to change production (as discussed earlier), or even a complete loss in production of the domestic product. The possibility is also that this may cause a negative effect of the product's publicity and therefore a decrease in the goods attractiveness on the international market (Todaro et al, 2003).

Moving passed these barriers to trade there is still one important factor to take into account when analysing the growth potential, which is time. As discussed in the literature review in Section 2, several studies have shown that the aim of reaching economies of scale and higher productivity normally requires a longer period of time. Therefore, it is important to consider the long-term gains compared to the short-term possible losses before determining the economic growth potential of the country.

These negative impacts have not been taken into account in the analysis of this study. Including the parameters to the regressions for such impacts could have yield a different result. Hence, the exclusion of these negative aspects may be underlying factors to why we do not find a significant positive effect from the EU accession on the trade volumes.

Based on the literature review and the theoretical framework, two hypotheses are formulated, keeping the main focus on the first one, and will be tested in order to investigate the effect on trade that is implied with the accession to the EU.

H_1: *Joining EU has a positive impact on trade growth*
H_2: *Joining EU changes the trade flows towards EU*

The following analysis is based on both the previous studies and the collected background presented above and aims to investigate if the accession to EU has an expected results of trade increase.

4 Data

The sample that is going to be used in the analysis consists of data for three countries, Poland, Romania, and Croatia, that enter EU in different periods of time, 2004, 2007, and 2013, respectively. Different entry dates allow us to analyse and see if the timing of the accession has the same or similar impact on trade throughout the years. In other words, it gives us the ability to analyse the results together and taking into account the external circumstances that might have had an influence on country's trade on the accession year. The chosen time period for the research is annual data accounting from 2001 to 2018, which was the latest year for which the information was available during the time of the data collection. By choosing this specific time period, it allows us to analyse the data on prior- and post-accession years for each country.

The trade analysis is made measuring the volumes of the macroeconomic trade variables, exports and imports, of each country throughout the years with other EU members, more specifically, the core of the EU – EU15, where the number 15 states the number of the member countries of EU before the accession of the next ten candidates on May 1st in 2004. Other available data options consisted of EU27 (27 EU countries after UK left EU on February 1st in 2020) and EU28 (28 EU members prior UK leaving EU) being the trade partners for the countries. This specific choice of using EU15 as a trading partner is done in order to get the most consistent results when measuring trade, so that each country has the same trading partners. This is relevant to this study since each country's accession year is different, and thereby the number of EU members during the years also differs. Trade volumes, i.e., the level of exports and imports, are measured rather than overall trade balance, since the later does not show the exact increase, and in case of mirror countries, it would have to be taken with caution because the coverage of data of exports and imports might be different.

The yearly data for the export and import performance of the sample countries was retrieved from Trade Map of International Trade Center. Both exports and imports are measured in US dollars, which makes the data comparable on the international level across the countries. The data available of Trade Map is collected from different sources of information, one of them being UN COMTRADE. The annual data that is used in this study is based on UN COMTRADE that is maintained by the United Nations Statistic Division, and it is integrated with the data collected by International Trade Center. UN COMTRADE displays data of more or less 160 countries and territories, while Trade Map covers approximately 220 countries and territories by using both reported and mirror statistical data.

Explained variables

In this research, trade volumes are being treated as dependent variables. It is both exports flowing from Poland, Romania, and Croatia to EU15 and imports flowing to Poland, Romania, and Croatia from EU15 for every year of the sample.

For the statistical purposes, to accommodate for the possibility of stationary data, the natural logarithm form of the variables is being used. Also, by taking the natural log of the values, skewness and heterogeneity can be reduced. By using natural logarithm forms of our data, we do not lose any values since our trade volumes do not have any values that would be equal to 0. For the economic purposes, using the natural log values is more meaningful and robust. It gives the growth rates or percentage change of the variables, which becomes handy when interpreting the results because our data changes with respect to time (Martin, 2015), e.g. logged variable coefficients measure the percentage change in trade, when they increase by 1% (Goldstein, Rivers and Tomz, 2007). Also, a rather simple reason for using natural logarithms is that it scales down the values of the variables, which makes it easier to interpret if the data has large deviations.

The same reasoning concerning taking natural logarithms of the variables applies when taking the natural log forms of the explanatory variables as well.

Explanatory variables

Based on previous studies, as well as availability of data and relevance to trade, most of the common and frequently used explanatory variables are also chosen for this thesis' analysis.

Gross Domestic Product (GDP), which is an aggregate measure of production that is equal to the sum of the gross values added of all resident and institutional units which are engaged in production and services (plus any taxes, and minus any subsidies, on products not included in the value of their outputs) (OECD, 2020), is used as a control variable to check for trade flows. Based on previous research, countries that have high values of GDP, also seem to have higher values in trade as a share of output (Ortiz-Ospina, 2018). The current-dollar GDP is retrieved from World Bank data base.

Foreign Direct Investment (FDI), is the investments actively made in open markets from one individual or a company to another one that is located in a foreign country, and is used as a control variable to check for trade flows in this study. The FDI in this thesis is considering the net inflows of foreign investment, measured in US dollar, to the three countries of interest individually. The study focuses on inflows of FDI rather than outflows with respect to its interest in examining the attractiveness change for the home market for each country, pre and post accession to the EU. Empirical evidence shows that FDI stimulates growth of exports from the original country, and as a following, is complementary to trade (Fontagné, 1999). The data for FDI is retrieved from World Bank data base.

Exchange rate (ER), a value of a currency from one country (economic zone) versus the currency of another one, is used as a control variable to check for trade flows. The relative valuations of currencies are often considered to have significant consequences on international trade, as well as overall economic performance. According to the J-curve theory a negative relation between imports and exchange rate is expected in the short-run. However, in the long-run the imports are expected to decrease, together with exports increasing due to its attractive prices. This explanatory variable has an importance for the researched, since countries of interest have different currencies (Zloty, Leu, Kuna) and we rather have same currency for all in order to get more precise results. Data for exchange rates is measured in national currency units against USD, as an annual average, and is retrieved from OECD data base.

Government spending (GS), measured in current US dollars, refers to money spend by the government on goods and services, that cannot be supplied by the private sector such as healthcare, education, defence and social protection, that are meant to accomplish the economic objectives, improve supply side of the macro-economy, promote social welfare and redistribute income, and is used. Government spending is included as one of the control variables in this thesis due to its highly linked relation with the levels of trade flows, especially imports. In general, the more the government spends the more the need to import increases, which is driven by the higher levels of demand (Bivens, 2018). The data for government spending is retrieved from World Bank data base.

Political stability (PS), measured as the perception of how likely it is that the country's government will be overthrown or destabilized by violent or unconstitutional means, that can include politically motivated violence, as well as terrorism. Political stability and economic growth are intensely interconnected, in the sense that political stability is crucial for economic growth to occur. And it is therefore included as a control variable to check for trade flows. The data for political stability is an estimate which is based on the perception index of how likely instability and violence are in the country due to the political situation. These estimates provide a normally distributed unit measure, ranging from -2.5 to 2.5 for each country. In the sample data used in this thesis values range from 0.06 to 1.07, and therefore taking the natural logarithm of this variable is mathematically correct. This data is retrieved from the World Bank data base. The data of political stability for year 2001 is not available, because the data base has no records of it for any country in the world.

Dummy variables

Membership (D), which will be added to the regressions in both the sequential analysis as well as in the pooled cross section regression. This allow us to check if the membership has had an effect on the country's trade volumes. The dummy variables are of value 1 in the year when a country enters EU and all subsequent years after, while it takes on the value of 0 for all years before the accession. The reasoning behind including the membership dummies is to eliminate the general effects of the change in trade. This appears to be relevant in this study considering the results retrieved from the structural break analysis.

Descriptive statistics

Table 1, 2, and 3 present the descriptive statistics for each country, Poland, Romania, and Croatia, in order to get a more direct understanding how variables differ between the full sample.

Table 1. Descriptive Statistics. Poland

Variable	*Mean*	*Median*	*Standard Deviation*	*Min*	*Max*	*Skewness*
Exports	92021140	1.03E+08	39819901	24755467	1.64E+08	-0.259423
Imports	81829036	89904168	28553618	30483457	1.30E+08	-0.435023
GDP	4.20E+11	4.75E+11	1.32E+11	1.91E+11	5.86E+11	-0.653537
FDI	1.34E+10	1.43E+10	6.63E+09	7.95E+08	2.50E+10	-0.275712
Political Stability	0.690647	0.713546	0.285352	0.152949	1.072063	-0.275693
Government spending	7.66E+10	8.53E+10	2.34E+10	3.55E+10	1.04E+11	-0.676253
Exchange rate	3.389444	3.246000	0.480162	2.409000	4.094000	-0.147014
n=18						

Table 2. Descriptive Statistics. Romania

Variable	*Mean*	*Median*	*Standard Deviation*	*Min*	*Max*	*Skewness*
Exports	26836816	27914532	11597587	7736346	47326583	-0.115461
Imports	31993153	37431987	12706906	8929302	51486009	-0.534852
GDP	1.52E+11	1.74E+11	6.22E+10	4.04E+10	2.40E+11	-0.650862
FDI	5.37E+09	4.48E+09	3.46E+09	1.14E+09	1.37E+10	0.895002
Political Stability	0.154661	0.179547	0.177770	-0.382386	0.463401	-1.218476
Government spending	2.31E+10	2.59E+10	9.63E+09	6.38E+09	3.98E+10	-0.421151
Exchange rate	3.275333	3.285000	0.491910	2.438000	4.059000	0.203995
n=18						

Table 3. Descriptive Statistics. Croatia

Variable	*Mean*	*Median*	*Standard Deviation*	*Min*	*Max*	*Skewness*
Exports	5100681	5332819	1383095	2527602	7971988	-0.179821
Imports	10279492	10468607	2419804	5224658	14905553	-0.249911
GDP	5.15E+10	5.59E+10	1.28E+10	2.32E+10	7.03E+10	-0.914071
FDI	2.09E+09	1.63E+09	1.38E+09	1.59E+08	5.19E+09	0.947004
Political Stability	0.597041	0.610025	0.105102	0.278126	0.768878	-1.557957
Government spending	1.01E+10	1.11E+10	2.68E+09	4.47E+09	1.31E+10	-0.857423
Exchange rate	6.168667	5.899500	0.899764	4.935000	8.342000	0.983575
n=18						

When comparing the countries, it is visible that Poland is the economically largest country included in the study, as measured by the size of GDP and taken into consideration the volumes of trade. The reason behind this might be the early accession to EU and having a wide background for economic growth, as well as having a beneficial geographical location with being close to the centre of Europe. Most of the variables in the sample have negative skewness, and higher standard deviation, which implies that heterogeneity might be present in the sample. By taking the natural logs of the values, it allows for a reduction in skewness and heterogeneity, which means that the qualities of the variables are non-uniform and could measure unlike effects due to dissimilarities in the subject. Therefore, values are logged to summarize the meaning so straightforward testing and conclusions would be allowed.

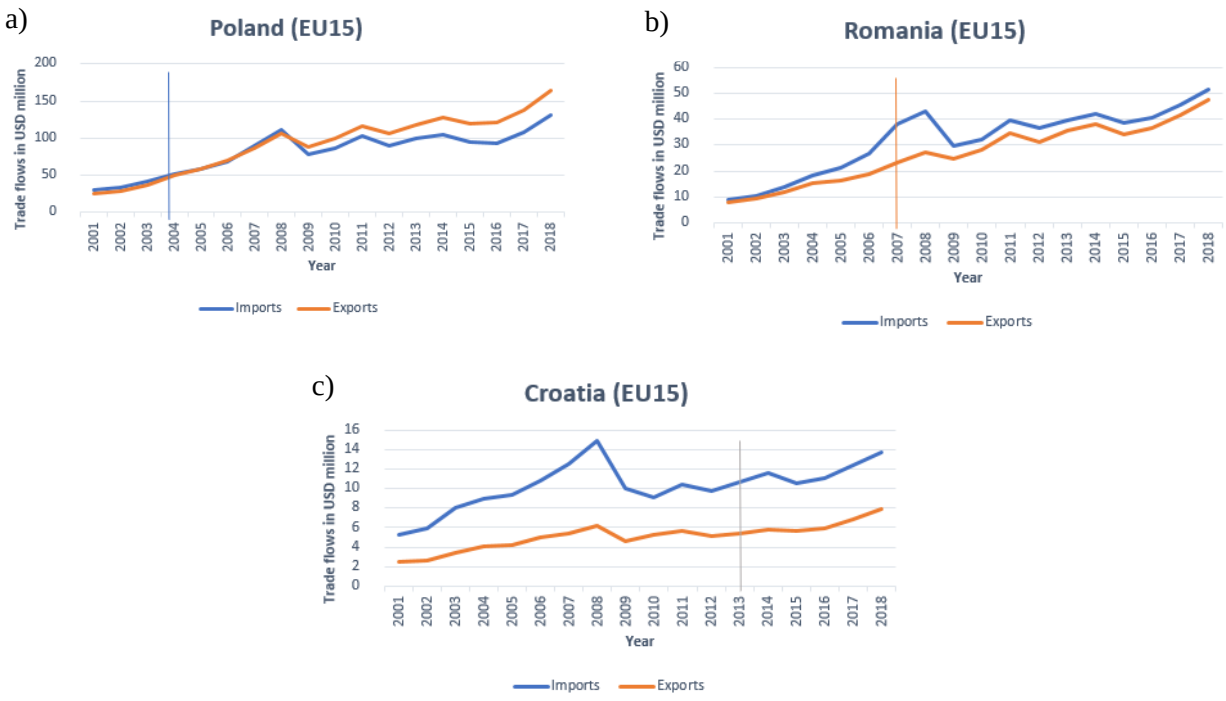
5 Empirical analysis and results

The empirical analysis of this thesis consists of six parts, where in subsections 1 to 4, analysis related to the first hypothesis stated are conducted. First part covers the graphical analysis of each country's trade flows and a comparison between exports and imports. The second part of this section includes stationarity tests that are conducted on all the existing variables used in this analysis. Subsections three and four of this section covers two types of structural brake analysis – multiple breakpoint test and Chow's breakpoint test, as well as the effects of an EU entry, which is split into two parts, country-wise analysis, and a pooled cross-section analysis. Subsection five includes the analysis of composition of trade for each country, aiming to answer the second hypothesis, and the last part covers the limitations of this thesis.

5.1 Graphical analysis

We start our analysis by graphically examining each country's exports and imports. In order to graphically analyse the changes in trade flows, several graphs were conducted based on the data collected. Each graph (Figure 1) depicts the flows of both imports and exports for each country throughout the period. Where the blue line represents the imports and the orange line represents the exports. Furthermore, a vertical line in each of the graphs was inserted to see the accession year for each country more clearly. Additionally, two graphs were conducted, one for the imports and one for exports for country comparisons (Figure 2). With the purpose to more easily compare the differences in the flows between the three countries. As shown in the graphs in Figure 2, each country is depicted with a different colour to facilitate the comparison.

Figure 1. Exports and Imports for Poland (a), Romania (b), and Croatia (c), in million USD (2001-2018)



When analysing the graphs of each country, there is no significant and clear visual change in trade flows on the year of the accession of any country. However, there is an overall increase on trade during the whole period for all three countries. This constant growth might be related to economic growth in general. Another reason for trade flows increase might be related to the announcement of the accession,

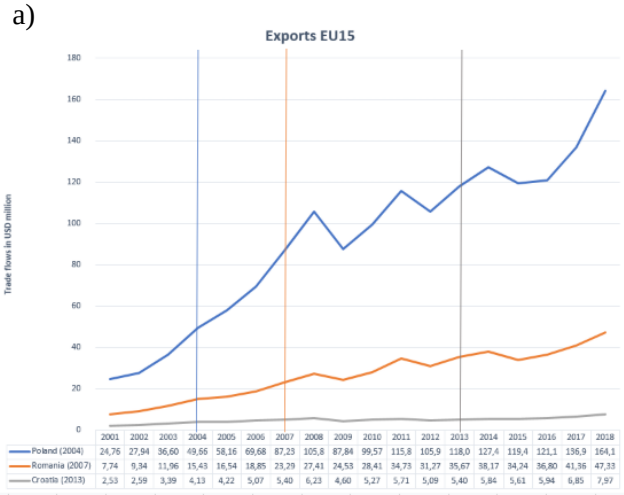
when countries might become more attractive for other trading partners, even though trade barriers are still not removed.

When analysing Poland's entry to the EU visually, both imports and exports, are growing more rapidly after the accession, compared to the years before. Also, comparing exports to imports, exports seem to have a bigger continuous leap, making the trade balance positive. For Romania and Croatia, the trade balances remain negative but with increasing trade volumes, which we could guess is impacted by the time of the accession. At a first glance Romania's accession seems to have quite significant influence on trade flows, but considering the financial crisis in 2007-2008, such an exogenous shock made a decrease in country's exports and imports. This is the case for all three countries, since the crisis had an impact on most parts of the world, which can visually be seen quite clear on the year 2008. After the crisis, Romania's trade balance seems steadier, possibly impacted by the accession, but it cannot be a proper assumption considering the previous mentioned exogenous shock. Analysing Croatia's trade flows after the accession, especially imports seem to have a more rapid increase, but only when comparing with the period after the financial crisis. Before the accession both imports and exports have some fluctuations, which become steadier after Croatia joins EU.

As mentioned before, for more in-depth comparison, all country's imports and exports are graphed in one graph for each variable. This is done to examine whether there is a particular change in trade flows for a country specifically on their accession year or if there is rather a general effect that influences the trade fluctuations in the same or similar way for each country.

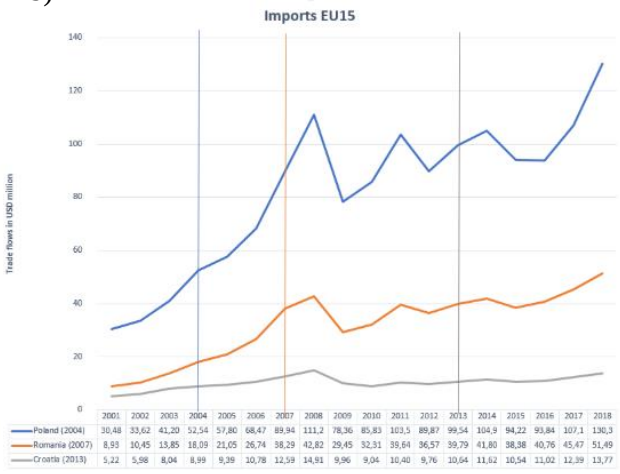
Figure 2. Exports (a) and Imports (b) for Poland (blue), Romania (orange), and Croatia (grey) in million USD (2001-2018)

a)



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Poland (2004)	24,76	27,94	36,60	49,66	58,16	69,68	87,23	105,8	87,84	99,57	115,8	105,9	118,0	127,4	119,4	121,1	136,9	164,1
Romania (2007)	7,74	9,34	11,96	15,43	16,54	18,85	23,29	27,41	24,53	28,41	34,73	31,27	35,67	38,17	34,24	36,80	41,36	47,33
Croatia (2013)	2,53	2,59	3,39	4,13	4,22	5,07	5,40	6,23	4,60	5,27	5,71	5,09	5,40	5,84	5,61	5,94	6,85	7,97

b)



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Poland (2004)	30,48	33,62	41,20	52,54	57,80	68,47	89,94	111,2	78,36	85,83	103,5	89,87	99,54	104,9	94,22	93,84	107,1	130,3
Romania (2007)	8,93	10,45	13,85	18,09	21,05	26,74	38,29	42,82	29,45	32,31	39,64	36,57	39,79	41,80	38,38	40,76	45,47	51,49
Croatia (2013)	5,22	5,98	8,04	8,99	9,39	10,78	12,59	14,91	9,96	9,04	10,40	9,76	10,64	11,62	10,54	11,02	12,39	13,77

There is no graphically notable change displayed in the graphs that points towards a difference in trade growth, when for instance, comparing when one country joins the EU, and others are only planning to. For both exports and imports, the accession probably would not be the main factor of trade growth, rather than the period of time, i.e. Poland joins in 2004 and is experiencing a continuous growth, but such is also the case for Romania and Croatia at the same time, even though they are on a path of joining EU.

Additionally, we can see that trade for all countries is experiencing growth only up until 2008, when being affected by the financial crisis. Considering Romania's accession, we probably would not see any positive effects, since the timing was disadvantageous, since the country joined EU right before the recession. After that point in the timeline, both exports and imports for all three countries are experiencing negative impact on trade, followed by varying levels of fluctuations, depending on the country's economy size, i.e. Poland having greater fluctuations than Romania, which has bigger

fluctuations than Croatia. Nevertheless, crisis being held such a disaster, countries manage to make a recovery and has since then kept a positive overall time-trend for growth of trade. Furthermore, Croatia's accession to EU does not seem to have had any visible impact on trade growth, it appears almost the same before and after joining EU. The reason behind these similar fluctuations is related to the general economic effects in the world and EU itself. In the last century world economy has been growing by around 3% every year in real terms, and slightly less in the end of it, after 1990. EU has also had the same growth rate, including the enlargements of EU. Even if after 1990 the economic growth was slower, it still was stable up until the global economic crisis unsteadiness of Eurozone in 2008 that had an impact on almost every country. Nevertheless, this shock was followed by a slow yet steady recovery, including the lowest unemployment since 2008, growing investments and better shaped public finances (EUROPA, 2017).

5.2 Augmented Dickey-Fuller

Since this thesis deals with time series data, it is important to check for and be able to adjust for the relatively high possibility of the sample data being non-stationary. This stationarity problem may cause autocorrelation problems and therefore violate the basic assumptions of the ordinary least square (OLS) regressions. Having a stationary form of the data helps us find the relation between the samples in our time series and makes the statistical properties of time series generating process to be constant over time. Hence, even if the series change over time, the way it changes remains the same, with a constant slope that shows the rate of the change. Therefore, the Augmented Dickey-Fuller test was conducted on each of the included variables. All the tests on the variables confirms that the data is non-stationary (Appendix Table A.1), which implies that means and variances of variables in our time series change over time and the covariance between those variables also change over time. For weakly stationarity to be achieved, the first-differences of the variables are taken, making most of the data stationary and having means, variances and covariances take on the same value for all time periods. Hypothesis are as stated:

H_0: *Variable has a unit root*
H_1: *Variable has no unit root*

Table 4. Stationarity tests for explained and explanatory variables, 1st difference values. All variables are of natural log form and first-difference.

	Poland		***Romania***		***Croatia***	
Variable	**t-Statistic**	**P-value**	**t-Statistic**	**P-value**	**t-Statistic**	**P-value**
Exports	-1.574356	0.1056[1]	-1.846937	0.0634[2]	-3.454079	0.0019
Imports	-3.014214	0.0051	-2.530284	0.0151	-3.180101	0.0035
GDP	-2.646157	0.0117	-1.873525	0.0599[3]	-2.162413	0.0333
FDI	-5.579736	0.0000	-3.190214	0.0034	-7.789884	0.0000
Political stability	-4.301051	0.0003	-4.914285	0.0001	-7.565662	0.0000
Government spending	-2.792182	0.0085	-1.944976	0.0520[4]	-2.066284	0.0406
Exchange rate	-3.956684	0.0006	-3.773769	0.0009	-2.893077	0.0067

We notice that different variables become stationary at varying levels of differences. We cannot run the regressions correctly if the variables have different integration orders, this will mean that variables are not cointegrated and thus would make the regression spurious (Granger and Newbold, 1974). To estimate the dynamic relationship between explained and explanatory variables, the order of integration has to match. If the explained variables are of first difference it means that at least some of the explanatory variables also have to be of the same level of difference. If this does not hold, the model would become misspecified (Parker, 2013). In this case, we choose to have first-difference values for

[1] 2nd difference t-statistic is -6.425846 and p-value is equal to 0.0000.
[2] 2nd difference t-statistic is -7.626100 and p-value is equal to 0.0000.
[3] 2nd difference t-statistic is -4.733695 and p-value is equal to 0.0001.
[4] 2nd difference t-statistic is -5.920685 and p-value is equal to 0.0000.

our following regressions, even if some variables are not completely stationary after running the first-differences. There are a few reasons behind this: first, we do not use the second-difference variable data, since we lose additional data by doing that, considering our sample size is already small. Secondly, to have consistent data, get more accurate results and have correct regressions, we make all the variables be of first-difference. Third, for the following analysis we run the regressions using first-differences so we could account for long-run effects. And finally, if we would have one regressor, the order of integration of explained and explanatory variables would need to match for the specification to make economic sense, but with more regressors and an integrated explained variable, it is possible to have a mixture of both integrated and stationary regressors (Parker, 2013).

5.3 Structural break analysis

From previously conducted graphical analysis, there are no visually significant changes in trade flows and examining the graphs is not statistically sufficient and reliable enough, and therefore conducting a time series analysis of a structural break, for both exports and imports of all countries, is necessary. In order to test the existence of the structural break that is expected by the accession to the EU, which in this case is a change in trade policy, or in other words, an endogenous change, two types of structural break analyses are applied, multiple and Chow's breakpoint tests. Interest variables are being tested individually, after taking the natural logarithms and the first difference. The null and alternative hypothesis being tested through both of the structural analyses are:

H_0: *structural stability*
H_1: *structural break*

For each country 2 single regression lines are run, one for each of the macroeconomic variables examined in this study (export and import). The regressions are expressed as follows:

$$EXs_t = \alpha_0 + \alpha_1 \Delta logEX_1 + \alpha_2 \Delta logEX_2 + \cdots + \alpha_t \Delta logEX_t + \mu_t \quad (1)$$
$$IMs_t = \alpha_0 + \alpha_1 \Delta logIM_1 + \alpha_2 \Delta logIM_2 + \cdots + \alpha_t \Delta logIM_t + \mu_t \quad (2)$$

In the above regressions EX and IM represents the exports and imports, respectively. Where, s is the structural break in time t for export and import, respectively. Additionally, μ is the coefficient that captures the random terms that are independently and identically distributed with both the mean and squared variance (σ^2) equal to zero.

5.3.1 Multiple breakpoint test

The first conducted test is Sequential Bai-Perron, also known as Sequential L+1 breaks vs. L, which is held as an extension provided by Bai (1997) and Bai and Perron (1998, 2003a) of Quandt-Andrews framework that allows for multiple unknown breakpoints. When conducting this test, it is assumed that we do not know the entry to EU dates but expect the results to show that the brake in trade volumes happened during the year each country entered the EU. By choosing sequential L+1 breaks vs. L method, we test for the single added breakpoint that is supposed to reduce the sum-of squares the most.

The data sample consists of observations for exports and imports for the period 2001-2018 for each country tested. Before testing the structural breaks, a specification of the maximum number of breaks that allowed is chosen, which is two. The allowance for two breaks rather than one is done in order to accommodate for the high risk of a break occurring in the year of the financial crisis rather than for the accession year. For these tests, the trimming percentage is 15% of the sample, and the significance level is of 5%. We are estimating our equation using OLS method.

The test results with F-statistics and Bai-Perron critical values for the statistics are presented in Table 5.

Table 5. Output results testing the 3 countries' Δlnex and Δlnim individually for the period 2001-2018, using the Sequential Structural Break Analysis

Country	*Entry Year*	*Tested Variable*	*Break Test*	*F-statistic*	*Critical Value*	*Sequential F-statistic Determined Breaks*
Poland	*2004*	Δ*lnEX*	0 vs. 1	10.54973	8.58	2009
			1 vs. 2	3.170960	10.13	None
		Δ*lnIM*	0 vs. 1	6.021463	8.58	None
Romania	*2007*	Δ*lnEX*	0 vs. 1	6.451152	8.58	None
		Δ*lnIM*	0 vs. 1	9.651828	8.58	2008
			1 vs. 2	3.911732	10.13	None
Croatia	*2013*	Δ*lnEX*	0 vs. 1	2.825887	8.58	None
		Δ*lnIM*	0 vs. 1	5.461219	8.58	None

For Poland, exports' sequential test results indicate that there is one breakpoint: we reject the null hypothesis of breakpoint 0 in favour of the alternative of 1, but the test of 2 versus 1 breakpoint does not reject the null hypothesis. Hence, the results indicate one breakpoint in the series, which occurred in the year 2009, which is not the year of the accession (2004). As for imports, no significant results are found, which means that there are no breaking points throughout the period. For Romania's exports, the result of the test shows no significant values, which indicates that no breaks have occurred. The sequential test on imports indicates one breakpoint: we reject the null hypothesis of breakpoint 0 in favour of the alternative of 1, but the test of 2 versus 1 breakpoint does not reject the null hypothesis. This time, the breakpoint year is 2008, which is close to the accession year of 2007. Nevertheless, this break might have occurred due to the crisis taking place at the same time. Both Croatia's exports and imports results indicate no breakpoints during the period, the tests of 0 versus 1 breakpoint does not reject the null hypothesis. Hence, there is constancy in the time series and no breaks occurred throughout the period.

The test results do not show any proof that accession to EU itself has had any impact on any country's trade, rather than the general effects of external circumstances. The shown breakpoints for Poland and Romania could be influenced by the financial crisis that has happened during the years of 2007-2008.

5.3.2 Chow's breakpoint test

In this test the accession year is the expected break-point year for each of the countries. Rather than letting the software detect a year we want to specify the accession year as the break of interest. Therefore, the Chow's F-test is applied as an addition to the multiple breakpoint analysis. In this test imports and exports are examined since these are the macroeconomic variables of interest in this thesis. To test this, the data is first split into two groups, one including the data for the years prior and one for the years post the structural break, which in this case stands for the accession year. In essence, this test compares the sum of squared residuals from a single equation where the entire sample is included, to the sum of squared residuals obtained when separating the sample into two regression equations (Gujarati, 2003). By choosing the accession year as the break point of the data sample, the Chow test examines whether there is a significant difference in the tested variable, imports and exports, between the period before and the period after. It is therefore expected to show proof of statistical significance prior and post to the country's respective accession year.

Using the values retrieved from the unit root test, the statistical program Eviews adopts the following formula in order to calculate the test statistic.

$$F = \frac{RSS - (RSS_1 - RSS_2)/K}{(RSS_1 + RSS_2)/(N_1 + N_2 - 2K)} \quad (3)$$

Where residual sum of squares (RSS) is capturing the full data set over all the time period, which is either imports or exports respectively to the variable that is being tested over the years from 2001 to 2018, for the tested country, Poland, Romania or Croatia. RSS_1 and RSS_2 deals with the data for the period before and after the structural break respectively, once again, being tested separately for imports and exports for each country. Additionally, K is the number of parameters that are being estimated i.e. equals 1 when testing the breaks in imports, and equals 1 when testing the breaks in exports, while N is the sample size i.e. the years included, from 2001 to 2018, being same for every test made on each country.

Table 6. Output results testing for a structural break in the 3 countries' Δlnex and Δlnim individually in their respective accession year 2004, 2007, 2013, using the Chow Test

Country	*Tested Variable*	*F-statistic*	*Probability*	*Tested year (accession year)*
Poland	*ΔlnEX*	0.948319	0.3456	2004
Poland	*ΔlnIM*	0.358757	0.5581	2004
Romania	*ΔlnEX*	2.994893	0.1040	2007
Romania	*ΔlnIM*	3.932239	0.0660*	2007
Croatia	*ΔlnEX*	0.026451	0.8730	2013
Croatia	*ΔlnIM*	4.03E-05	0.9950	2013

The results of the Chow's Test, as shown in the Table 6, indicates that there are no significant structural breaks at the 5% significance level, for neither of the variables in any of the countries. However, there appears to be a break in 2007 for Romania's imports if comparing to the 10% level of significance. To remain consistent with the multiple breakpoint test, the significance level is kept at 5%, so that the similar type of tests would have the same assumptions and it would not affect the results to be drastically different. Therefore, we fail to accept the null hypothesis of stability in trade flows for all countries across the entire time period examined. Hence, this test does not support the expectations based on the theoretical framework and literature section, and thereby concludes that accessing to the EU does not have a significant impact to trade flows.

5.4 Effects of an EU entry

To further support our findings in the structural break analysis, a country-wise analysis and pooled cross section analysis were run. By doing these tests we further eliminate the general effects that might have occurred due to some other exogenous economic shocks, rather than the accession itself, detected in the structural break analysis, and as well try to also analyse the membership effect rather than only the accession effect. These analyses could be held as a robust approach to evaluating the effects of the trade agreement. The methods will alike the structural break check if the entry has had an effect, by adding a dummy variable to the regressions. This membership dummy will allow a split in the data in such way that the dummies for the year and all the ones after each country's accession will be equal to 1. This, while the earlier years' dummy will be represented by a value of 0. Together with that we include other control variables that explain trade, which should show if they affect trade significantly.

The effects of an EU entry are measured in a few steps. First, country-wise analysis is conducted to measure the individual effects of the EU entry for each country. As for the second part of this subsection, a pooled cross-section analysis is carried out, which shows more of the overall effects of EU accession on the group of countries as a whole. The hypotheses for the following analyses are stated as follows:

H_0: Dummy coefficient is not significantly different from zero
H_1: Dummy coefficient is significantly different from zero

5.4.1 Country-wise analysis

We begin this analysis with running the regressions on each country separately, one on exports and one on imports, adding the control variables sequentially. This is done in addition to the other analyses to

see how significantly each variable affects the trade flows. The last variable added to each regression is the dummy variable, which is going to show if becoming a member of EU has had any significant effect on each country's trade flows. Since the conducted structural breaks had two outcomes, showing the breaks around the financial crisis, and indicated that there were no significant breaks during or even around the entry year, we expect to see a more precise result that is focused only on the effects of entering EU. The model[5] with full set[6] of control variables is:

$$logEX_t = \beta_0 + \beta_1 logGDP_t + \beta_2 logFDI_t + \beta_3 logGS_t + \beta_4 logPS_t + \beta_5 logER_t + \beta_6 D_t + u_t \quad (4)$$

Results from all sequential regressions for exports when adding control variables sequentially are shown in Table 7.

Table 7. Coefficients of control variables from sequential regressions on Poland's exports. All values in parentheses are noted as t-statistics. Data is of the first difference and in a natural logarithm form.

Explained variable	*Exports*					
Sequential regression	(1)	(2)	(3)	(4)	(5)	(6)
GDP	1.021776***	1.012661***	1.262815	1.014342	0.770836	1.332051***
	(7.914803)	(7.713163)	(1.660660)	(1.431285)	(0.950711)	(2.439802)
FDI		0.010912	0.010486	0.003721	0.005310	0.002205**
		(0.785634)	(0.727754)	(0.272055)	(0.374011)	(0.237851)
Government spending			-0.251659	0.040406	-0.203440	-0.160543
			(-0.334328)	(0.057188)	(-0.251454)	(-0.304881)
Political stability				-0.055544*	-0.055416*	-0.070461***
				(-1.873623)	(-1.826091)	(-3.505036)
Exchange rate					-0.544341	0.120974
					(-0.672459)	(0.218990)
Dummy						-0.121885***
						(-3.997218)

As shown by Table 7, when including all of the control variables, GDP, FDI, and political stability has a significant impact on the exports. The GDP appears to have the strongest positive impact, where a 1% increase yields a 1.33% increase in exports. This significance could be explained by Poland experiencing the largest and uninterrupted increase in GDP per capita when comparing with other EU-15 countries, standing for around 45% (Piatkowski, 2015). FDI is also positively impacting the tested variable with a weaker magnitude (being close to zero), where a 1% increase yields approximately 0.0022% increase in exports. This positive relationship between FDI and exports has a rather natural meaning behind it since it is the inflows of investment are measured in this study. However, the impact caused by political stability appears to be negatively related to the exports, where a 1% increase yields a 0.07% decrease in exports. This result might be affected by the fact that Poland's political stability was not stable throughout the period, even if now being held among the top 10 countries of having the highest political stability rating. The negative relationship for this value and other political stability measures can also be explained by a small variation in the variable itself (in whole data sample it varies from 0.06 to 1.07). To see more precise and proper outcome, the values in the tests would have to vary much more, than it does currently.[7] Furthermore, the dummy for Poland's exports is also significant, suggesting that the EU accession has an impact on the exports. However, the value of the dummy coefficient is negative, and hence the accession appears to be impacting the exports negatively. Since the dummy only measures the effect being a member, the small negative impact could be explained by the tariff deduction after joining EU, since most of the importers of Polish goods were EU members prior to Poland's accession.

[5] In this example only regression for exports is shown for any country. Regression regarding imports is with $logIM_t$ on the left hand-side and identical on the right hand-side for any chosen country. Subscript t denotes the year from 2001 to 2018.

[6] All the variables in the regressions are not only in the form of natural logarithm, but also of the first difference.

[7] The tests are done while political stability is measured in a natural logarithm form. The test was also made when political stability is of level value and the coefficient value result is still negative.

The same procedure is carried out for Poland's imports. Results for import's sequential regressions are shown in Table 8.

Table 8. Coefficients of control variables from sequential regressions on Poland's imports. All values in parentheses are noted as t-statistics. Data is of the first difference and in a natural logarithm form.

Explained variable	*Imports*					
Sequential regression	(1)	(2)	(3)	(4)	(5)	(6)
GDP	1.294986*** (9.011269)	1.290132*** (8.681196)	2.066283** (2.470713)	1.887394** (2.241444)	1.369655 (1.490827)	1.768673* (2.012813)
FDI		0.005811 (0.369627)	0.004489 (0.283303)	-0.000381 (-0.023465)	0.002998 (0.186357)	0.000790* (2.037609)
Government spending			-0.780821 (-0.943198)	-0.570547 (-0.679642)	-1.089009 (-1.187912)	-1.058510 (-1.264364)
Political stability				-0.039989 (-1.135301)	-0.039716 (-1.155013)	-0.050413 (-1.577349)
Exchange rate					-1.157372 (-1.261818)	-0.684339 (-0.779190)
Dummy						-0.086659 (-1.787559)

As shown by Table 8, when including all of the control variables GDP and FDI appears to have a significant impact on the imports at 10% level. One percent increase in GDP gives a 1.77% increase in imports and one percent increase in FDI yields a 0.0008% increase in Poland's imports. This again for GDP can be explained by continuous GDP increase throughout the years, and for FDI it is a rather natural increase when measuring the inflows of investment. Additionally, the dummy for Poland's imports is insignificant, suggesting that the EU accession has no statistically significant impact on the imports. If the value of the dummy coefficient would have shown a significant result, then it would have suggested that the EU accession impacts the imports, alike the exports, negatively. The existence of very few significant variables affecting imports might be explained by Poland being more focused on exports, increasing their GDP almost seven times since 1990 (Walker, 2019). In the country's economy, the industry sector contributes by 34.2% of GDP, and its top exported goods include electronic equipment, machinery and vehicles. This would explain why some trade explanatory variables for Poland is significant in exports, and none in imports.

We repeat all the regressions for Romania's trade volumes. Results are shown in Table 9 and Table 10.

Table 9. Coefficients of control variables from sequential regressions on Romania's exports. All values in parentheses are noted as t-statistics. Data is of the first difference and in a natural logarithm form.

Explained variable	*Exports*					
Sequential regression	(1)	(2)	(3)	(4)	(5)	(6)
GDP	0.615338*** (5.004509)	0.618914*** (4.056610)	1.149481*** (3.278567)	1.055313** (2.805973)	0.838024* (1.607913)	0.843367* (1.514834)
FDI		-0.002028 (-0.042496)	-0.006137 (-0.136229)	-0.016935 (-0.357702)	-0.000164 (-0.002948)	0.000689 (0.011400)
Government Spending			-0.514153 (-1.659342)	-0.436192 (-1.318721)	-0.414790 (-1.212435)	-0.412492 (-1.137397)
Political stability				-0.027626 (-1.213566)	-0.026643 (-1.134731)	-0.026540 (-1.069883)
Exchange rate					-0.320568 (-0.622485)	-0.313689 (-0.565000)
Dummy						0.003524 (0.058801)

Table 10. Coefficients of control variables from sequential regressions on Romania's imports. All values in parentheses are noted as t-statistics. Data is of the first difference and in a natural logarithm form.

Explained variable	*Imports*					
Sequential regression	(1)	(2)	(3)	(4)	(5)	(6)
GDP	1.019561***	0.949153***	1.511637***	1.499555***	1.022556*	1.030282*
	(8.007553)	(6.152455)	(4.309450)	(3.756714)	(1.978495)	(1.866552)
FDI		0.039924	0.035567	0.029323	0.066137	0.067371
		(0.827456)	(0.789118)	(0.583567)	(1.197995)	(1.124321)
Government spending			-0.545081	-0.535626	-0.488644	-0.485321
			(-1.758318)	(-1.525740)	(-1.440337)	(-1.349774)
Political stability				-0.012181	-0.010022	-0.009873
				(-0.504170)	(-0.430444)	(-0.401460)
Exchange rate					-0.703719	-0.693771
					(-1.377999)	(-1.260379)
Dummy						0.005096
						(0.085759)

From Table 9, attention is again put to the last regression including all the control variables. As the p-values indicate, the coefficient for GDP is significant at the 10% level. Therefore, a 1% increase in GDP will yield a 0.84% increase in exports. The GDP is significant for all set of regressions, where in the last two it is significant at the 10% level and in the fourth at the 5% level. For the first three regressions, it is significant at the 1% level. A one percent increase in GDP yields a change in the country's exports that vary from approximately 0.62% to 1.15%. Even though the dummy for Romania's exports is positive, it is however not significant. Hence, the EU entry has had no significant effects of Romania's exports. This can be justified by their entry year and financial crisis taking place at the same time. Table 10 shows the effects of the control variables on imports.

Also for the imports seen in Table 10, as for the exports, the GDP is the variable with a significant effect. The results from regression 6 shows that at the 10% level a 1% increase in GDP will yield a 1.03% increase in imports. The GDP is significant for all the regressions run, and its impact on exports vary from 0.95% to 1.51%. For the first four regressions it is significant at the 1% level and in the last two it is significant at the 10% level. As for the dummy variable, it is not significant at any of the three significance levels, which means that the EU entry has had no positive effects on imports. This once again can be justified by financial crisis and entry year taking place at the same time.

Finally, Tables 11 and 12 below summarize the results for Croatia's exports and imports.

Table 11. Coefficients of control variables from sequential regressions on Croatia's exports. All values in parentheses are noted as t-statistics. Data is of the first difference and in a natural logarithm form.

Explained variable	*Exports*					
Sequential regression	(1)	(2)	(3)	(4)	(5)	(6)
GDP	0.849946***	0.891482***	2.710322***	2.690698***	2.274934**	2.187049
	(4.106139)	(3.800159)	(4.026214)	(3.874033)	(2.863421)	(2.639562)
FDI		-0.009817	-0.001690	-0.002435	-0.009822	-0.011397
		(-0.421696)	(-0.087773)	(-0.122442)	(-0.468324)	(-0.525010)
Government spending			-1.992482**	-1.949652**	-2.313085**	-2.059404**
			(-2.818733)	(-2.659244)	(-2.870144)	(-2.238781)
Political stability				-0.042224	-0.032079	-0.036047
				(-0.501004)	(-0.380138)	(-0.414346)
Exchange rate					-1.161344	-1.013538
					(-1.060327)	(-0.881333)
Dummy						0.012085
						(0.635303)

As shown by Table 11, when including all of the control variables only the one for government spending appears to have a significant impact on the imports. This impact is negative, where a 1% increase yields a 2.06% decrease in exports. Such relationship usually occurs because increased government spending leads to increased trade deficit (Bivens, 2018), therefore decreasing trade gives that kind of result. The significance of government spending in this test is consistent at 5% level of significance through all the regressions that include government spending. Furthermore, the GDP appears to be somewhat impacting the imports still, due to its significance at 1% and 5% levels in all the previous regressions run. One percent increase in GDP would give an increase in trade that varies approximately from 0.85 to 2.71%. Additionally, the dummy for Croatia's exports is not significant, suggesting that the EU accession has no statistically significant impact on the exports. If the value of the dummy coefficient would have shown a significant result, then it would have suggested that the EU accession impacts the exports positively.

Table 12. Coefficients of control variables from sequential regressions on Croatia's imports. All values in parentheses are noted as t-statistics. Data is of the first difference and in a natural logarithm form.

Explained variable	*Imports*					
Sequential regression	(1)	(2)	(3)	(4)	(5)	(6)
GDP	1.128971*** (5.710884)	1.112209*** (4.938556)	3.134734*** (5.453354)	3.134941*** (5.231428)	3.017921*** (4.214427)	2.910915*** (0.0027)
FDI		0.003962 (0.177268)	0.012999 (0.790820)	0.013007 (0.758127)	0.010927 (0.578040)	0.009010 (0.6496)
Government spending			-2.215611*** (-3.670626)	-2.216064*** (-3.503288)	-2.318355** (-3.191583)	-2.009480** (-2.465016)
Political stability				0.000446 (0.006129)	0.003301 (0.043396)	0.001530 (-0.019851)
Exchange rate					-0.326870 (0.7468)	-0.146904 (0.8882)
Dummy						0.038244 (-0.331106)

Table 12 shows the effects of control variables on Croatia's imports. In the regression where all of the control variables are included, only GDP (at 1% level of significance) and government spending (at 5% level of significance) results in a significant effect. GDP has a positive effect on imports and 1% change in it yields in a 2.91% increase in imports. This result can be explained by that having a better economic performance leads to a wider ability to import other goods. However, government spending gives a negative effect on Croatia's imports and a 1% change in government spending results in a 2.01% decrease country's imports. Originally, government spending should also increase trade deficit by increasing imports, but in this case as both exports and imports decrease, trade deficit is not affected positively. The dummy of EU entry does not seem to have any significant effects, which means that the accession to EU does not have any impact on imports. Throughout all the regressions, GDP is consistently significant and in a positive way. If GDP changes by one percent, imports of Croatia increase from 1.11% to 3.13% approximately. Government spending is also significant in regressions 3, 4 and 5, and has a negative effect. A one percent change in government spending decreases imports by approximately from 2.22% to 2.32%.

The insignificance for dummies in both imports and exports regressions may be explained by the recentness of the accession and the higher level of integration with EU countries. Since Croatia joined in 2013, it already had other trade agreements with several countries before EU. Moreover, political uncertainty might have hindered the economic progress before 2017, when coalition with smaller parties was formed (Heritage, 2020).

5.4.2 Pooled cross-section analysis

To see the overall results of the EU entry on the trade volumes in general, a pooled cross-section analysis is conducted. The regression looks similar to the one of Bergstrand (1985) for the bilateral trade:

$$X_i = A_0(GDP_i)^{\alpha_1}(FDI_i)^{\alpha_2}(GS_i)^{\alpha_3}(ER_i)^{\alpha_4}(PS_i)^{\alpha_5}(D_i)^{\alpha_6}u_i, \quad (5)$$

where X_i is going to be the value of either exports or imports from the researched country to EU15, GDP_i is the value of GDP in the researched country, FDI_i in this case will stand for the FDI in country i, GS_i will be government spending of the country i, ER_i stands for exchange rate, PS_i is going to be political stability of the researched country, D_i denotes the set of dummy variables of EU accession, and u_i is a random error term.

Log-linearizing the regression provides the empirical version of it, which is similar to the one estimated by Brada and Mendez (1985) and Sapir (1981). We insert two regressions[8], for exports and imports separately:

$$logEX_i = \beta_0 + \beta_1 logGDP_i + \beta_2 logFDI_i + \beta_3 logGS_i + \beta_4 logER_i + \beta_5 logPS_i + \beta_6 D_i + u_i \quad (6)$$

$$logIM_i = \beta_0 + \beta_1 logGDP_i + \beta_2 logFDI_i + \beta_3 logGS_i + \beta_4 logER_i + \beta_5 logPS_i + \beta_6 D_i + u_i \quad (7)$$

A pooled cross-section regression with dummies for imports and exports are run separately to be able to see if the dummy is significant. A significant dummy would imply that the entry to the EU has had any significant effect on the countries' trade volumes. The regressions are being run on the countries' exports and imports separately. We assume that the error term in the pooled cross-section analysis is not correlated.

Table 13. Pooled Cross-Section analysis on exports and imports. Data is of the first difference and in a natural logarithm form.

Variable	*Exports*			*Imports*		
	Coefficient	T-statistic	P-value	Coefficient	T-statistic	P-value
GDP	1.202189***	3.686226	0.0006	1.711467***	5.408727	0.0000
FDI	-0.001302	-0.112678	0.9108	0.005185	0.462361	0.6462
Government spending	-0.709339**	-2.593226	0.0129	-0.848610***	-3.197238	0.0026
Political stability	-0.029816	-1.652750	0.1057	-0.018227	-1.041270	0.3036
Exchange rate	-0.468788*	-1.915817	0.0621	-0.389976	-1.642466	0.1078
Dummy	0.024766	1.107688	0.2742	0.018890	0.070730	0.3887

The results from the pooled cross-section analysis on exports in Table 13 shows that GDP and government spending and exchange rate are the significant variables. A 1% increase in GDP will yield 1.20% increase in exports. As for government spending, it has a negative impact on exports and one percent increase of it will yield a 0.71% decrease in exports. Exchange rate also has a negative relationship with trade, where 1% change leads to 0.47% decrease in exports. The dummy variable in this case is not significant, suggesting that entry to EU has no effects on exports overall. However, although not being significant, the effects are positive. As for imports, results shown in Table 13 suggest that GDP and government spending are significant and gives positive and negative effects respectively. 1% increase in GDP yields in a 1.71% increase imports, and 1% increase in government spending yields an 0.85 % decrease in imports. The dummy variable for imports is positive while not being significant, and hence the EU membership has had no effects on imports overall as well.

The GDP significance in both exports and imports is as expected before the research. As GDP is generally calculated by including exports and imports in its equation, it is as much as one of the main variables that then explains trade. Therefore, an increase in GDP leads to increase in trade balance and vice versa. The thesis analysis results align with the previous studies by Keuschnigg and Hohler (1996) where they state that after the entry to EU and individual economy has a GDP gain. As for government spending, the negative relationship might be justified by taking only goods into the account when

[8] The variables in the regressions are of first difference and in a natural logarithm form.

measuring trade, while government spending is measured on both goods and services. And it might therefore justifiably show the actual effect. The insignificant dummy effect might be associated with many aspects related with choice the of data and the empirical analysis model, such as length of time series, composition of trade, checking short-run effects rather than long-run, or even the choice of the countries.

5.5 Composition of trade

To be able to confirm the second hypothesis in this thesis, we researched the top five trading partners of each country for exports and imports separately throughout the chosen period, on an annual basis (Appendix Table A.2). We also expect this to help us justify the results of the pooled cross-section analysis, where the accession to EU dummy is not significant, which results in the accession to EU not yielding any significant effect on trade volumes.

For Poland's exports, until 2004 top five trading partners were Germany, France, Italy, UK, and the Netherlands. From 2004 The Netherlands are replaced by Czech Republic and in 2012, Russian Federation is one of the top trading partners instead of Italy, but it changes back in 2014. The redirection of trade does not necessarily occur since one EU country replaces another, and also it does not show any significant changes in trade in pooled cross-section analysis since Poland has been integrated with existing EU members prior accession. Considering that Poland had a growing economy since 1990, the change in the top trading partners do not alter the overall percentage share notably. For the imports, the top five trading partners are Germany, Russian Federation, Italy, France and UK. Before 2004 UK was replaced by China, and in 2013 France was replaced by the Netherlands for a few years until France was once again one of the top trading partners in 2016. For imports the overall percentage share does, once again, not change a lot when one or another trading partners takes place.

The export trading partners for Romania since 2001 are Italy, Germany, France, UK and Turkey until 2006, when UK was replaced by Hungary and it stayed this way until 2015 when Turkey was replaced by UK. As for imports, the first five top trading partners are Italy, Germany, Russian Federation, France and Hungary, and the latest being replaced by Turkey in 2003. In 2007 France took Turkey's place, in 2009 China changed with the Russian Federation back and forth until 2013 when Poland became the 5th partner. The redirection of trade does not occur straight away after the accession to EU, but it is established throughout the years, especially when the country's economy is more stable. The constantly changing top trading partners contribute to the same amount of percentage share of imports and/or exports, which may indicate that even by disregarding the general effects caused by the financial crisis, trade volumes do not differ significantly.

Croatia's top five trading partners in exports do not change through all of the 18 years, which may also be a good explanation to why Croatia's exports do not differ significantly after country joins EU. For imports of Croatia, the top five trading partners are Italy, Germany, Slovenia, Russian Federation and Austria. But China replaced Austria in 2007, until 2013, when the main trading partners since solely consists of EU countries: Germany, Italy, Slovenia, Austria and Hungary. This suggests that after joining EU, a country's trade is redirected towards other EU or at least European countries. The results from the previous analysis might not be significant due to the new trading partners not having such a large share of total imports, and the previous percentage share before the accession and old trading partners adds up to the percentage share after joining and redirecting trade.

Overall, the top five trading partners do not change significantly after a country joins EU. This may be due to the countries already having good trading relations with the old EU members before their own accession. These results are similar to Papazoglou et al. (2006), where they find that the least integrated countries experience bigger increase in trade and vice versa. The changing partners' percentage share of either exports or imports match, and therefore the overall percentage share for all top five trading partners do not differ that much prior or post the accession. With this being said, this could be an

explanation to the results from the country-wise and pooled cross-section analysis as to why the effects on trade are not significant.

5.6 Limitations

By discussing the limitations to the study, we may further explain why the empirical analysis showed no significant or even negative impact from the EU accession to the trade flows leading to the results turning out to be different than anticipated. In this subsection the main limitations concerned with this thesis and their impact on the results found will be discussed.

Sample size

In economics a larger sample size of the data that is being analysed is preferred. By using a too small sample size, issues with the regression and the test results may be encountered. Therefore, the relatively small sample size of 18 years (per country) collected for this analysis may have caused a less equitable result. Reconstructing this analysis by increasing the sample size, for example from annual to monthly data, could therefore lead to differentiating results on this research. Note however that expanding the sample size forward or backward in time by adding more years may also have a differentiating impact on the results. This based on earlier discussed implications on accessing the EU in this thesis.

Short-run and long-run effects

The interest for this thesis lies in both short-run and long-run effects of entering the EU, i.e. structural break tests are measuring the change during the accession year and pooled cross-section analysis tries to capture the effect of the membership. However, to be able to see more precise results and possibly several significant changes, the long-run would need to be adjusted. For instance, Poland already has a longer time span, but Romania's and Croatia's time periods after the accession could be extended. Additionally, analysis could be made on such as 5-year membership, 10-year membership and so on, to see if results differ regarding that. The reason behind this would be to analyse how, for example, 5-year membership affects trade, not only becoming a member. This lack of perspective could also explain the insignificance of some variables in the tests, as also suggested by other previous discussed studies.

EU 15

In this study the data analysis is conducted upon import and export data from each of the countries with the rest of the EU. Since the countries entered at different times, the number of members is varying for all. To have a unified data collection, making sure that the countries would have the same amount of trading partners for all their time in the EU, this thesis has limited its data to the EU15 members, rather than the current EU28 (EU enlargement factsheet). For comparison that choosing EU15 does not affect the results significantly, exports and imports for each country with EU27 and EU28 is provided (see Appendix Figure A.1-A.6).

Goods and services

The data collected on the two variables of interest in this thesis, imports and exports, are limited to the trade of goods only. This excludes the trade of services, which possibly impacts the results reported in this thesis. The decision to solely focus on the trade of good is based on the expectations that the increase in tangible products should be more significant than that of the intangible commodities. This is an expected result derived from the decrease in transaction costs, driven down by the absence of tariffs and tolls.

6 Conclusions

The purpose of this thesis has been to analyse the trade effects for Poland, Romania, and Croatia of joining the EU during different years between 2001 and 2018. Through studying the annual trade flow changes of Poland, Romania, and Croatia the aim was to answer the research question: Does the accession to EU have a positive effect on trade growth? To answer the question, a graphical analysis, two structural break analyses and a pooled cross-section analysis was conducted using time-series data for the period from 2001 to 2018. The countries analysed in the study were Poland who joined EU in 2004, Romania, who joined in 2007, and Croatia who joined the latest of the three countries, in 2013. Since the countries joined at different points, we could at least partly control for general time effects around the accessions. Analysing the trade volumes data, our aim has been to see what effect EU membership has on a country's trade levels.

The results of the research suggest that a country's accession to the EU, independent of the entry year, does not significantly affect its trade flows positively, which is contradictory to our anticipated results and the majority of the previous researches done regarding the topic. The, on beforehand, expected result was that EU entry and new member's trade volumes would have a significantly positive relationship. However, the results after the analysis state otherwise, more specifically that the relationship is not significant. In general, being a member of EU will yield a positive effect, although it is not significant enough to support our hypothesis. Both types of structural break tests suggest that there were no significant changes in either country's trade volumes during the year of the accession. To complement this, the pooled cross-section analysis shows the exact same results, suggesting that an accession to the EU does not affect the trade in a significant positive manner.

Our study, compared to most studies conducted on the topics of EU/EMU accession and its effects on trade, have used the two structural break analyses, as well as the pooled cross-section analysis, rather than an ad-hoc gravity model to help answer the question. This is what we assume to be one of the main reasons for our differentiating results compared to other studies. For instance, structural break analysis might need to have a more significant and abrupt change it the data of trade volumes for the test to be able to show a significant enough break during the time period. Additionally, the country choice might also have had a vital impact on the analysis results, since both Poland, Romania, and Croatia seem to have been highly integrated with old EU members quite well prior their own accession to the union. Therefore, change in increase of trade or redirection of it might not show if the chosen countries have had quite high trade with EU members already before the accession.

This study is limited to analysing the general effects of EU entry based on only a few countries joining in different periods of time. And therefore, we cannot be completely sure how other members of EU were affected by their membership and if the results would be similar if all countries would be tested. Based on our results positive effects on trade should not be expected on other similar countries as well, but either way, EU membership yields more benefits to the members than just those related to trade.

On that account, for future research on the subject, as based on this thesis limitations in section 5.6, a suggestion would be to include more countries as well as to study more years. As previous research suggests that it takes a longer period of time to really see the significant impact that EU membership has on an individual country's trade, expanding the time frame, will be one of our main suggestions. Another aspect of this time issue could be to include autoregressive terms in a stepwise manner. The aim of this would be to account for the time lags that appears to be present in the EU issue, such as the time it takes for a country to adjust to EU regulations. To help explain the insignificant result future researchers could aim to also account for the negative aspects of the EU membership, which were not dealt with in this study.

7 References

Allaro, H. B. (2018). A Time Series Analysis of Structural Break Time in Ethiopian GDP, Export and Import. *Journal of Global Economics*, 6(3).

Allaro, H. B., Belay, K., & Kotu, B. H. (2011). A Time Series Analysis of Structural Break Time in the macroeconomic variables in Ethiopia. *African Journal of Agricultural Research*, 6(2): 392-400

Bai, J. (1997). Estimating multiple breaks one at a time. *Econometric Theory*. New York, USA, 13: 315-352.

Bai, J., & Perron, P. (1998). Estimating and Testing Linear Models with Multiple Structural Changes. *Econometrica*, 66: 47-78.

Bai, J., & Perron, P. (2003). Computation and analysis of multiple structural change models. *Journal of Applied Econometrics*, New York, USA, 18: 1-22.

Baier, S. L., & Bergstrand, J. H. (2007). Do free trade agreements actually increase members international trade? *Journal of International Economics*, 71(1): 72–95.

Bergstrand, J. H. (1985). The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence. *Review of Economics and Statistics*, 67(3): 474–81.

Bivens, J. (2018, October 26). *Increased government spending boosts growth, rising trade deficit and weak investment muffles it.* Retrieved May 13, 2020, from https://www.epi.org/press/increased-government-spending-boosts-growth-rising-trade-deficit-and-weak-investment-muffles-it/

Brada, J. C. & Mendez, J. A. (1985). Economic Integration among Developed, Developing and Centrally Planned Economies: A Comparative Analysis. *Review of Economics and Statistics*, 67(4): 549–56.

Buch, C. M., & Piazolo, D. (2001). Capital and trade flows in Europe and the impact of enlargement. *Economic Systems*, 25(3): 183–214.

Bun, M. J. G., & Klaassen, F. J. G. M. (2007). The Euro Effect on Trade is not as Large as Commonly Thought. *Oxford Bulletin of Economics and Statistics*, 69(4): 473–496.

Bussière, M., Fidrmuc, J., & Schnatz, B. (2008). EU Enlargement and Trade Integration: Lessons from a Gravity Model. *Review of Development Economics*, 12(3): 562–576.

Chiva, C. & Phinnemore, D. (2009). Preface: The European Union's 2007 Enlargement. *Perspectives on European Politics and Society*, 10(2): 149-151

Europa. (2017, November 8). *10 years since the start of the crisis: back to recovery thanks to decisive EU action.* Retrieved May 8, 2020, from https://ec.europa.eu/commission/presscorner/detail/en/IP_17_2401

Europa. (2019, November 6). *Trade*. Retrieved February 28, 2020, from https://europa.eu/european-union/topics/trade_en

Europa. (2020). *EU member countries in brief.* Retrieved May 8, 2020, from https://europa.eu/european-union/about-eu/countries/member-countries/poland_en

Europa. (2020, February 10). *EU in figures.* Retrieved February 28, 2020, from https://europa.eu/european-union/about-eu/figures/living_en#quality_of_life

Europa. (2020, March 30). *EU enlargement*. Retrieved April 4, 2020, from https://www.consilium.europa.eu/en/policies/enlargement/

European Parliament. (2019). *The European Union and its trade partners: Fact Sheets on the European Union.* Retrieved February 17, 2020, from https://www.europarl.europa.eu/factsheets/en/sheet/160/the-european-union-and-its-trade-partners

Fontagné, L. (1999, October 14). *Foreign Direct Investment and International Trade: Complements or Substitutes?* Retrieved February 17, 2020, from https://www.oecd-ilibrary.org/science-and-technology/foreign-direct-investment-and-international-trade_788565713012

Glick, R. (2017). Currency Unions and Regional Trade Agreements: EMU and EU Effects on Trade. *Comparative Economic Studies*, 59(2): 194–209.

Granger, C. W. J., & Newbold, P. (1974). Spurious Regressions in Econometrics. *Journal of Econometrics* 2(2):111-120.

Gujarati, D. N. (2003). *Basic econometrics* (4th ed.). (pp. 273-279). Boston: McGraw Hill.

Hungarian Chamber of Commerce and Industry. (n.d.) *Benefits of EU membership*. Retrieved February 28, 2020, from https://mkik.hu/en/benefits-of-eu-membership

Itc. (n.d.). Trade statistics for international business development. Retrieved February 25, 2020, from https://www.trademap.org/Country_SelProductCountry_TS.aspx?nvpm=1|642|||26|TOTAL|||2|1|1|2|2|1|2|1|1

Keuschnigg, C., Kohler, W., Casella, A., & Sapir, A. (1996). Austria in the European Union: Dynamic Gains from Integration and Distributional Implications. *Economic Policy*, 11(22): 155.

Lejour, A. M., Mervar, A., & Verweij, G. (2008). The Economic Effects of Croatias Accession to the EU. *SSRN Electronic Journal*.

Mancini-Griffoli, T. & Pauwels, L. L. (2006). Is There a Euro Effect on Trade? An Application of End of-Sample Structural Break Tests for Panel Data, *HEI Working Papers*, 04-2006. Economics Section, The Graduate Institute of International Studies. Retrieved February 17, 2020, https://econpapers.repec.org/paper/giigiihei/heiwp04-2006.htm

Martin, L. L. (2015). *The Oxford handbook of the political economy of international trade*. New York, NY: Oxford University Press.

Micco, A., Stein, E. H., & Ordoñez, G. L. (2003). The Currency Union Effect on Trade: Early Evidence from Emu. *Economic Policy*, 37: 315-356

Mika, A., & Zymek, R. (2018). Friends without benefits? New EMU members and the "Euro Effect" on trade. *Journal of International Money and Finance*, 83: 75–92.

OECD. (2020). Conversion rates - Exchange rates. Retrieved April 8, 2020, from https://data.oecd.org/conversion/exchange-rates.htm

OECD. (2020). GDP and spending - Gross domestic product (GDP). Retrieved April 8, 2020, from https://data.oecd.org/gdp/gross-domestic-product-gdp.htm

Ortiz-Ospina, E. (2018, October). Does trade cause growth? Retrieved April 8, 2020, from https://ourworldindata.org/trade-and-econ-growth

Papazoglou, C., Pentecost, E. J., & Marques, H. (2006). A Gravity Model Forecast of the Potential Trade Effects of EU Enlargement: Lessons from 2004 and Path-dependency in Integration. *The World Economy*, 29(8), 1077–1089.

Parker, J. (2013). *Economics 314 Coursebook: Regression with Non-Stationary Variables (Chapter 4).* Retrieved February 17, 2020, from https://www.reed.edu/economics/parker/s13/314/book.html

Piatkowski, M. (2015, February). How Poland became Europe's growth champion: insights from the successful post-socialist transition. Retrieved May 8, 2020, from https://www.brookings.edu/blog/future-development/2015/02/11/how-poland-became-europes-growth-champion-insights-from-the-successful-post-socialist-transition/

Rose, A. K. (2000). Does a Currency Union Boost International Trade? *California Management Review*, 42(2): 52–62.

Sapir, A. (1981). Trade Benefits under the ECC Generalised System of Preferences. *European Economic Review*, 15(3): 339–55.

Taras, R. (2003). Poland's Accession into the European Union: Parties, Policies and Paradoxes. *The Polish Review*, 48(1): 3-19

The World Bank. (n.d.). *World Development Indicators*. Retrieved March 10, 2020, from https://databank.worldbank.org/reports.aspx?source=2&series=NY.GDP.MKTP.CD&country=

Todaro, P., Smith, M., & Stephen, C. (2003). *Economic Development*. United Kingdom, Harlow. Pearson Education, Inc.

Tomz, M., Goldstein, J. L., & Rivers, D. (2007). Do We Really Know That the WTO Increases Trade? Comment. *American Economic Review*, 97(5): 2005-2018.

Vicarelli, C., & Nardis, S. D. (2003). The Impact of Euro on EMU Trade: The (Early) Effect is not so Large. *IDEAS Working Paper Series from RePEc 017.*

Walker, S. (2019, October 26). 'This Is the Golden Age': Eastern Europe's Extraordinary 30-Year Revival. *The Guardian*. Retrieved May 8, 2020, from https://www.theguardian.com/world/2019/oct/26/this-is-the-golden-age-eastern-europes-extraordinary-30-year-revival

Weyerstrass, K., & Neck, R. (2008). Macroeconomic effects of Slovenia's integration in the Euro Area. *Empirica*, *35*(4): 391–403.

WITS. (2020). *Country Profile*. Retrieved March 10, 2020, from https://wits.worldbank.org/CountryProfile/en/Country/POL/Year/2018/Summary

Appendix

Robustness check for exports and imports with EU27 and EU28

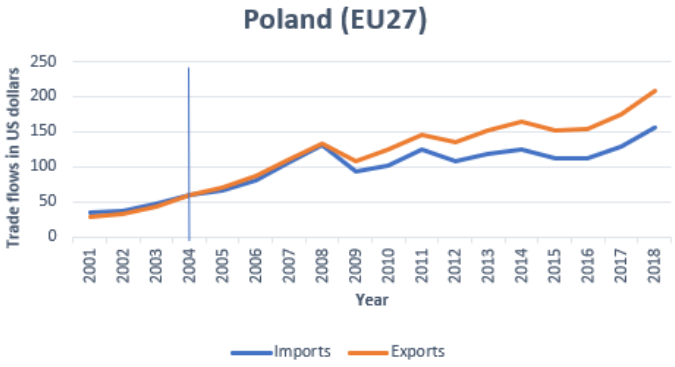


Figure A.1 Exports and Imports, Poland (EU27), in million USD (2001-2018)

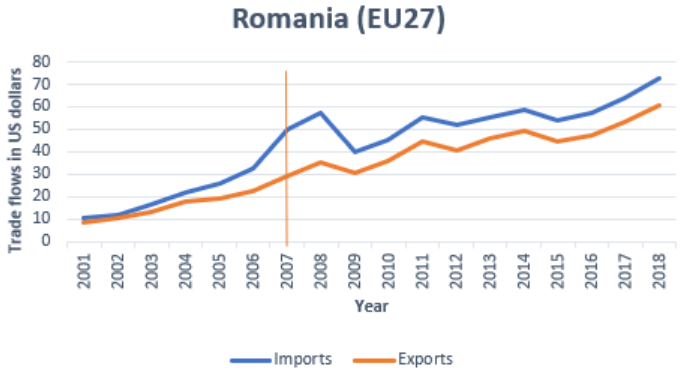


Figure A.2 Exports and Imports, Romania (EU27), in million USD (2001-2018)

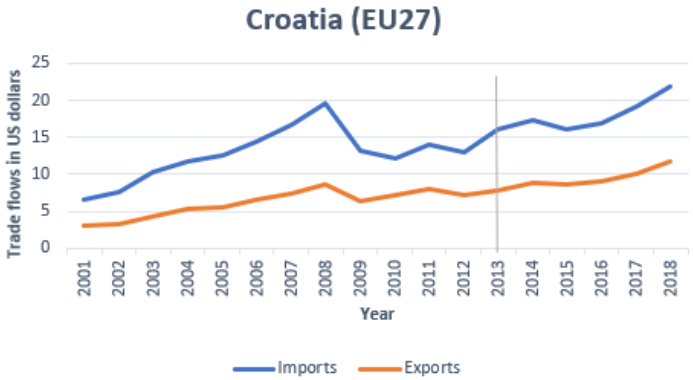


Figure A.3 Exports and Imports, Croatia (EU27), in million USD (2001-2018)

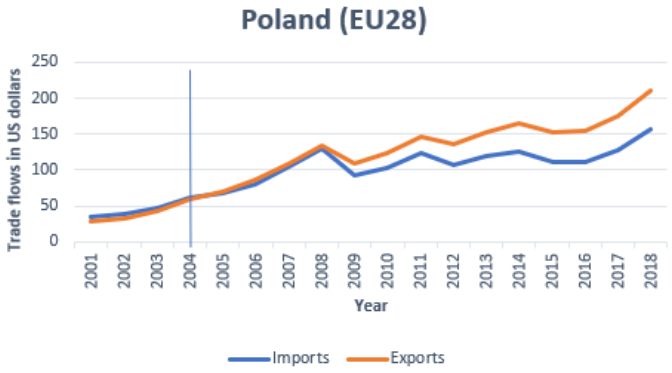


Figure A.4 Exports and Imports, Poland (EU28), in million USD (2001-2018)

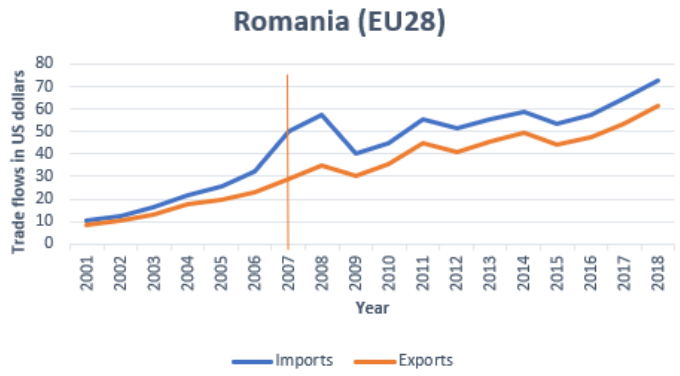


Figure A.5 Exports and Imports, Romania (EU28), in million USD (2001-2018)

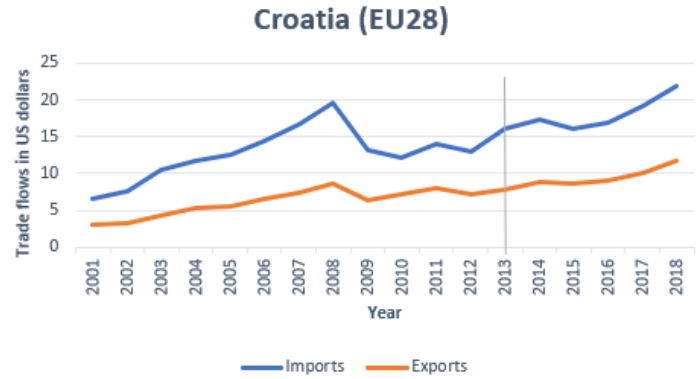


Figure A.6 Exports and Imports, Croatia (EU28), in million USD (2001-2018)

Stationarity test on explained and explanatory variables

Table A.1. Stationarity tests for explained and explanatory variables, level values. All variables are of natural log form and level value.

	Poland		***Romania***		***Croatia***	
Variable	**t-Statistic**	**P-value**	**t-Statistic**	**P-value**	**t-Statistic**	**P-value**
Exports	3.434771	0.9993	3.640003	0.9995	2.063408	0.9866
Imports	2.146200	0.9887	2.412050	0.9935	1.478134	0.9591
GDP	2.366757	0.9928	2.802314	0.9971	2.022118	0.9855
FDI	0.151652	0.7173	0.871709	0.8885	0.137985	0.7122
Political stability	-4.123026	0.0005	-0.310798	0.5575	-0.637202	0.4230
Government spending	2.243541	0.9907	2.652332	0.9961	2.119704	0.9881
Exchange rate	-0.496368	0.4859	0.664119	0.8496	-1.047000	0.2540

Composition of Trade

Table A.2. Top 5 trading partners in exports and imports for Poland (a), Romania (b), and Croatia (c) (2001-2018)

a)

Poland

	Export			**Import**		
	Country	**USD million**	**% share**	**Country**	**USD million**	**% share**
2001	Germany	12377	35	Germany	12003	24.27
	France	1933	5.46	Russian Federation	4409	8.92
	Italy	1925	5.44	Italy	4111	8.31
	United Kingdom	1779	5.03	France	3383	6.84
	Netherlands	1682	4.76	United Kingdom	2056	4.16
2004	Germany	22132	30	Germany	21479	24.37
	Italy	5408	6.11	Italy	6934	7.87
	France	4454	6.04	Russian Federation	6391	7.25
	United Kingdom	3986	5.4	France	5924	6.72
	Czech Republic	3189	4.32	China	4065	4.61
2007	Germany	35901	25.87	Germany	39400	24
	Italy	9152	6.59	Russian Federation	14353	8.74
	France	8443	6.08	China	11753	7.16
	United Kingdom	8238	5.94	Italy	11236	6.84
	Czech Republic	7684	5.54	France	8380	5.1
2013	Germany	50942	24.99	Germany	44230	21.51
	United Kingdom	13314	6.53	Russian Federation	25261	12.29
	Czech Republic	12522	6.14	China	19301	9.39
	France	11451	5.62	Italy	10729	5.22
	Russian Federation	10805	5.3	Netherlands	7913	3.85
2018	Germany	73692	28.15	Germany	59957	22.4
	Czech Republic	16657	6.36	China	30972	11.57

	United Kingdom	16198	6.19	Russian Federation	19642	7.34
	France	14519	5.55	Italy	1343	5.02
	Italy	12044	4.6	France	9770	3.65

b)

Romania

	Export			**Import**		
	Country	**USD million**	**% share**	**Country**	**USD million**	**% share**
2001	Italy	2854	25.07	Italy	3112	20.01
	Germany	1781	15.64	Germany	2364	15.2
	France	919	8.07	Russian Federation	1184	7.61
	United Kingdom	586	5.15	France	979	6.29
	Turkey	451	3.96	Hungary	599	3.85
2004	Italy	3980	21.2	Italy	5602	12.15
	Germany	3514	14.96	Germany	4868	14.9
	France	1995	8.49	France	2317	7.09
	Turkey	1643	7	Russian Federation	2229	6.83
	United Kingdom	1561	6.65	Turkey	1365	4.18
2007	Italy	6867	17.05	Germany	12029	17.2
	Germany	6828	16.96	Italy	8899	12.72
	France	3117	7.74	Hungary	4857	6.94
	Turkey	2819	7	Russian Federation	4417	6.32
	Hungary	2248	5.58	France	4375	6.26
2013	Germany	12215	18.54	Germany	13691	18.64
	Italy	7566	11.48	Italy	8058	10.97
	France	4461	6.77	Hungary	6049	8.23
	Turkey	3385	5.14	France	4210	5.73
	Hungary	3257	4.94	Poland	3264	4.44
2018	Germany	18392	22.97	Germany	20025	20.46
	Italy	9152	11.43	Italy	9185	9.38
	France	5686	7.1	Hungary	6717	6.86
	Hungary	3910	4.88	Poland	5440	5.56
	United Kingdom	3401	4.25	China	5211	5.32

c)

Croatia

	Export			**Import**		
	Country	**USD million**	**% share**	**Country**	**USD million**	**% share**
2001	Italy	1107	23.72	Italy	1657	18.12
	Germany	690	14.78	Germany	1583	17.31
	Bosnia and Herzegovina	561	12.01	Slovenia	712	7.78
	Slovenia	426	9.14	Russian Federation	654	7.15
	Austria	268	5.74	Austria	631	6.9
2004	Italy	1834	22.86	Italy	2819	16.99

	Bosnia and Herzegovina	1154	14.38	Germany	2569	15.49
	Germany	895	11.16	Russian Federation	1206	7.27
	Austria	757	9.43	Slovenia	1179	7.11
	Slovenia	601	7.49	Austria	1131	6.82
2007	Italy	2360	19.09	Italy	4145	16.05
	Bosnia and Herzegovina	1783	14.42	Germany	3719	14.4
	Germany	1237	10.01	Russian Federation	2619	10.14
	Slovenia	1021	8.26	China	1603	6.21
	Austria	756	6.11	Slovenia	1534	5.94
2013	Italy	1852	14.53	Germany	3076	14.03
	Bosnia and Herzegovina	1562	12.26	Italy	2878	13.12
	Germany	1497	11.75	Slovenia	2513	11.46
	Slovenia	1326	10.41	Austria	1971	8.99
	Austria	797	6.26	Hungary	1371	6.25
2018	Italy	2511	14.49	Germany	4289	15.25
	Germany	2279	13.24	Italy	3709	13.19
	Slovenia	1904	11.06	Slovenia	3140	11.17
	Bosnia and Herzegovina	1613	9.37	Hungary	2152	7.65
	Austria	1111	6.45	Austria	1938	6.89

Full tables for composition of trade for each country covering every year from 2001 to 2018 are available upon request.