University of Economics, Prague
Faculty of Economics
Major: Economics and Economic Administration

Optimum Currency Area: the case of the EMU and Turkey

Bachelor Thesis

Author: Malika Shukayeva
Supervisor: Ing. Lukáš Augustin Máslo, Ph.D
Year: 2019

I hereby declare that I wrote this Bachelor Thesis independently and used only sources and aid indicated.

Malika Shukayeva

Prague, 19.08.2019

Acknowledgement

I would like to express my appreciation and gratitude to my thesis supervisor, Ing. Lukáš Augustin Máslo, Ph.D for his continuous support, guidance and patience during the studies and in the process of the thesis completion.

I wish to express gratitude to the coordinator of the ECON program, Mgr. Lucie Wagnerová, who was very kind to me and supported during all the years of my studies at the university.

I am very grateful to all the teachers I had a chance to cooperate with as it was a real pleasure to get knowledge and new skills from different scientific fields together.

Finally, I wish to express the highest gratitude to my family and friends for their unconditional love, continuous support and help.

University of Economics, Prague
Department of Economics

Faculty of Economics

BACHELOR THESIS TOPIC

Author of thesis:	Malika Shukayeva
Study programme:	Economics and Economic Administration
Field of study:	Economics
Thesis supervisor:	Ing. Lukáš Augustin Máslo, Ph.D.
Title of the thesis:	**Optimum Currency Area: the case of the EMU and Turkey**
Language version:	English

General content:

The thesis will analyze eligibility of the Republic of Turkey as a candidate country for joining the European Union to adopt the Euro in case of accession according to the Theory of Optimum Currency Area. The aim of the study is to show to what extent the Turkish economy is ready to fulfill the criteria required for being a member of the European Monetary Union.

The theoretical part will overlook the conditions necessary for creation of a single currency region and particular requirements to a country that wishes to participate. It is also essential to outline the history of the relationship between the EU and Turkey in order to assess the degree of their interaction.

The practical part will focus on the calculation and analysis of the candidate country`s macroeconomic indicators for joining the optimum currency area such as labor and capital mobility, the share of exports and imports of the respective country and monetary union in each other`s international trade, the correlation of business cycles which implies the correlation of real growth rates and annual changes in unemployment rate – it will help to measure how close the movement paths of Eurozone and Turkey are. Furthermore, it is of great importance to investigate the stability of the exchange rate illustrating the country`s ability to cope with asymmetric shocks. The final results will be used to make a conclusion regarding the Turkey`s preparedness to become a member of the single currency area.

Length of thesis: 45 pages

Bibliography:

1. Mundell, Robert A. “A Theory of Optimum Currency Areas.” The American Economic Review, vol. 51, no. 4, 1961, pp. 657–665. JSTOR, JSTOR, www.jstor.org/stable/1812792.
2. McKinnon, Ronald I. “Optimum Currency Areas.” The American Economic Review, vol. 53, no. 4, 1963, pp. 717–725. JSTOR, JSTOR, www.jstor.org/stable/1811021.
3. Mundell, Robert A. “Monetary Unions and the Problem of Sovereignty.” The Annals of the American Academy of Political and Social Science, vol. 579, 2002, pp. 123–152. JSTOR, JSTOR, www.jstor.org/stable/1049787.
4. Grubel, Herbert G. “The Theory of Optimum Currency Areas.” The Canadian Journal of Economics / Revue Canadienne D'Economique, vol. 3, no. 2, 1970, pp. 318–324. JSTOR, JSTOR, www.jstor.org/stable/133681.
5. MONGELLI, FRANCESCO PAOLO. "NEW" VIEWS ON THE OPTIMUM CURRENCY THEORY AREA: WHAT IS EMU TELLING US? www.ecb.europa.eu/pub/pdf/scpwps/ecbwp138.pdf?7f9fcb71c9a79e446251a79273c9ba60.
6. “Turkey - European Neighbourhood Policy And Enlargement Negotiations - European Commission.” European Neighbourhood Policy And Enlargement Negotiations, ec.europa.eu/neighbourhood-enlargement/countries/detailed-country-information/turkey_en.
7. “Turkey-EU Relations.” Republic of Turkey Ministry of Foreign Affairs, www.mfa.gov.tr/relations-between-turkey-and-the-european-union.en.mfa.
8. Blaszkiewicz, Monika, and Przemyslaw Wozniak. “Do Candidate Countries Fit the Optimum-Currency-Area Criteria?” CASE Center for Social and Economic Research, www.case-research.eu/en/do-candidate-countries-fit-the-optimum-currency-area-criteria.

Date of entry: February 2019

Date of submission: May 2019

Malika Shukayeva
Solver

Ing. Lukáš Augustin Máslo, Ph.D.
Thesis supervisor

prof. Ing. Robert Holman, CSc.
Head of department

prof. Ing. Zdeněk Chytil, CSc.
Dean NF VŠE

Abstract

The thesis concerns the issues related to the Optimum Currency Area (OCA) theory and its application to the European Monetary Union (EMU) and the Republic of Turkey. To be specific, the Optimum Currency Area (OCA) criteria were discussed in detail and then analysed from the view point of Turkish economy`s preparedness to fulfill the real convergence requirements. The Maastricht nominal criteria were assessed as well.

The business cycle synchronization, openness to trade and specialization criteria were chosen to evaluate the degree of Turkey`s integration with the European Monetary Union`s member states, particularly with Austria, Belgium, France, Germany and the Netherlands, which are considered as the "core" of the single currency area.

The Hodrick-Prescott filter was used to detrend the industrial production series and then calculate the cross-correlation of the cyclical components of production series which are a measure of countries`s business cycles co-movements. To analyze openness to trade index, the ratio of bilateral trade over a country`s Gross Domestic Product (GDP) was calculated. As regards the industry specialization criterion, it was computed as the sum of squared ratios of export for each product group over a country`s total exports.

Organization for Economic Co-operation and Development (OECD), World Integrated Trade Solution (WITS), Eurostat, International Monetary Fund (IMF), European Central Bank (ECB) databases were used for data collection.

After the assessment of both nominal and real convergence criteria, it was concluded that the Republic of Turkey did not fulfill the Maastricht nominal criteria over a period 2010-2017, whereas the OCA criteria observed were partially met as there was found a strong and statistically significant cross-correlation of Turkish and German business cycles. Germany was used as a benchmark for evaluation purposes.

Key words: Optimum Currency Area, Integration, Convergence, Business Cycle Synchonization, Trade

JEL Classification: F410, F450, F440, F62

Contents

List of Figures/Tables/Charts/Graphs

List of abbreviations

- BOP – Balance of Payments
- CBRT – Central Bank of the Republic of Turkey
- EEC – European Economic Community
- EFTA – European Free Trade Assosciation
- ECB – European Central Bank
- ERM – Exchange Rate Mechanism
- EU – European Union
- GDP – Gross Domestic Product
- H-P filter – Hodrick-Prescott filter
- IMF – International Monetary Fund
- NATO – North Atlantic Treaty Organization
- OCA – Optimum Currency Area
- OECD – Organization for Economic Co-operation and Development
- WITS – World Integrated Trade Solution
- WTO – World Trade Organization
- SITC – Standard International Trade Classification

Introduction

Twenty years have passed since the adoption of a common currency, Euro, in the European Union member states and since then Europe is on its way to form an Optimum Currency Area (OCA). Ongoing debates on optimality of fixed and floating exchange rate regimes at the beginning of sixties and well-known publications of Mundell (1961), McKinnon (1963) and Kenen (1969) gave an impetus to the development of the OCA theory. Each of them proposed certain OCA criteria or pre-requisites necessary to be fulfilled by countries willing to form an Optimum Currency Area. The traditional OCA properties include factor mobility across countries, openness to trade, trade integration as well as product diversification. All these OCA conditions offer different methods for the OCA member states to mitigate the adverse effects of asymmetric shocks to which currency union`s participants are more likely to be exposed to. Besides these criteria, price and wage flexibility, financial, fiscal and political integration, convergence of inflation rates are assumed to provide solid grounds for micro- and macroeconomic stability and effectiveness of a common monetary policy across all countries.

Out of 27 EU member states currently 19 countries constitute Euro area and this number is expected to rise as other 7 European Union countries[1] are required to join Eurozone as soon as the nominal convergence criteria, also known as the Maastricht criteria are met. Also, Euro area has a big potential for future enlargement in case the candidate countries for EU membership will join. Currently officially recognized candidate countries are Turkey, Serbia, Albania, North Macedonia and Montenegro (European Commission).

The Republic of Turkey expressed its willingness for close cooperation with European countries in 1959 that was partially achieved by signing the “Association” also known as Ankara Agreement. Over the period of 60 years, Turkey and the modern European Union member states have been constructing tight economic linkages resulted in obtaining the status of a candidate country.

[1] Denmark has 4 opt-outs from EU co-operation, among which is its participation in EMU (Danish Parliament)

Thus, this paper aims at assessing the candidacy of the Republic of Turkey as a prospective EU and Eurozone member state with respect to criteria proposed by the Optimum Currency Area theory and Maastricht Treaty taking Germany as a center country. For the purpose of this paper, Euro area is assumed to include only five Eurozone countries, which construct the "core": Austria, Belgium, France, Germany and the Netherlands. All Maastricht criteria will be analyzed, while for the OCA requirements, business cycle synchronization, openness to trade and specialization are considered in the scope of the paper.

The paper is organized as follows. Section 1 revisits the OCA theory as well as various OCA criteria and their role in adjustment process connected with relinquishing of independent monetary policy and national exchange rates. The history of EU-Turkey relationship is also included in Section 1. Section 2 deals with empirical part of the paper, where all the indicators are calculated and analyzed. Section 4 concludes. Appendices are also included.

1. Theoretical Section

1.1 A Theory of Optimum Currency Areas

In this chapter I will review traditional and most influential papers on the Optimum Currency Area (OCA) theory introduced by R.A. Mundell, R.I. McKinnon and J.Frankel and A.Rose. The starting point in theory development dates back to 1961 when Mundell`s work "A Theory of Optimum Currency Areas" has been published. Since then R.A. Mundell is considered to be the founder of the OCA theory. Before elaborating the OCA theory from the point of view of the above mentioned economists, it is essential to provide a definition of what the optimum currency is.

Grubel (1970) defines an optimum currency area as "a territory with one or several currencies whose relative values are fixed permanently but whose common external value is determined in markets free from official intervention." In other words, a situation where several countries choose to establish a common currency across their territories in pursuit of economic gains by sacrificing independent monetary and fiscal policies is called an optimum currency area.
Now let us have a detailed review of OCA theory and examine its key assumptions and implications.

Mundell and the OCA theory
Ongoing debates over exchange rate regime choice examine past events and consequences used to support or refute the theory. One of the most commonly used examples is the balance of payments crisis case. The balance-of-payments crises are the "integral part of the international economic systems"[2] due to infeasibility of fixed exchange rates and rigid wages and prices to function as the adjusting instruments leading to an international disequilibrium situation. In connection with this, the following question arises: what exchange rate regime is more appropriate and economically effective? The proponents of a system with flexible exchange rates argue that the latter can play an important role in the adjustment to idiosyncratic shocks proposing that in cases of external balance deficit and

[2] Mundell(1961)

surplus the unemployment and inflation can be subdued by currency depreciation and appreciation respectively[3]. Such an argument in favor of floating exchange rates provides an impetus to ponder whether it is indeed the best tool for national currencies to respond to disequilibrium in economy.

The central role of Mundell`s well-known paper is dedicated to a system of fixed exchange rates as a result of economic integration within a currency area. He distinguishes between the two cases, first is a currency area - composed of several regions - with a single currency, and second is an area composed of several regions with multiple national currencies (with fixed exchange rates). The first case implies a single central bank that functions as the highest monetary institution with a power to issue interregional means of payments with "potentially elastic supply". In other words, potentially elastic supply of interregional means of payments means that in an area with a single currency a monetary authority (central bank) has a power to regulate and easily change the amount of monetary assets in circulation in a contractionary or expansionary manner without incurring high transaction costs to correct a balance-of-payments disequilibrium. Currency area with several currencies is comprised of independent central banks that can provide only a limited amount of banknotes due to existing barriers such as the degree of cooperation between the regional banks and the rate at which the bank`s monetary liabilities can be expanded[4] .

To illustrate the process of adjustment in two different currency areas, the author proposes a model of two regions (entities or countries), A and B, with full employment and balance-of-payments equilibrium. Then there is assumed a shift in demand for goods in the entity A from those of the entity B that would cause inflation in "A" and unemployment in "B"[5]. First, the regions are considered as countries with national currencies. In this situation, as mentioned above, regions A and B suffer from inflationary pressures and unemployment respectively. To take into account the possibility of price rise in entity A, a smaller share of burden of adjustment may be imposed in the region B. On the other hand, if the monetary

[3] M.Friedman, F.L. Lutz, R.A. Mundell

[4] Mundell notes that monetary expansion depends on the income elasticity of demand and output elasticity of supply. Additionally, the process is accompanied by the loss of the bank reserves and aggravation of convertibility. (Mundell, 1961)

[5] Assumed that in the short run it is impossible to reduce nominal wage and price levels without causing unemployment and inflation-preventing actions can be taken by monetary authorities.

authorities in region A adopt stricter policies regarding the allowable range of inflation, all the burden of adjustment will be shifted onto entity B. The necessary action to take is to decrease the real income in "B" or, - in case of inability to manipulate price levels (decrease in "B" or increase in "A"), - cut output production and employment in country B.

In contrast, in the area where regions use a common currency, the shift of demand from region B to region A implies an increase in the price level and unemployment in entities A and B respectively. Correspondingly, the balance-of-payments[6] in country A will result in a state of surplus. A monetary expansion can offset the adverse consequences of the demand shift on employment in region B but simultaneously exacerbate the inflationary pressures in region A. To correct employment imbalance in country B, the monetary policy can be quite effective under condition that the surplus country (country A with balance-of-payments surplus) raises the price level. Evident from potential repercussions, there is always a tradeoff between unemployment and inflation. Degree of trade-off depends on the goal set by policy makers – either to reach full employment at the expense of higher inflation in a surplus region or to reduce inflation permitting growth in unemployment in the deficit region.

Mundell`s OCA theory draws on classical theory of international trade based on the assumption of a British economist David Ricardo (1817). Ricardo`s model assumes that factors of production are immobile internationally but are fully intra-industry mobile within a country. Taking into account the above assumption, Mundell (1961) supports the effectiveness of flexible exchange rate regime with national currencies on condition of low capital and labour mobility between different countries. Thus, in a common currency area composed of entities with single currency and fixed exchange rates and subject to idiosyncratic shocks, it is of great importance for factors of production to have a high degree of mobility.

McKinnon`s view on OCA

[6] IMF gives the following definition: "a statistical statement that summarizes all transactions between residents and nonresidents during a period. It is comprised of goods and services account, the primary income account, the secondary income account, the capital account and the financial account. http://data.imf.org/?sk=7A51304B-6426-40C0-83DD-CA473CA1FD52

Another economist who contributed to the development of optimum currency area theory is Ronald I. McKinnon. In his study McKinnon (1963) focuses on the issue of optimality explaining the necessity of achieving internal price-level stability and determining how strongly both external and internal balances can be affected by openness of the economy. Traditionally the degree of economic openness is defined as the ratio of tradable to non-tradable goods.[7] The notion of "optimum" is used to describe an area with single currency within which the countries can use monetary and fiscal policies as well as flexible external exchange rates to reach economic goals of full employment, balanced international payments and average price level stability.

Further Mckinnon proposes a simple model to find an appropriate solution for a question of which adjusting mechanisms - flexible external exchange rates or internal expansionary/contractionary fiscal and monetary policies - are more efficient to bring the external balance into equilibrium[8]. The model has the following assumptions: the world is considered as a large single currency area, if the investigated optimum currency area is small, the domestic exchange rates or domestic currency prices can not influence the money prices of tradable goods as the outside currency will be an affecting factor.

McKinnon provides two possible scenarios depending on the degree of economy`s openness to trade, in other words, - on the size of tradable goods sector of an economy. In the first scenario, the sector of exportables and importables is assumed to constitute a significant share of domestically consumed goods. External flexible exchange rates are used as a tool of restoring external balance. Variability of exchange rates causes fluctuations (rise or decline) in domestic prices of both exportable and importable goods while prices of non-tradables stay constant in terms of the domestic currency. The necessary measure to correct balance of payments (BOP) is to increase production and cut domestic consumption of tradables implying that more goods previously consumed by national residents are available for exports and importables produced domestically can

[7] Mckinnon(1963,p.717) denotes tradables as exportables(goods produced domestically and partially exported) and importables (domestically produced goods which are partially imported) which in comparison with non-tradable goods cannot be involved in foreign trade.

[8] OECD defines external balance of goods and services as the value of exports of goods and services less imports of goods and services. https://stats.oecd.org/glossary/detail.asp?ID=923

substitute imports. Therefore, from the previous example it is clear that for a highly open economy it is infeasible to keep the price level stable with changes in exchange rates related to the shifts in the demand for imports or exports.

In addition, for an economy in a state close to full employment, it is necessary to implement contractionary fiscal policy in the form of an increase in taxation in order to respond to variations in external exchange rates and cut domestic expenditures to achieve trade balance. Taking into account all the potential consequences triggered by external flexible exchange rates, for open economy in this case the optimal policy is to set completely fixed exchange rate regime. In other words, a country with high trade intensity may avoid inflationary pressures and reach a more stable domestic price level under fixed exchange rate as a pegged exchange rate regime reduces volatility and fluctuations in relative prices of tradable and non-tradable goods.

In the second scenario, McKinnon assumes that the share of non-tradable goods in production prevails that of tradable goods. In such situation, it is optimal to fix the "domestic currency price" of non-tradable goods and alter the domestic prices of exportables and importables by changing exchange rates. As a result, the domestic devaluation would lead to an increase in domestic prices of tradable goods. The desirable outcome of the rise in relative prices is to propel the production of exportables and importables and refine external balance.

However, a reduction in domestic demand as a tool of monetary-fiscal policy may cause high unemployment. In such case if there is a factor immobility, the external balance would be less likely to improve and the reduction in money prices for non-tradable goods may be a necessity before the extensive production of tradables takes place. It is worth to note that an important constituent element of non-tradable economic sector is labour services meaning that it may need for wage costs to be reduced with respect to domestic prices of tradable products. Additionally, under the condition that prices of non-tradable goods are successfully lowered, the overall domestic price level is affected.

McKinnon elaborates his model of a currency area not only in terms of ratio of tradable to non-tradable sectors in the economy, but also stipulates monetary implications of the model. As discussed above, the adjustment processes with the goal to preserve external balance are more likely to bring the fluctuations at domestic price level. Thus, it is of great importance to look at the liquidity property of money. The liquidity property of money means a property that makes money a stable and strong medium of exchange and store of value. So, to minimize fluctuations in the oveall price level, there should be set up such kind of money whose value in terms of a representative bundle of economic goods stays more stable than any single physical good.

The author (McKinnon 1963,p.721) argues that monetary policy aims to set up money with stable value to stimulate savings and capital accumulation. To illustrate this relationship, two cases are considered. The first case represents a large size single currency area so that non-tradable goods constitute a substantial share of the production and the value of the domestic currency is pegged to the non-tradable goods sector of economy. Such a policy of fixing domestic currency value to the group of goods not involved in foreign trade with outside world ensures money liquidity value that is usually sought by the residents of the area. This may not be a sufficient condition for potential foreign investors but in case of a large size currency area, this interest group is not of primary concern because the main focus is on the success and efficiency of internal capital accumulation and full employment rather than inflows of foreign investments. In case of trade imbalance, relative price changes are a necessary tool to bring the trade patterns into equilibrium and maintain full employment, therefore the flexible exchange rate regime will be an optimal policy to implement. Moreover, fluctuations of internal prices will not cause a negative effect for domestic currency`s value used as a medium of exchange and a store of value.

The second case describes a small size single currency area whose currency unit is not pegged to that of a larger area and as a result, due to its low liquidity value, the domestic nationals will have incentives to accumulate foreign bank balances. Such behavior of national residents is expected because savers as major suppliers of investments tend to accumulate cash balances with higher liquidity value. Along with the size of the area,

monetary mismanagement can also be a reason for low liquidity value of domestic currency which consequently leads to capital outflows. In this case monetary authorities of small countries with illiquid currency should implement strict exchange rates control to keep external balance stable.

For this purpose, Mckinnon suggests uncontrolled floating exchange rate[9] as an appropriate adjusting mechanism. Compared to the above situation, the floating exchange rates may be ineffective if short-term capital flows occur between the countries whose currencies share approximately equivalent liquidity value and exchange risk. It should be noted, prior to making a statement on the necessity of floating exchange rates, a precise definition of currencies` optimal domains is required. For this purpose, McKinnon provides an example of a common currency area with some depressed region[10] whose production is oriented on non-tradable goods sector out of which labour services constitute a large share of that sector. Under these conditions due to the surplus of non-tradables and shortage of tradables, the balance of deficit in this subregion is expected to occur. The author states that for restoring equilibrium in external balance and employment, establishing a monetary system with own currencies is less likely to be successful because of the high tradable to non-tradable goods ratio. To maintain trade balance and full employment, monetary national authorities opt for currency devaluation, which in turn causes inflationary pressures in the region. As a result of an increase in price level, money illusion[11] prevents labour to accept cuts in their real wages. In addition, a currency pegged to the bundle of non-tradable goods has a low liquidity value which in turn lowers the incentives of region`s residents to perceive the currency as a reliable store of value.

After an extensive discussion, McKinnon summarizes some of the findings consonant with the idea of factors of production mobility that defines optimum currency area proposed by Mundell (1961). Mundell concludes that for a single currency area with several countries

[9] Floating exchange rate is defined by Czech National Bank (CNB) as a constantly fluctuating exchange rate determined in the foreign exchange markets depending on demand and supply.
https://www.cnb.cz/en/faq/What-is-the-difference-between-a-fixed-and-a-floating-exchange-rate/
[10] A separate country within the currency area
[11] The term "money illusion" means a tendency to think in terms of nominal rather than real monetary values. (Shafir et al., 1997)

which are subject to idiosyncratic shocks, fixed exchange rate regime is effective if the degree of mobility of both labour and capital is high between the countries within it.

Further McKinnon (1963, p. 724) distinguishes the two types of factor mobility with respect to changes in geographic location, in other words, mobility among the regions and intra-industry mobility. In accordance with the above theory, in case of both geographic and inter-industry factor immobility it is quite complicated to divide the world into optimum currency areas and define their geographical size as well as the way to manage the use of resources among different industries to ensure full employment, balance of payments and efficient allocation of resources.

The contribution of Frankel and Rose to OCA theory

Another influential paper highly appreciated among economists and considered to be one of the key studies in the history of development of the Optimum Currency Area theory is that of Frankel and Rose (1998). Along with the criteria for the OCA to function defined earlier by Mundell (1961) and Mckinnon (1963), Frankel and Rose (1998) extend the list of conditions to consider potential members of a currency union. The argument states that countries with close international trade relations and positively correlated economic paths are more likely to enjoy benefits[12] from joining the single currency area arising from a stronger business cycle synchronization. At the same time membership in the currency union brings the costs such as the loss of sovereignty in terms of monetary-fiscal policies to be implemented independently in response to asymmetric shocks.

The significance of close business cycle correlation among intra-countries is viewed from the perspective of lower adjustment process costs if they are subject to asymmetric shocks[13]. Taking into account the disappearance of exchange rates and ineffective monetary policy in case of business cycles fluctuations after joining the monetary union, more synchronized business cycles and countries` openness to trade can play a role of an "automatic stabilizer". The hypothesis stated in the paper (Frankel and Rose 1998) is that international trade and business cycles co-movements are positively-related as it is

[12] All the potential benefits and costs are summarized in the report by the Commission of the European Communities (1990)
[13] Fatas (1996) determines asymmetric shocks as "Shocks idiosyncratic to either regions or countries"

expected for higher degree of integration to increase trade intensity and for closer international trade linkages to lead to greater correlation of business cycles. For empirical evidence of this relationship, Frankel and Rose (1998) measure bilateral trade intensity between the potential monetary union countries and correlations of their economic activities. The international trade intensity is represented as the sum of total nominal exports and imports from one country to another over the sum of both countries` total global exports and imports. The larger value indicates higher trade intensity between the countries and vice versa. Closer international trade links lead to more synchronised business cycles across countries making the use of a single currency more likely and more desirable.

The second measure focuses on bilateral trade intensity only where trade intensity index is expressed as the sum of exports and imports from one country to another over the sum of their corresponding gross domestic products (GDPs). Regression analysis is used to estimate the correlation of countries` business cycles. The sample tested for trade intensity index and business cycle synchronization includes EU countries as well as some other developed non-member states from different parts of the world[14]. Based on the results obtained from the experiment, Frankel and Rose (1998) argue that reduced barriers to trade as a requirement for deeper integration may bring to life two possible scenarios. First one considers such economic liberalization as a catalyst of increased industrial specialization by the country which in turn can provoke synchronized economic activities due to industry-specific shocks. Second one suggests that intensive trade relations may boost intra-industry trade between the countries of the common currency area and accelerate the process of business cycle synchronization.

The main finding of Frankel and Rose (1998) confirms that the relationship between close trade linkages and correlation of business cycles is strong and positive as has been assumed before obtaining the experiment`s results. In addition, authors assert that due to endogeneity of the OCA criteria[15], historical data of a potential member-state of the

[14] Data covered 21 industrialized countries over a period of thirty years, out of which 14 countries were EU member states.
[15] A criterion is considered to be endogenous when a change in this criterion has a particular effect on another one. In this particular case an increase in trade intensity between two countries causes acceleration of their business cycles.

common currency area may provide weak evidence for country`s eligibility to be a part of the optimum currency area even though the entry to the monetary union can stimulate the trade expansion and higher correlation of business cycles. Following this, one may say that a country is likely to fulfill criteria for entry after acceding a currency union rather than before the accession.

1.2 Convergence Criteria

Before starting the discussion of convergence criteria, it is of great importance to shed a light on what the concept of convergence itself means. Economic literature has been widely studying the issue of economic convergence and defines it as a process of catching up with more developed countries by less developed ones (Drastichova, 2012, p.108). Convergence facilitates closing the gaps between various economic indicators that characterize huge difference in countries` economic performance. Two types of convergence are usually considered: real convergence and nominal convergence.

According to Triandafil (2013, p.9), nominal convergence implies the dynamics of nominal variables such as inflation, interest rate, exchange rate and two fiscal indicators (budget deficit and public debt) within the margins defined by the Maastricht Treaty[16], while real convergence is considered to be "a process oriented towards the standardization of the living standard in emerging and developed countries, reflected in the similarity of the output, income, employment rate or productivity". In other words, real convergence occurs when economically lagging behind countries are overtaking those with higher productivity, incomes and lower rates of unemployment.

The next sub-section is concerned with traditional convergence criteria required to be fulfilled for successful functioning of an optimum currency area and ensuring real economic convergence of countries involved. Overall, there are six OCA criteria out of which the first three are classical economic, while the rest three are political. The first criterion is concerned with minimizing costs of an asymmetric shock, the next two

[16] http://www.europarl.europa.eu/about-parliament/en/in-the-past/the-parliament-and-the-treaties/maastricht-treaty

economic criteria deal with areas that may suffer if hit by an asymmetric shock. The last three criteria`s goal is to identfy whether the countries that are willing to form an optimum currency area are eager to demonstrate solidarity and provide aid in case of adverse economic shocks.

1.2.1 Real Convergence in terms of Optimum Currency Area

Labor mobility criterion: the optimum currency area is that within which there is a free movement of labor[17].

This criterion has already been introduced in the previous section within the discussion of the OCA theory origins. The key idea is that perfectly mobile factors of production would eliminate the cost of sharing the same currency. Since capital is conventionally assumed to be mobile between country A and country B, the real hindrance comes from the lack of labor mobility. If country A is hit by an adverse demand shock and country B is not affected, disequilibrium in both countries arises. The adversely affected country A undergoes unemployment while non-affected country B faces inflationary pressures. Therefore, to bring economies back to equilibrium, a shift of production factors(labor movement from A to B) can be made to achieve a zero output gap in both countries[18]. Another potential benefit of labor mobility is that there is no need for prices and wages to change in either region because once factors of production have moved, the currency area`s nominal exchange rate delivers the real exchange rate that is best for each country.

Nevertheless, potential optimum currency area member states may face some impediments with cross-border labor migration[19]. The first possible hurdle is cultural and linguistic differences. The second potential barrier is institutional regulation. Another hurdle to cope with is the degree of product homogeneity in countries A and B. For example, if products differ substantially, it may take a long period of time for workers from country A to obtain necessary knowledge and skills to manufacture the goods of country B. Finally, labor

[17] Baldwin and Wyplosz (2009, p.322)
[18] Zero output gap is defined as "an economic measure of the difference between the actual output of an economy and its potential output." (IMF)
[19] Mobility and migration here are used interchangeably.

should be provided with productive capital, but what if all capital resources are already in use in country B? In such a case country B suffers from shortage of capital resources and surplus of labor. A logical answer would be capital mobility but not all types of it can be easily moved from one country to another. Having considered above, one may also assume mobility of only certain types of capital. For instance, physical capital such as plants and other immovable assets is not mobile and it takes time to construct new production facilities and shift physical location of economic activities. By contrast, financial capital can be freely and quickly moved across the countries.

Openness criterion: optimum currency area is a geographic region within which countries have no barriers to trade with each other.

This real convergence criterion implies that giving up exchange rate as an adjustment tool does not entail serious loss of policy independence if the countries intended to create an optimum currency area are very open to trade and trade intensively with each other. To justify this statement, Baldwin and Wyplosz (2009, p. 326) argue that when economy is relatively small in size and very open to trade, it has little power to affect prices of its products on the international markets. Let us consider an example of a market for pens. Pens are produced in countries A and B and exported to some common market. Countries A and B do not share the same currency, so they have different exchange rates *vis-a-vis* the rest of the world. On condition that these countries are very open and intensively trade with each other, there is no distinction between countries A and B`s pens (assumed to be homogeneous) as competition will equalize prices of this product when expressed in the same currency. The competitive structure of the market ensures that price of country A`s domestic goods expressed in P_A is the same as price of country B`s goods expressed in P_B when they are traded in common market and therefore largely independent of the exchange rate. Any changes in nominal exchange rate in either country must lead to immediate changes in local prices so that the world price level is not affected ($E_AP_A=E_BP_B$), where E_A and E_B are the nominal exchange rates *vis-à-vis* the rest of the world in countries A and B respectively. As a result, prices in both countries are not rigid anymore and the real exchange rate *vis-à-vis* the rest of the world remains unchanged ($E_AP_A/P^*=E_BP_B/P^*$).

As can be seen, when prices are flexible, exchange rate is of small significance. However, one should note that the change in domestic price of export goods and related to it change of exchange rate may still have an effect. For instance, if currency appreciates, higher export prices would bring higher profits for exporters. This may attract more firms to shift their business activities to export sector. In such case, exchange rate may influence economy but its effect is expected to be negligible if the country is very open to trade.

Product diversification criterion: optimum currency area is formed by countries with widely diversified production and exports of similar structures.

As discussed above, in a common currency area an asymmetric shock can represent a real threat for all member states as each member country is expected to be negatively affected to a certain degree by such disruption. For this reason, it is of paramount significance to reveal the potential sources of such asymmetric shocks and how frequently they may arise. Most of the shocks are assumed to be permanent and originate from the shifts in spending patterns like changing tastes or production of new goods associated with technological improvements. Usually specific industries are subject to such kind of shocks but if the shocks are relatively large and asymmetric, it may become a serious challenge for a whole currency area. Severe shocks most likely affect the countries whose production is narrowly diversified or differently structured from the rest of member states. For example, in a particular currency area some countries specialize in production and export of only one good, sugar cane. Due to emergence of new sugar cane suppliers, these regions are hit by a decline in demand for sugar cane - an adverse asymmetric shock that negatively affects economic performance of these countries. Conversely, countries with highly diversified production patterns are less likely to be hit by a shock related to a particular product as the share of this good is relatively small in total production. In effect, if optimum currency area`s member states specialize their production in a wide range of goods which are similar, potential shock is expected to be of little impact or symmetric implying fewer need for exchange rate as an adjustment mechanism.

Transfer criterion: optimum currency area is formed by countries which agree to compensate each other for adverse shocks.

In this section I would like to consider the situation where a currency union is composed of two countries in which one of them is hit by adverse asymmetric shock. An important aspect of such situation is that as these countries share the same currency, an unaffected country would also be in economic disequilibrium. To mitigate the impact of the shock, one of the best possible solutions can be financial support in the form of paying less taxes and receiving more welfare benefits to a country facing severe consequences of asymmetric shock. As a result, both recession in the affected country and overheating of the second economy are alleviated by a fiscal transfer.[20] Such transfer scheme is commonly used in federal countries like Germany and Switzerland and acts as a kind of insurance against adverse shocks.

Homogeneous preferences criterion: currency union is a geographic region in which member states share consensus regarding the way of dealing with shocks.

When facing both symmetric and asymmetric shocks, all countries of a currency union are assumed to have a uniform agreement on how to deal with each and every possible shock so that national interests and preferences of no country are infringed. However, in practice there is no "best way" to deal with a shock. There are always trade-offs that are the result of confrontation of opposing interests influenced by political parties, labor and trade unions and lobbies. For instance, policymakers decide on whether a fight with inflation or unemployment is a priority, or what exchange rate to choose - a weak exchange rate encourages exporters which lead to competitiveness gains while a strong exchange rate raises purchasing power of consumers. Thus, to choose one common strategy that fits each member of a monetary union is a hard task as national preferences across countries usually are not homogeneous. If the currency area countries do not share the same policy preferences over such trade-offs, each of them would want the common Central Bank to

[20] Overheating is defined as a situation "when the economy reaches the limits of its capacity to meet all of the demand from individuals, firms and government. One element of overheating is the concept of 'full employment' which occurs when almost everyone who wants to work has a job." (Central Bank of Ireland, https://www.centralbank.ie/consumer-hub/explainers/what-does-overheating-in-the-economy-mean)

adopt different policies. At best, it may end up with some countries left unhappy, at worst monetary union may not survive the tension. To conclude, policy response to shocks should favor collective preferences implying that differences in national priorities of each individual currency area country are not too wide.

Solidarity criterion: when the common monetary policy engenders conflicts of national interests, the countries that form an optimum currency area should accept the costs in the name of a common destiny.[21]

The final real convergence criterion concerns political considerations. As mentioned in above section, even symmetric shocks give rise to trade-offs and conflicts of national interests and may lead to political disagreements as well. Such disagreements are inherent to any country and may be more delicate if asymmetric shocks generate disagreements across regions. In individual states resolution of such debates represents the cost of living together. The outcome is acceptable by all the citizens of a country as they share some degree of solidarity with each other. Countries that plan a formation of a currency union must realize that similar disagreements will appear in future and may follow national lines, especially if the shocks produce asymmetric effects or are asymmetric by nature. In such a case, contradiction between solidarity and nationalism may come into sight. That is why, to tolerate potential political debates, it is crucial for residents that form a monetary union to accept the idea of a common destiny and broaden their sense of solidarity from national borders to the whole currency union. Otherwise, the formation of a common monetary union is impossible as preponderance of national tendencies may cause intransigent dissensions.

1.2.2 Nominal Convergence Criteria

The following sub-section deals with the idea of nominal convergence and criteria (also known as Maastricht criteria) proposed by the Article 140(1) of the Treaty on European

[21] Homogeneous preference and Solidarity criteria are out of scope of interest as they are more related to political economy issues. For the purposes of thesis subject, only economic convergence criteria are considered in this paper.

Union (TEU). First of all, let us provide some facts about this founding document and economic requirements set for potential members of monetary union.

The Treaty on European Union, known as the Maastricht Treaty, was signed by the members of the European Communities[22] on 7 October 1992 and entered into force on 1 November 1993[23]. Besides strengthening the power of European Parliament and introducing the concept of European citizenship, clarifying institutional changes and issues of social protocol and new policies, the TEU has made a significant contribution to laying the foundations for economic and monetary union and introducing a single currency. The Maastricht Treaty marks the end of a long way of attempts towards the European integration and the beginning of "a new stage in the process of creating an ever-closer union among the people of Europe".

"Maastricht criteria" or convergence criteria are criteria based on economic indicators that the European Union (EU) member states are required to fulfil to enter the euro zone[24]. In the early 1990`s, the macroeconomic situation in Europe differed substantially from one country to another. Price instability was the main indicator of poor economic performance and huge hindrance for further deeper European integration and adoption of a single currency. Germany, as one of the economically strongest countries with low inflation, was highly concerned that some states were not ready to meet necessary monetary requirements and insisted on the list of criteria that should be satisfied to join the monetary union and create a single currency area (Baldwin and Wyplosz, 2009, p.490).

So, in order to enter the euro zone and become a member of the monetary union, 5 convergence criteria must be fulfilled by all current EU member states[25] and prospective candidate countries[26].

[22] The European Communities (EC) include the following 3 international organizations: the European Coal and Steel Community (ECSC), the European Atomic Energy Community (EAEC or Euratom) and the European Economic Community(EEC).
[23] Originally signed by 12 countries: Belgium, Netherlands, Luxembourg, France, Germany, Italy, Ireland, Denmark, Spain, Portugal, Greece and the United Kingdom.
[24] Definition provided by Insee https://www.insee.fr/en/metadonnees/definition/c1348
[25] Denmark and the UK had legal opt-outs from EU Treaties granting them an exemption from adoption of Euro.
[26] Currently, official EU candidate countries are Albania, the Republic of North Macedonia, Montenegro, Serbia and Turkey.

Inflation criterion

The first criterion to deal with is concerned with price stability. To be an eligible candidate for monetary union membership, a candidate country`s inflation rate should not be higher than the average of the three lowest inflation rates obtained by the EU member states by more than 1.5 percentage points.

Long-term nominal interest rate

Some countries that are willing to join the rows of EMU members can meet the previous convergence criterion on temporary terms by freezing administered prices (for example, prices for electricity or transport). To avoid such kind of "cheating", the second requirement states that over a period of one year before the examination, a potential member of the monetary union should achieve the average nominal long-term interest rate that does not exceed the average rates of three best performing member states in terms of price stability. Interest rates are measured on the basis of long-term government bonds or comparable securities (TEU). The criterion on convergence of interest rates is an appropriate tool to assess the nature of low inflation rates by applying the Fisher principle[27] (Baldwin and Wyplosz, 2009).

ERM membership[28]

This Maastricht criterion implies that the prospective Eurozone member is required to participate in the exchange-rate mechanism for at least two years and demonstrate the ability to keep its exchange rate within the normal fluctuation margins provided by the ERM without severe tensions and need to devalue its currency rate vis-à-vis the monetary union members` currency.

Budget deficit

The previous criteria aim at achieving permanent price stability and set the margins within which it can be gained. But the question is what can lead to potential price level fluctuations. The answer is clear – large budget deficits. When the government runs a budget deficit, it needs to find ways of financing its activities. The first source is the

[27] Fisher principle: nominal interest rate = real interest rate + expected inflation. Since the real interest rate is considered to be quite stable, the long-term interest rate is mainly affected by long-term inflation rate.
[28] European exchange rate mechanism

financial markets where the government can borrow. When the deficits continue to grow, the financial markets` reaction is to stop lending to a highly indebted government as the latter does not look credible due to low chances for the debts to be repaid. The only opportunity to repay the debts is to print more money. When Central Bank increases the amount of money, the subsequent consequence is a fast money growth what in turn causes high inflation.

That is why, the criterion on the government budgetary position sets a limit on budget deficits. According to German "golden rule", the budget deficits should not exceed the government`s spending on public investment (telecommunications and infrastructure) as the latter can generate resources for repaying initial borrowings. As the public investment spending equals to approximately 3 per cent of GDP, the following Maastricht criterion expects the monetary union members` budget deficits not to exceed 3 per cent of their GDP.

Public debt

The last nominal convergence criterion is also concerned with the government`s budgetary position and is regarded as a "more permanent feature" of fiscal stability. Thus, the Maastricht Treaty requires the monetary union`s candidate countries to keep their public debts at the level not exceeding 60 per cent of their GDPs.

1.3 Relationship between Turkey and the EU

Historically due to its advantageous geographical location, Turkey has always been involved in close economic and political relationships with both European and Asian neighbour-states. The history of the modern Turkish state dates back to 1923 when the Ottoman Empire was succeeded by the Republic of Turkey, due to the defeat in the World War I and unstable internal political situation[29]. Since the collapse of the Ottoman Empire and loss of its erstwhile military superiority, Turkey has been at a lagging position in terms

[29] Occupation of the Ottoman Empire`s territories under the Mondros Armistice of 1918 and following it the National Resistance and Liberation movement under Mustafa Kemal and the Turkish National Liberation War in 1919-1922.

of technological development compared to that of European countries. The source of such cultural and technological backwardness was hidden in the features of the political and economic system inherited from the Ottoman Empire.

In this section I would like to look at the developments of Turkey-EU relationship by highlighting the key moments that influenced the dynamics of bilateral interaction. Since the fall of the Ottoman Empire and the start of a new era in the Turkish history in the 20th century, a core national objective emerged to mainly fight against economic decline. The road towards the adoption of European norms and values for "Europeanization" and "westernization" of Turkish economy and political system has been adopted.

To overcome the overall stagnation, there was a demand in Turkey to import European model of economic growth, political system, way of living and thinking based on European norms and values. The process of "Europeanization" and "westernization" of Turkish economy and political system accelerated since the declaration of independence of the Republic of Turkey in 1923.

The relationship between Turkey and EU has been oscillating and ambivalent from the beginning due to various factors, both internal and external. Generally, opinions are divided between those who opt for Turkey`s integration with the EU and see it as a positive factor for both sides, and those who are against Turkey`s accession to the EU and see it as detrimental for both sides. Despite all contrary views on this matter and current difficulties in the dialogue between Ankara and Brussels, one thing is obvious – Turkey and EU remain important partners from economic point of view and depend on each other in terms of foreign policy agenda.

The initial acceleration of the process of Turkish modernization was initiated by Mustafa Kemal Atatürk – the founder and the first President of the Republic of Turkey – who

disposed both the Sultanate and Caliphate forms of government and introduced a series of reforms designed to transform Turkey into a modern and secular European state[30].

The turning point of the process of Europeanization occurred after the end of the Second World War. The issues of security, reinforcement of democratic regime and political stability were on top of the agenda for the U.S. and European countries. For Turkey this was a perfect moment to catch up economically by becoming closer to European bloc of countries. Thus, joining the Western camp as a strategic ally against Communist bloc and being included in the Marshall plan[31] could allow Turkey to gain success to the western world. The key step towards "westernization" was Turkey`s accession to the North Atlantic Treaty Organization (NATO) in 1949, which confirmed Turkey`s inclination towards Western world. Interestingly, apart from becoming closer to Europe, a membership in NATO was perceived by Turkey as guarantee in case of a dispute, controversy or military conflict that would protect Turkey`s territorial integrity from both internal and external forces[32]. On the other hand, NATO members, especially the USA, considered Turkey as a strategic ally in view of the spread of the Communist regime before the dissolution of the Soviet Union in 1991 and threats coming from the Middle East, especially after 2001 terrorist attacks.

Having achieved close political cooperation with Western Europe, the Turkish government was also very enthusiastic to be the part of European economic alliance. 1959 is the major turning point in the history of Turkey-EU relations. Shortly after the birth of the European Economic Community (EEC) in 1958, Turkey was the second country (after Greece) that applied for membership in July 1959[33]. Due to internal political problems and difficult economic situation, the EEC`s response to Turkish application was to establish an association between the EEC and the Republic of Turkey till the point of Turkish eligibility for full membership in the EEC. The association between Turkey and the European

[30] Reforms were concerned with issues in political, social, educational and economic spheres like introduction of multi-party system, separation of powers, principles of secular democracy, gender equality, women`s rights, land reform, establishment of state-owned enterprises and banking system.
[31] Officially called European Recovery Program initiated by the USA and aimed at providing economic assistance to rebuild Western European economies after the World War II.
[32] This is especially important within Turkey-Greece and Turkey-Cyprus relations.
[33] EEC was a regional organisation aimed to bring economic integration through the establishment of the common market and customs union. It was created by the Treaty of Rome in 1957 and signed by the "Inner Six" – Belgium, Netherlands, Luxembourg, France, Italy and West Germany.

Economic Community was established after the Ankara agreement[34] was signed in 1963 and came into force in 1964 limited to trade and financial matters only. The agreement provides the framework for cooperation between Turkey and the EEC (nowadays between Turkey and the European Union) and aimed at securing Turkey`s full membership in the EEC via the establishment of a Customs Union in three stages. The Association Agreement has been modified by signing Additional Protocol in 1970. The relationship between Turkey and the EU worsened following the Southern enlargement in 1980s when Spain, Portugal and more importantly Greece joined the EU. This was considered by the Turkish officials and general population as a real threat for Turkey`s future accession since Greece could use its power to veto such decision due to the territorial disputes in Aegean Sea and the northern part of Cyprus.

Expectedly, Turkey applied for the full membership in 1987 which was rejected in1989 due to difficult period of digestion of the Southern enlargement. Nevertheless, the relations and accession process were re-activated via the Ankara Agreement. The next critical point between Turkey and the EU occurred during anticipated Eastern enlargement where the Eastern European and Baltic countries were included into the list of candidate countries. This Eastern enlargement was declared as a primary objective of the EU policy during the Copenhagen Summit in 1993. Importantly, in addition to economic criteria, political criteria have been announced. The new Copenhagen criteria included the issues of democracy, human rights, independent judicial system, and the rule of law, which complicated Turkey`s chance for EU membership. Turkey did not qualify for political criteria as opposed to the Eastern European states.

An important milestone was achieved in 1995 when the Customs Union, which basically abolishes tariffs on import, was established between the EU and Turkey. This is a purely economic union without any political provisions.

Following the summit in Copenhagen where a new set of criteria has been announced, the next summit that took place in Luxembourg in 1997 excluded Turkey from the pre-

[34] This is the key agreement signed between EEC and Turkey which is known as the Association Agreement.

accession strategy for the EU enlargement despite Turkey`s good economic indicators at that time. Turkey considered this as a discrimination of its right for accession where the priority is given to countries which applied much later after Turkey. This decision of the EU was interpreted by Turkey as an exclusion from European Union on religious and cultural grounds. Regardless of opinions from both sides, there was a clear shift of EU enlargement policy that demonstrated a priority of political matters over economic concerns during the enlargement decision-making process. Luxembourg Summit developments marked a serious downward trend in terms of cooperation between Turkey and the EU.

In addition, it should be noted that the attitude of the EU voters and politicians towards enlargement has changed due to high cost related to the adoption of new members. Rather Europeans opted for deeper integration within the current member countries.

Nevertheless, European Union officials acknowledged the geostrategic weight of Turkey in the Middle East and the importance of having mutually trustable relationship. Turkey`s position as a candidate country was supported by the United States of America government which helped to catalyse the process of negotiations between the EU and Turkey. The Helsinki Summit of 1999 was a real breakthrough for Turkey along its long way to become a member of the EU. Finally, the status of a candidate member country was assigned to Turkey and Accession Partnership Document was approved by the European Council in 2001. The Document basically represents a roadmap of actions necessary to be taken for accession. There are a few reasons for this decision of including Turkey – (a) stop deterioration of bilateral relationship, (b) favourable political position in Germany supporting Turkey`s accession, (c) improved Greek attitude towards Turkey, (d) facilitating role of Washington. Following the requirements outlined in the Accession Partnership Document, massive amendments in Turkey`s legislation took place.

Starting from 2002 a new political power (Justice and Development Party known as AKP) led by the current President, Recep Tayyip Erdoğan, formed Turkey`s negotiations agenda with the EU. The first period of 2002-2007 is characterized by the positive attitude from both political leaders and general population strengthened by the reforms undertaken in the

country. The EU officials also expressed satisfaction with the changes in Turkey`s economic, political, social and judicial areas, coming closer to the framework supported by the EU.

This positive trend was interrupted in 2007-2011 when Turkey`s domestic issues such as ethnic minority rights, media freedom and torture have become prominent again despite the so-called domestic democracy packages implemented since the start of official EU-Turkey negotiations in 2005. The situation with democratic changes worsened further after 2013 following the oppression of Gezi demonstrations. Many observers pointed at the increasing concentration of power and control in the hands of the leading political party AKP. At the moment, the relationship between Turkey and the EU is stalled following the rise of "authoritarianisation" of social and political institutions in today`s Turkey. On the other hand, the Refugee Agreement signed by Turkey and the European Council in March 2016 aimed at stopping the irregular migration signalled a potential for resumption of negotiations between them.

To summarize, the analysis of Turkey-EU relationship, it should be noted that cooperation in the area of trade, energy, security and migration remain critical for both sides and will most probably continue to underpin the bilateral cooperation despite the continuous freezing of negotiations considering the accession of Turkey into the European Union as a member state.

2. Practical part

The main objective of this paper is to measure the degree of economic integration between the Republic of Turkey and Eurozone countries constituting the "core" of the common currency area. Turkey`s eligibility for joining the European Monetary Union and its adoption of a common currency is analysed on the base of Optimum Currency Area (OCA) criteria as well as Maastricht convergence criteria, which represent the official economic requirements to a country willing to enter the Euro-area.

Description of data and main sources used for the analysis is presented in section 2.1, methodology and computational procedure are given in section 2.2. In section 2.3, the analysis of OCA criteria is described and the results as well as their interpretation are offered. Section 2.4 provides the analysis of nominal convergence criteria.

2.1 Data

This paper considers various macroeconomic indicators for the Republic of Turkey and five Eurozone countries - Austria, Belgium, France, Germany and the Netherlands in an attempt to evaluate suitability of Turkey`s accession into the European Monetary Union (EMU) from economic criteria point of view as set by the European Council. Nevertheless, the issue of Turkey`s potential membership in the EMU is complex as it has multiple economic, political, cultural and other possible components which may have an impact to a certain degree on the decision-making of European and Turkish officials. For the sake of this paper, I will solely focus on the economic reasoning behind Turkey`s suitability to join the EMU without measuring other factors which may have an effect on Turkey`s EMU membership eligibility.

Traditionally, the Eurozone countries are split into the "core" and the "periphery" countries depending on their relative economic and political weight within the EMU region. The "periphery" includes countries like Greece, Ireland, Italy, Portugal and Spain. This

classification is defined in von Hagen and Neumann (1994), Caporale and Girardi (2011), Cesaroni and De Santis (2015), Bartlett and Prica (2016) and Alesina *et al*. (2017). The selection of Germany and surrounding it neighbour-states as Eurozone`s "core" is based on conclusion made by Bayoumi and Eichengreen (1993). In particular, the analysis in Bayoumi and Eichengreen (1993) of coherence of aggregate demand and supply disturbances across eleven European Community (EC) member states[35] and the speed of adjustment to these shocks confirmed the idea of "Europe of Two Speeds" and argued that shocks experienced by the core of EC consisting of Germany and its immediate neighbours are of similar magnitude and cohesion. In other words, shocks in these countries are highly correlated[36]. Thus, for the purpose of this paper, the Optimum Currency Area is defined as a region comprised of Austria, Belgium, France, Germany and the Netherlands, in other words, countries that are located geographically close to each other, share the same currency and have a relatively high economic weight within the Eurozone compared to other member states. Germany is assumed to be the centre country of the currency union due to its economy`s relative size and potential impact on other countries of the union in case of macroeconomic shocks.

The choice of variables to assess Turkish eligibility for joining the European Monetary Union as a member of a single currency area is justified by the Optimum Currency Area criteria following the works of Artis and Zhang (1998), Artis and Zhang (2001), Boreiko (2002) and Rose and Engel (2000). Overall, there are 3 key indicators that allow to perform the subject evaluation - synchronisation of business cycles, degree of trade integration and trade intensity. Due to the lack of data for Turkey, the volatility of real exchange rate and labour market flexibility were not investigated in this paper.

The data was extracted from various databases including Eurostat, OECD Statistics and OECD Data, WITS and IMF covering the period from 1999 to 2017 for the majority of macroeconomic indicators unless stated otherwise. Both monthly and annual time series have been applied. The selection of 1999-2017 period in this paper is justified by the two reasons. Firstly, Euro was officially adopted as a single currency of the European Monetary

[35] The "core" countries of Eurozone constituted the "core" of European Community before the creation of EU and Eurozone.
[36] Campos and Macchiarelli (2018) https://voxeu.org/article/history-european-core-and-its-periphery

Union in 1999. Secondly, Turkey was officially recognized as a candidate for the EMU full membership in 1999 during the Helsinki Summit by the European Council. Later, the negotiations between Turkey and the European Council stalled in 2016-2017 following the comments of the European officials regarding the violation of certain accession criteria by Turkey.

2.2 Methodology

Business cycle synchronisation

Business cycle co-movements along with intensive international trade play a role of "automatic stabilizers" for the optimum currency area`s member states if they are subject to asymmetric shocks. In other words, the more synchronous economic paths of the countries that form the monetary union, the lower the adjustment process costs associated with the loss of independent monetary policy, in particular flexible exchange rate regime.

The OCA criterion on synchronisation of business cycles among single currency area members implies symmetry of output shocks and is traditionally measured by the cross-correlation of cyclical components of output de-trended by applying the Hodrick-Prescott (H-P) filter (Artis and Zhang (2001)). The cross-correlations are gauged for all the countries observed in a sample with reference to a benchmark (usually a centre country).

R.J. Hodrick and E.C. Prescott in their paper "Postwar U.S. Business Cycles: An Empirical Investigation" (1997) proposed a procedure for representing a time series as the sum of a trend component and a cyclical component that is now known as the Hodrick-Prescott (H-P) filter. They investigated the nature of co-movements of the cyclical components using quarterly data on post-war U.S. macroeconomic time series. The main finding implies that the co-movements of the cyclical components of various time series are very different from those of the slowly varying components of the corresponding variables. Let us have a closer look at decomposition procedure using the H-P filter.

Aggregate macroeconomic time series are viewed as comprising of two types of components: a cyclical component and a growth (or trend) component. Actually, they may also contain a seasonal component if the data is not seasonally adjusted. Thus, in case of seasonally adjusted data, the observed time series y_t is represented as the sum of a growth component g_t and a cyclical component c_t.

$$y_t = g_t + c_t \qquad \text{for } t = 1, \ldots, T. \tag{1}$$

Hodrick and Prescott (1997) assume that the growth component varies "smoothly" over time. The smoothness of the growth component (g_t) is measured as the sum of the squares of its second difference, whereas the cyclical components (c_t) are deviations from g_t and their average is close to zero over long time periods. Taking into account the above considerations, for determination of the growth component the following programming formula is derived:

$$\underset{\{g_t\}_{t=-1}^{T}}{Min}\left\{\sum_{t=1}^{T} C_t^2 + \lambda \sum_{t=1}^{T}[(g_t - g_{t-1}) - (g_{t-1} - g_{t-2})]^2\right\}, \text{ where } c_t = y_t - g_t. \tag{2}$$

The parameter λ is a smoothing parameter, which penalizes the variability in the growth component and is a positive number. The larger the value of λ, the smoother is the growth component. As λ approaches infinity, the final result corresponds to a linear time trend model.

Openness to trade

International trade in goods and services is a major component of a global economic integration process. The importance of international linkages is indicated by the country`s degree of openness to trade (Belke and Wang, 2005). This indicator is especially vital for a country that is willing to join an integration area like the Eurozone where tight connections between member states` goods and services markets is one of the crucial requirements for successful functioning of a fixed exchange rate regime and subsequent adoption of a single currency.

In their paper "Endogeneity of the Optimum Currency Area Criteria" (1998) Frankel and Rose argue that countries have more potential to constitute an Optimum Currency Area (OCA) due to the reason that if they are highly integrated with each other in terms of international trade in goods and services, business cycles of potential members of a single currency area become more synchronised and vice versa meaning that more integration is expected to result in higher trade intensity. Greater trade causes savings in transaction costs and risks associated with different currencies to grow. In other words, trade acts like an automatic stabiliser.

The trade-to-GDP-ratio is the most frequently used indicator to show the importance of international transaction in relation to domestic transactions. It measures "openness" or "integration" of a country`s economy in the world trade and evaluates the weight of total trade in its economy. The trade-to-GDP-ratio is also called the trade openness ratio. The trade-to-GDP-ratio is calculated via the following formula:

$$[(M_t+X_t)/GDP_t]*100 \quad (3)$$

where M_t and X_t represent total imports and total exports of goods and services at time t respectively, GDP_t is the Gross Domestic Product of the country observed at time t.

It is impotant to note that international trade plays a greater role for countries which are small in terms of size or population and surrounded by neighbouring states with high degree of economic openness rather than for large, geographically isolated as well as self-sufficient countries (OECD, 2005). The differences in trade-to-GDP ratios across countries can be explained not only by the factors (size of a country and geographic remoteness) mentioned before, but also historical and cultural aspects of potential trading partners, existence of both tariff and non-tariff barriers to trade, trade policies and economies` structures, power of supranational organizations such as European Union (EU), European Free Trade Association (EFTA) and World Trade Organization (WTO) as well as the state of the world economy (boom or recession) may significantly affect the degree of country`s integration into international trade.

For the purposes of the paper, the openness to trade index resembles the trade-to-GDP ratio but differs in a way that it relates the value of goods and services, sold/bought by the country to/from the member states of an integration area to the value of all goods and services produced domestically (GDP) for the period of one year and expressed as a percentage. This type of measure of trade integration shows the dependency of a country`s residents on both exported and imported goods and services. The formula for trade openness index looks as follows:

$$T_i = [(X_{ijt} + M_{ijt})/GDP]*100 \quad (4)$$

where X_{ijt} and M_{ijt} are total exports and imports of country *i* to the "core" *j* at time *t,* GDP is the nominal Gross Domestic Product.

Thus, the indicator of trade openness assesses the value of Turkey` bilateral trade with the core countries of Eurozone (Austria, Belgium, France, Germany and the Netherlands) as a share of its national income (GDP).

Specialization

Another OCA criterion the fulfilment of which can help the optimum currency area`s countries to mitigate the effects of asymmetric shocks without using the exchange rate as an adjustment mechanism is the degree of industry specialization. In other words, if the monetary union`s member states have highly diversified production patterns and specialize in a similar range of goods, a potential idiosyncratic shock is assumed to be of little effect as the share of the vulnerable to a shock good is relatively small in overall production.

Rose and Engel (2000) propose to use the Herfindahl index as a measure of product specialization. The Herfindahl index is calculated as follows:

$$H_{it} = \Sigma(x_{ijt}/X_{it})^2 \quad (5)$$

where x_{ijt} represents exports for country *i* of SITC subgroup[37] *j* in year *t*, X_{it} denotes total exports for country I in year t and the sum of all SITC subgroups is taken.

The index is bounded by a range of values (0; 1] and its high value indicates the country`s specialization in production of a few goods (Rose and Engel, 2000).

2.3 Analysis of OCA criteria

Business cycle synchronisation

The fulfilment of the OCA criterion on business cycle synchronisation by Turkey was analysed using the approach of Artis and Zhang (1998). Co-movements of business cycles in Turkey and the "core" countries were studied by cross-correlations of the cyclical components of monthly seasonally adjusted industrial production series over the period 2000-2017 from the International Monetary Fund (IMF) International Financial Statistics (IFS)[38]. Germany as the best-performing economy in the "core" and Eurozone as a whole was used as a proxy for single currency area`s industrial output movement.

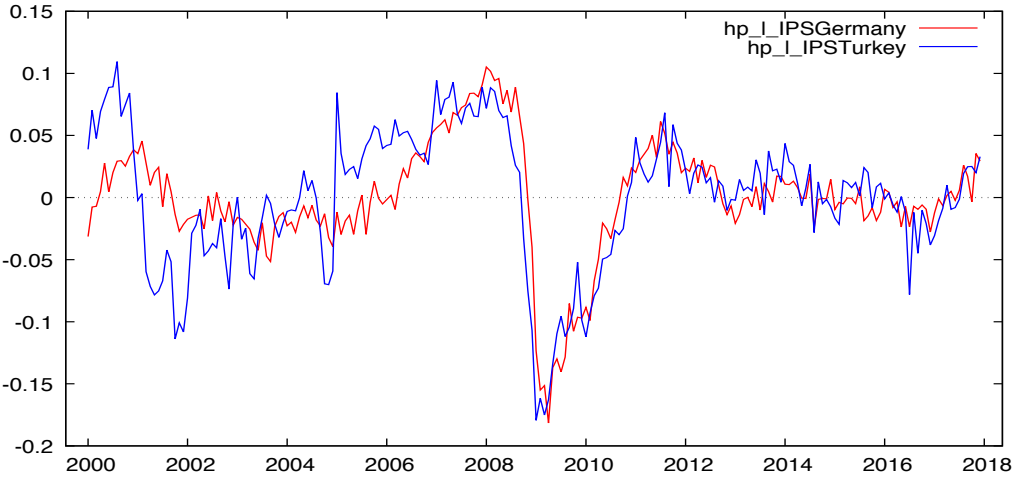
First, as the raw data represents industrial production as an index, natural logarithms of output series were calculated so that the change in the growth component, $g_t - g_{t-1}$, corresponded to a growth rate (Hodrick and Prescott, 1997). After that, the Hodrick-Prescott filter was applied to de-trend the data and extract the cyclical components of industrial production series with the value of the dampening parameter (λ) equal to 129600[39]. The cyclical components of the industrial production series of Germany and Turkey are given in Figure X:

[37] The Standard international trade classification (SITC) is a product classification of the United Nations (UN) used for external trade statistics (export and import values and volumes of goods), allowing for international comparisons of commodities and manufactured goods.
https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Standard_international_trade_classification_(SITC)

[38] Due to unavailability of data for Turkey and Austria for the year 1999, the data was extracted starting from 2000.

[39] The value for the dampening parameter was chosen according to recommendations given by Ruvn and Uhlig (2001) with regard to frequency of series observed.

Figure 1: De-trended Cyclical Components of Monthly Industrial Production Series: Germany and Turkey



Finally, the cross-correlations of the cyclical components were computed and the final results can be seen in the table X:

Table 1: Correlation coefficients, using observations 2000:01 – 2017:12
5% critical value (two-tailed) = 0.1335 for n = 216

Austria	Belgium	France	Germany	Netherlands	Turkey	
1.0000	0.7982	0.8714	0.9180	0.5798	0.6994	Austria
	1.0000	0.7987	0.8232	0.6038	0.5503	Belgium
		1.0000	0.9156	0.6717	0.7251	France
			1.0000	0.6193	**0.7690**	Germany
				1.0000	0.4583	Netherlands
					1.0000	Turkey

Source: own calculations based on IMF data
Note: cross-correlation coefficients are in the interval from -1 to +1, including the end values (Journal of Targeting, Measurement and Analysis for Marketing (2009))

The degree of synchronisation between Turkey and Germany`s business cycles for the period from 2000 to 2017 was measured by the cross-correlation at lag 0 (contemporaneous cross-correlation[40]) and equals to the value of 0.7690. The coefficient indicated a strong positive linear relationship between the industrial production series of the Republic of Turkey and Germany. To assess whether the cross-correlation coefficient was statistically significant, the

[40] Contemporaneous cross-correlation measures the degree of synchronization between two cycles. Artis and Zhang (1995)

standard measure of "significance" – the p-value method was applied. The p-value is a number between 0 and 1 and represents the lowest significance level at which the null hypothesis (H_0) is rejected. If α[41] (significance level) is higher than p-value, we reject H_0, while if α is lower or equal to p-value, we do not reject H_0.

The null hypothesis (H_0) states that there is no significant linear relationship (correlation) between industrial production series of Germany and respective country, whereas the alternative hypothesis argues that correlation of industrial output series of Germany and that of a respective country is statistically significant:

H_0: there is no correlation between industrial production series of Germany and that of respective country

H_1: non-H_0

The p-values of cross-correlation coefficients between Germany and Turkey as well as Germany and "core" countries are presented in the table Y:

Table 2: Detailed correlation statistics for the period 2000:01 – 2017:12

	Germany	**t-statistic (214)**	**p-value (two-tailed)**
Austria	0.9180	33.8542	0.0000
Belgium	0.8232	21.2123	0.0000
France	0.9156	33.3142	0.0000
Netherlands	0.6193	11.5387	0.0000
Turkey	0.7690	17.5964	**0.0000**

Source: own calculations based on IMF data

The cross-correlation coefficient for German-Turkish business cycles got the p-value of 0 that was lower than the 5% significance level (α), p-value of 0.0000 < α value of 0.05. This inferred that at 5% significance level we rejected the null hypothesis (H_0), which in turn meant that that there was a statistically significant strong positive linear relationship between the industrial production series, in other words, business cycle movements, of Germany and Turkey. The same inference could be applied to the cross-correlations between Germany and all "core" countries, as all their p-values were lower than the significance level of 5%.

[41] The probability of rejecting the null hypothesis (H_0) when it is true.

As can be seen in Table X, the highest value of German business cycle synchronisation was obtained with Austria and France, the correlation coefficients of which were 0.9180 and 0.9156 respectively. Such close business cycles co-movements of Germany-Austria and Germany-France pairs were expected taking into account their deep economic and political relationships as well as geographical proximity. It is noteworthy that among all single currency area`s member states, the Netherlands obtained the lowest cross-correlation index showing that over the period 2000-2017 the business cycle of Germany became more synchronised with the Turkish one rather than with that of the Netherlands.

The high level of synchronisation of industrial production between Germany and Turkey can be explained as a consequence of intensive trade in industrial products. Germany is the largest trading partner of the Republic of Turkey. The main products exported by Turkey are machinery and transport equipment as well as manufactured goods. The main role in Turkey`s relationships with the "core" countries (and the EU as a whole) is played by the Customs Union Agreement, which came into force in 1995 and is based on Ankara Agreement (1963) and its Additional Protocol (1970). It covers all industrial products and processed agricultural goods implying the free movement of goods within the Customs Union[42]. Among the main contributions of the Customs Union can be mentioned increased competitiveness and productivity of Turkish manufacturing industry, diversification of production patterns, positive impact of adoption of EU`s intellectual property and competition rules leading to enhanced integration of Turkey with the world economy[43]. Thus, as industrial output constitutes a large share of goods manufactured and traded by Turkey, the high degree of business cycle synchronisation between Turkey and Germany over the period 2000-2017 is clear and largely contributed by the countries` close trade linkages which are one of the main channels business cycle synchronisation can be carried out through.

[42] The Customs Union does not cover agricultural products as defined in Annex I of the Amsterdam Treaty and coal and steel products as covered by the European Coal and Steel Treaty. https://trade.ec.europa.eu/tradehelp/customs-unions
https://ec.europa.eu/trade/policy/countries-and-regions/countries/turkey/
[43] https://www.ab.gov.tr/customs-union_46234_en.html

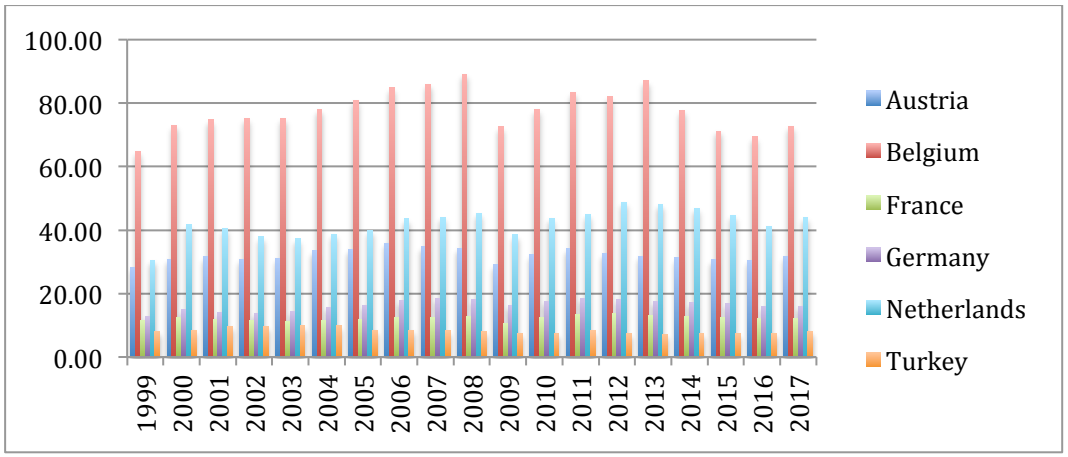
Openness to trade

To analyse the fulfilment of the OCA criterion on openness to trade by the Republic of Turkey, openness to trade index was used. Turkish economy`s openness to trade was measured as a share of bilateral trade between Turkey and "core" Eurozone countries over Turkey`s Gross Domestic Product (GDP). In other words, the sum of total exports and imports to/from Turkey`s potential currency area partners divided by the Turkey`s nominal GDP was calculated as an index of openness to trade. The values were multiplied by 100, in order to present the index in per cent.

Annual international trade statistics for the Republic of Turkey and five Eurozone countries was extracted from the World Bank`s database, World Integrated Trade Solution (WITS) over the period 1999-2017. Germany as the best-performing economy of a single currency area played a role of a benchmark for openness to trade.

To compare the degree of trade openness of Turkish economy with that of the "core" countries, openness to trade indices for Austria, Belgium, France, Germany and Netherlands were calculated and presented in the chart G below:

Chart 1: Openness to trade index over the period 1999 – 2017



Source: own calculations based on WITS data
Note: measured in % as a share of a country`s GDP

According to the results, among all "core" countries Belgium was taking the leading position in the euro area in terms of openness to trade within the monetary union over the whole period of 1999-2017. Then, according to the openness to trade index it was followed by the Netherlands, Austria, France and Germany, being the least open to trade country in the Eurozone`s "core". As regards Turkey, its openness to trade index was significantly lower than that of a benchmark, Germany.

Before calculating the indices, it was expected for member states of a currency union to have tight trade linkages due to their geographical proximity and a shared historical and cultural heritage that played a role of a solid foundation for the development and strengthening of bilateral trade relationships. Besides the traditional determinants of trade, adoption of a common currency in 1999 and the establishment of a Single Market in 1993 substantially contributed to deeper trade integration across the member states of Eurozone guaranteeing the "four freedoms" – free movement of goods, capital, services and labour within the European Union[44] as a whole. Within the framework of the Single Market, there are no barriers to intra-EU and intra-euro area trade that in turn leads to greater trade intensity, higher competition, increased efficiency and improvement in product quality.

To come back to the openness to trade index among the core countries of a currency union and Turkey, Germany`s low share of intra-euro area trade can be explained by its intensive trade with neighbouring countries of Eastern Europe as well as Asian economies[45]. When assessing the share of bilateral trade within the single currency area, large differences in size of an export sector across countries should be taken into consideration. For Belgium, Netherlands and Austria high values of openness to trade indices are determined by their relative small geographical size and population compared to German ones as well as neighbourhood with large and self-sufficient countries like France and Germany (OECD, 2005). As regards the openness of Turkish economy to trade with the "core" Eurozone member states, the low value of openness to trade index can be determined by Turkey`s geographical remoteness from the "core" of a single currency area which in turn brings about high transportation costs. Another reason for Turkish economy`s relatively low share

[44] https://ec.europa.eu/commission/priorities/internal-market_en
[45] https://www.ecb.europa.eu/pub/pdf/other/art2_mb201301en_pp59-74en.pdf?fa94ef8c56e6b0a9fc4a617466b16d91

of trade with its trading partners from euro area is the large geographical size of the Republic of Turkey as well as its high level of population significantly exceeding those of Austria, Belgium and Netherlands.

It is important to note the significant role of a common currency (Euro), in economic and monetary integration providing solid grounds for internal market flourishing. The main benefits of a common currency are as follows: lower transaction costs, elimination of exchange rate uncertainty and associated with it extra costs and risks, higher business confidence, greater transparency in prices and cross-border transactions, increased competition and efficiency in the common market and deeper financial integration across currency union`s member states leading to a reduction of the costs related to trading in bonds, equity and banking assets[46]. So, as the Republic of Turkey cannot enjoy all these benefits arising from participation in a single currency area, a lower openness to trade index could be expected.

However, taking into account relatively low values of trade openness in France and Germany in comparison with the rest three countries of the "core" Eurozone, it can be supposed that one more reason of Turkish economy`s low trade integration with Eurozone countries over the period of 1999-2017 is that its export sector is oriented on markets other than Austria, Belgium or Netherlands, even though the EU as a whole is the main trading partner of Turkey. For example, in 2017 the only country from Eurozone among Turkey`s top 5 exporters was Germany as the main destination of Turkish exports and being the second after China in the list of Turkey`s major trading partners in terms of imports[47]. The same tendency was noticed in Germany`s international trade statistics for 2017[48] where the United States of America, France, United Kingdom and Netherlands were determined as the main markets for German export products. From year to year growing involvement of Turkish economy in international trade relations and its tight trade linkages with the countries of EMU can be seen in Appendix A, where the values of Turkish exports for each product subgroup for the period over 1999-2017 are provided. An increase in Turkey`s

[46] https://ec.europa.eu/info/about-european-commission/euro/benefits-euro_en
[47] Trade summary for Turkey provided by WITS https://wits.worldbank.org/countrysnapshot/en/TUR/textview
[48] https://wits.worldbank.org/countrysnapshot/en/DEU/textview

overall exports as well as in exports of particular SITC subgroups demonstrates gradual growth of the Turkish tradable goods sector over time.

Thus, reliance on openness to trade index can not fully demonstrate Turkey`s real position in international trade, especially the degree of its trade integration with the "core" Eurozone countries taking into consideration that Germany, the largest economy of Eurozone and European Union as a whole, had the second lowest values of openness to trade index over the whole time period observed.

Specialisation

The analysis of the OCA criterion on specialisation in international trade in the Republic of Turkey was based on calculation of a Herfindahl index – a measure of trade specialisation proposed by Rose and Engel (2000, p.6). The Herfindahl index for Turkey and each particular Eurozone country was computed as the sum of squared shares of exports of each Standard International Trade Classification (SITC) subgroup for the period over 2002 – 2017[49]. The annual export statistics (recorded in million of Euro) was extracted from Eurostat database. The following SITC subgroups for each country-year observation were used to calculate the Herfindahl index:

SITC0_1: Food, drinks and tobacco
SITC2_4: Raw materials
SITC3: Mineral fuels, lubricants and related materials
SITC5: Chemicals and related products, n.e.s.
SITC6_8: Other manufactured goods
SITC7: Machinery and transport equipment[50]

As the best-performing economy in the currency area, Germany was taken as a benchmark of product specialisation.

The statistical measures of specialisation for all countries of interest are presented in the table below:

[49] The long-term international trade in goods statistics (annual frequency) for Eurozone countries was available since 2002 only.
[50] Eurostat international trade statistics

Table 3: Herfindahl index for Turkey and five "core" Eurozone countries[51]

	2002	2005	2008	2011	2014	2017
Austria	0.3287	0.3115	0.2994	0.2865	0.2936	0.2981
Belgium	0.2490	0.2382	0.2255	0.2167	0.2069	0.2126
France	0.3012	0.2780	0.2497	0.2416	0.2476	0.2563
Germany	0.3623	0.3422	0.3212	0.3170	0.3195	0.3325
Netherlands	0.2042	0.2083	0.1903	0.1927	0.1957	0.2074
Turkey	0.3941	0.3456	0.3133	0.3072	0.2990	0.2876

Source: own calculations based on Eurostat data.

As can be seen from the table Z, all the countries experienced a decrease in the level of trade specialisation for the period 2002-2013. From the OCA theory perspective, this can be viewed as a positive shift in the patterns of specialisation in Turkey as well as the "core" countries of a single currency area. In other words, countries with lower Herfindahl indices and higher product diversification are less vulnerable to asymmetric shocks, especially to those specific to a particular industry[52]. However, starting from 2014, greater values of Herfindahl indices clearly show that Turkey along with the single currency area countries have experienced greater specialization patterns. Such an increase in specialization index may provide evidence for deeper economic integration between countries. This argument on connection between integration and specialization was stated by Krugman (1993, p.244) and based on the experience of the U.S highly specialized agricultural regions which produced only a few goods and were vulnerable to market fluctuations in these particular products. Thus, Krugman (1991) argues that in future Eurozone countries will become more specialized and that greater specialization will make countries more vulnerable to asymmetric industry shocks.

The link between the three OCA criteria analysed in this paper always has been the object of interest among economists. For example, Frankel and Rose (1998) proposed the "endogeneity hypothesis" insisting on strong interdependence between business cycle

[51] The full statistics can be found in Appendix B.
[52] Krugman (1993), p. 260.

synchronisation and trade integrity. In other words, the more members of a common currency area are involved in trade, i.e. the higher their openness to trade, the more synchronised their business cycles become and the opposite is true meaning that greater correlation of countries` business cycles leads to a deeper trade integration between them. In the first case, intra-area trade serves as a channel for the transmission of macroeconomic shocks across borders[53].

Rose and Engel (2000, p.7) argue that currency area members have higher Herfindahl indices and their export of goods is much smaller than those of countries with flexible exchange rate. Also Rose and Engel (2000) state that countries with floating exchange rate regime and independent monetary policy tend to be less open to trade and have lower degree of industry specialization.

Krugman (1993) suggests that deep trade integration causes increased product specialization across countries what in turn leads to a reduction in international correlations of incomes.

2.4 Analysis of Maastricht convergence criteria

Along with real convergence criteria, this paper aims to assess eligibility of the Republic of Turkey for joining the European Monetary Union on the base of five Maastricht convergence criteria. For the purpose of the analysis, statistics was extracted from the databases of Eurostat, OECD and European Central Bank (ECB) covering the period 2010-2017. The time series of both annual and monthly frequency have been applied. The selection of 2010-2017 time range was due to the reason that data on fiscal indicators (public debt and government deficit) for Turkey was available since 2010 only.

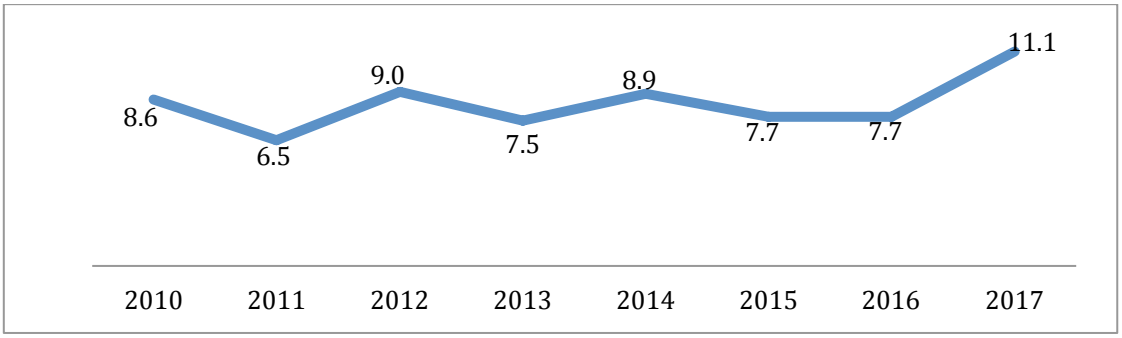
[53] ECB, Monthly Bulletin, January 2013: https://www.ecb.europa.eu/pub/pdf/other/art2_mb201301en_pp59-74en.pdf?fa94ef8c56e6b0a9fc4a617466b16d91

Price stability

The primary objective of the European Central Bank`s (ECB) monetary policy is to maintain price stability, in other words to safeguard the value of euro[54]. Thus, the first convergence criterion for the Republic of Turkey to enter the European Monetary Union (EMU) and adopt a single currency deals with sustainability of price levels. To achieve the goal, Turkey as a prospective Eurozone participant is required to have a sustainable price stability dynamics with an average inflation rate not in exceed of 1.5 percentage points than that of the three best-performing EU member states in terms of price stability over a period of one year before the examination.

For the purposes of assessment of Turkey`s compliance with the price stability criterion, the Harmonized Index of Consumer Prices (HICP) is used to measure the rate of inflation[55] in the period 2010-2017. This index is a measure of the average price which consumers spend on market-based "basket" of goods and services. The cut-off date for the data used is December 2017. The inflation reference value is calculated to be 2.1% in December 2017, with Ireland, Cyprus and Finland as the three best-performing countries in terms of stable price levels[56]. The respective 12-month average inflation rates for these countries are 0.3%, 0.7% and 0.8%. The average rate of inflation in Turkey during 12 months period to December 2017 is 11.1%, which is significantly higher than the reference value of 2.1%.

Graph 1: Turkey`s Harmonized Index of Consumer Prices (HICP), in %



Source: Eurostat, https://ec.europa.eu/eurostat/web/hicp/data/database
Note: measured as annual average rate of change (2015=100)

[54] https://www.ecb.europa.eu/ecb/tasks/html/index.en.html
[55] HICPs are designed for international comparisons of consumer price inflation. HICP is used by the ECB for monitoring of inflation in the EMU and for the assessment of inflation convergence as required under Article 121 of the Treaty of Amsterdam.
[56] The number is obtained as the simple average of 12-month average inflation rates of Ireland, Cyprus and Finland plus 1.5 percentage points.

To understand the main reasons for the rise of inflation rate in Turkey for a considered period 2010-2017 let us look closer at the factors responsible for the price level increase. As one of the largest factors of the rising price level was the country`s weakening currency. Investors` concern over the county`s economic and political health contributed to the lira`s loss of its substantial value against Euro and US dollar over time. This currency depreciation was mainly due to the domestic political tensions related to the President Erdoğan`s regime and instability in US - Turkey relationship. Consequently, such pressure on the Turkish currency has pushed up prices and eroded confidence in what was once a well-performing emerging market. In addition, Turkey is heavily reliant on imported oil, therefore, the increase in crude prices, which are denominated in dollars, severely influenced both businesses and consumers. Producers often pass on prices to consumers, in other words, the burden of price escalation is usually carried by the purchasers. At the same time, Turkish lira plunged against US dollar and euro during the considered period, with a sharp depreciation started in the end of 2016 and continued in 2017.

Graph 2: Exchange rate dynamics[57] – Euro vs Turkish lira in 2010-2017

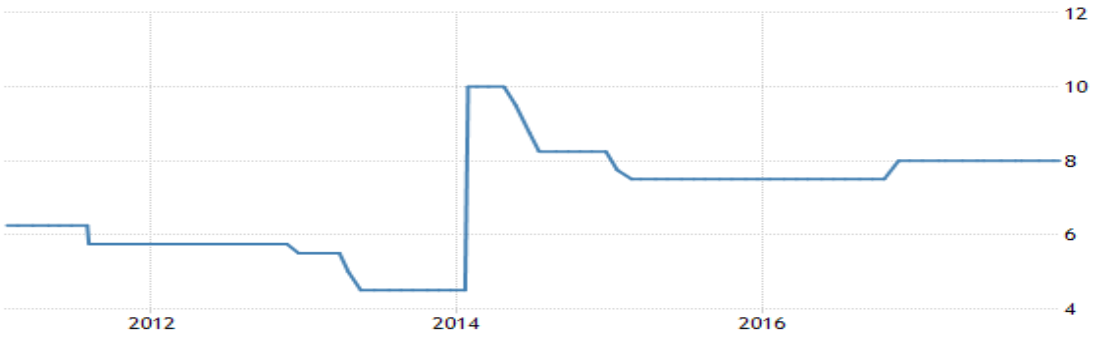
Source: European Central Bank office website[58]
Key facts: minimum value (17 May 2010): 1.9039, maximum value (24 November 2017): 4.6826.

Following the price instability and persistent inflation in the domestic market which put pressure on the national currency, a special attention was brought to the Turkish Central Bank policymakers in an attempt to understand the direction of their actions in terms of adjusting the interest rate. As it can be seen on the graph X, the first rise in the interest rate

[57] On the graph there is a clear upward trend in euro/Turkish lira exchange rate dynamics meaning that euro is becoming stronger compared to lira.
[58] Available at https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/eurofxref-graph-try.en.html

occurred in 2014 reaching 10% at its peak. The rate has been lowered in 2015-2016 amounting to 7.5-7.7% on average. In 2017 there was a slight rise when the rate reached average 8%, which remained unchanged that year. Therefore, the Turkish Central Bank opposed to raising interest rates to cool down the economy and support the national currency during the analysed period.

Graph 3: Turkey`s interest rate dynamics in 2010-2017



Source: CBRT, Trading Economics official website, https://tradingeconomics.com/turkey/interest-rate

Taking into account fluctuations of inflation rates in the Republic of Turkey and its mismatch with the reference value, it can be concluded that Turkey does not fulfil the criterion on price stability in the period considered.

Long-term interest rate criterion

The second Maastricht requirement that must be met by the Republic of Turkey to join the single currency area (Eurozone) is to obtain stable long-term interest rates. The convergence of interest rates implies that Turkey as a candidate member state has had an average nominal long-term interest rate that does not exceed by more than two percentage points the average value of the three best-performing member states in terms of price stability over a period of one year before the examination[59].

For the purpose of this paper, to illustrate the dynamics of long-term interest rates in Turkey, the data for a 7-year period from 2010 until 2017 is analysed. For measuring this criterion fulfilment, monthly interest rates on the base of long-term government bond yields

[59] Article 140(1) of the Treaty on the Functioning of the European Union (TFEU) requirement.

with 10 years maturity are used to evaluate convergence of Turkish interest rates towards those of the Eurozone members. The cut-off date for the data observed is December 2017. The interest rate reference value is calculated to be 3.32% in December 2017, with Cyprus, Ireland and Finland as the three best-performing countries in terms of price stability. The respective 12-month average interest rates for these countries are 2.62%, 0.8% and 0.55% respectively. The average interest rate for Turkey during 12 months period to December 2017 is 11.11% which is more than three times higher than the reference value of 3.32%.

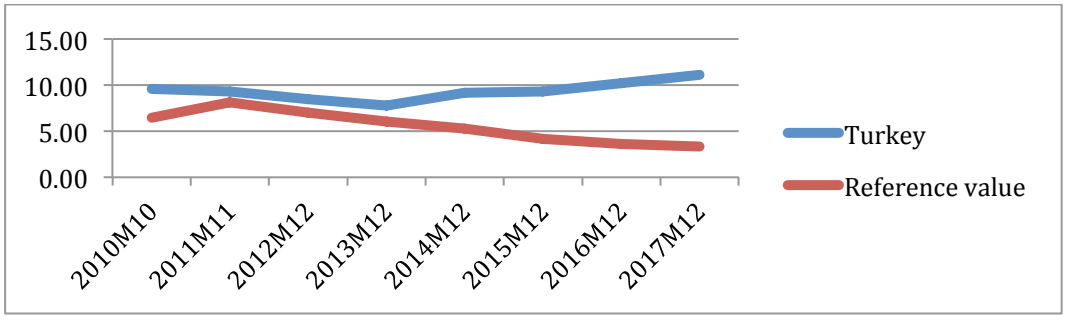
Table 4: 12 month moving average long-term interest rates

	Dec 2010	**Dec 2011**	**Dec 2012**	**Dec 2013**	**Dec 2014**	**Dec 2015**	**Dec 2016**	**Dec 2017**
Reference value	6.45	8.13	7.02	6.05	5.27	4.15	3.62	3.32
Turkey	9.62	9.28	8.47	7.77	9.18	9.30	10.19	11.11

Source: Eurostat and own calculations based on the monthly data.
Note: values are measured in %.

It is clearly seen that generally over the 2010-2017 period the long-term interest rate indicator has been rising slowly in Turkey in contrast to the average reference interest rate value of the three best-performing Member States that has been declining over years.

Graph 4: 12 month moving average long-term interest rates dynamics



Source: own calculations based on Eurostat data
Note: values are in %

The major macroeconomic developments in Turkey in 2017 in the form of robust GDP growth and Turkish lira depreciation continued to put upward pressure on inflation. The

Central Bank of the Republic of Turkey (CBRT) key objective has been to keep inflation under control by conducting tight monetary policy by continuing to rely on the Late Liquidity Window (LLW)[60]. Thus, CBRT expected that increasing long-term interest rates would support the national currency and lower inflation.

Turkey does not fulfil the long-term interest rate criterion based on the assessment carried out for year 2017. Overall, this indicator has been higher than the reference Eurozone value throughout the 7-year period considered in this paper.

Criterion on public finances

To fulfil the criterion on public finances, the Republic of Turkey is required to achieve sustainability of the government financial position. Sustainable budgetary position of the Turkish government is assessed on the base of share of budget deficit and public debt as a percentage of GDP. Thus, Turkey meets this nominal convergence criterion if both components of the fiscal criterion are satisfied, i.e. its public debt does not exceed 60 per cent of GDP as well as budget deficit does not constitute more than 3 per cent of GDP.

As for the previous convergence criterion, the cut-off date for examination of the fiscal stability indicators for Turkey was 2017. To illustrate the dynamics of Turkish gross government debt, data for the 7-year period prior to 2017 is analysed.

Table 5: General government gross debt, (in % of GDP)

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Reference value	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Turkey	49.22	43.93	41.25	34.54	33.4	32.77	34.59	35.17

Source: OECD Statistics

As can be seen from the table above, the general government debt had a downtrend for the period 2010-2015, when the value of the public debt fell from its peak of 49.22% of GDP

[60] The Late Liquidity Window (LLW) is the Turkish lira borrowing facility that the CBRT as the lender of last resort provides for banks to meet their temporary liquidity needs at the end of the day in order to avoid possible problems in the payment systems. Through the Late Liquidity Window Facility, banks can also lend their excess liquidity at the end of the day.

in 2010 to below 33% of GDP in 2015. It was the lowest recorded value of general government debt for the whole time series observed. Since then, however, Turkey experienced a slight rise in debt-to-GDP ratio resulting in an increase of the public debt by 1.82 and 2.4 percentage points, in 2016 and 2017 respectively.

The second requirement to be achieved as a part of public finances convergence criterion is the budget deficit-to-GDP ratio (general government balance) which should be equal to 3 per cent at most. For consistency of the analysis, the same time series period 2010-2017 for this indicator is selected.

Table 6: General government balance, (in % of GDP)

	2010	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Reference value	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0
Turkey	-2.68	-0.74	-0.18	0.20	0.24	0.64	-1.11	-2.77

Source: OECD

Over the given period, the general government sector achieved its best fiscal performance in 2015 when the general government surplus accounted for 0.64% of GDP. In the next fiscal years the indicator has slightly deteriorated when the deficit-to-GDP ratios amounted to 1.11% and 2.77% in 2016 and 2017 respectively.

Deterioration of public balance indicators in 2016-2017 happened because of the weak domestic demand that was much lower than its potential level due to political and policy uncertainty, following the attempted coup d`etat, which brought about a sharp deterioration in consumer confidence and gradual erosion of business confidence resulting in high interest rate, unemployment and inflation which dragged private consumption down[61], a significant increase in primary expenditures, such as soaring security spending, a government subsidy for the rise in the minimum wages and increased government

[61] Economic Reform Programme of Turkey (2017-2019), Commission Assessment http://data.consilium.europa.eu/doc/document/ST-8440-2017-INIT/en/pdf

employment and tax amnesty. Among other factors that largely contributed to the aggravation of the Turkish government budget deficit and subsequently led to higher public debt were tax cuts on durable goods and furniture, lower privatisation revenues, household transfers and investment expenditures[62].

In spite of the fact that during the last two years of the observed period, debt-to-GDP ratio gradually rose, Turkey still fulfils the public debt component of fiscal stability criterion in 2017 as its public debt does not exceed the reference value of 60 per cent of GDP. Despite the downward trend in the deficit-to-GDP ratio, the Turkish government managed to maintain its budgetary position within the permissible fluctuation margins not exceeding the reference value of 3 per cent of GDP.

To conclude, both components of the public finances criterion – debt-to-GDP ratio and deficit-to-GDP ratio – comply with Maastricht requirements and the Republic of Turkey fulfils the criterion dealing with public finances for the analysed period 2010-2017.

Exchange Rate Stability Criterion

To satisfy the Maastricht criterion on participation in the exchange rate mechanism the European Monetary System, the Republic of Turkey as a potential EU and Eurozone member state must participate in the European Exchange Rate Mechanism II (ERM II) for the period of at least two years before the examination and keep its currency within the allowed maximum fluctuation band of +/- 15% from the fixed central rate to euro. To satisfy the above criterion, Turkish lira`s central parity should not have been devalued on the country`s own initiative and should not have been subject to excessive pressures on its exchange rate. In this chapter, I will briefly consider the criterion of exchange rate stability in respect to Turkey`s national currency in view of country`s attempt to join the EMU.

The Treaty on the Functioning of the European Union (the TFEU)[63] refers to the exchange rate criterion as "the observance of the normal fluctuation margins provided for by the

[62] Turkey Economic Outlook, 1st, 2nd and 3rd quarters 2017 by BBVA

[63] Article 140(1) of this Treaty requires the European Commission and the ECB to report to the European Council, at least once every two years, or at the request of a Member State with a derogation, on the progress made by the Member States in fulfilling their obligations regarding the achievement of economic and monetary union.

exchange rate mechanism of the European Monetary System, for at least two years, without devaluing against the euro.

After the 2001 economic crisis, the Central Bank of the Republic of Turkey (CBRT) operates a floating exchange rate regime determined by supply and demand conditions in the market, under which the exchange rate is not used as a policy instrument[64]. Foreign exchange (FX) supply and demand are determined by the domestic monetary and fiscal policies, international developments and expectations. Under the current exchange rate regime, a nominal or real exchange rate target is not set by Turkey`s Central Bank.
Next, I would like to look at the exchange rate stability criterion in a more detail by setting up a hypothetical scenario of Turkey entering the ERM II system in order to understand country`s potential performance in respect to this criterion.

Formally Turkey does not participate in the ERM II since the country is not a member of the EU, and therefore, is not expected to fulfil the exchange rate stability criterion and adopt Euro as its currency. Formal fulfilment of the subject criterion would be possible only after Turkey joins the ERM II.

For the purpose of this paper, I will consider Turkey`s hypothetical performance in terms of exchange rate stability criterion by assessing the assumed central parity between EUR/TL for the two-year period 2015-2017. This particular two-year time range is selected as it is the latest period within the considered time series in this paper. The central parity is set as an average Euro/Turkish lira exchange rate for Q4 2014, which is the last quarter before the hypothesized ERM II entrance at the start of 2015. In this way, it is theoretically possible to monitor whether Turkey would have fulfilled the exchange rate stability criterion in the given time period.

It is clearly seen from the graph that Turkish lira is depreciating gradually against Euro starting from 2015 which can be well traced by the upward EUR/TL curve. The graph below visualizes the hypothetical scenario outlined above, where the average Q4 2014

[64] Monetary and Exchange Rate Policy for 2018, CBRT publication

EUR/TL exchange rate is set at 2,8255. The allowed maximum fluctuation band of +/-15 % from the fixed central rate is calculated at 3,2494 (depreciation of Turkish lira by 15%) and 2,4017 (appreciation of Turkish lira by 15%) accordingly. On the graph the fluctuation band is marked by upper and lower horizontal blue lines, and the central reference exchange rate is marked by the horizontal yellow line. Starting from September 2015 the exchange rate exceeded the upper fluctuation limit by bouncing back later that year to the "allowed" value, however overpassing the upper limit considerably in the end of 2016 and beginning of 2017. As a result of this simple simulation of Turkey`s potential entrance into ERM II, one can see that the country does not qualify against the exchange rate stability criterion within the assessed two-year period of 2015-2017.

According to official CBRT monetary and exchange rate policy announcement in 2016, since 2013 Turkey`s economy has been largely affected by global monetary policy developments and unconventional policies of advanced economies[65]. Thus, the official road map released by CBRT on 18 August 2015 among other provisions included policies related to Turkish lira liquidity, foreign exchange liquidity and financial stability expected to be implemented before and during the normalization period. Central issue for CBRT has been the growing inflation pressure with a worsening outlook starting from 2015 reflecting the pass-through from the Turkish lira depreciation, elevated food inflation, increased minimum wages. Monetary policy was simplified to a large since March 2016 by gradually lowering the CBRT overnight lending rate during the March-September 2016 period. Further, in order to contain adverse impact of exchange rate movements CBRT opted for some monetary tightening in November 2016. Continued volatility experienced in foreign exchange markets and its impact on the inflation outlook affected CBRT monetary policy decisions in early 2017. Following exchange rate developments affecting the upside risks to inflation, the CBRT continued a strong monetary tightening throughout 2017 to limit the deterioration in inflation outlook. In the end of 2017 exchange rate movements along with geopolitical risks and increases in oil prices continued to pose an upward pressure on inflation. To address the worsening outlook, CBRT reduced the borrowing limits of banks in the Interbank Money Market to zero for overnight transactions. The upper limit of

[65] Monetary and Exchange Rate Policy official releases by the National Bank of Turkey dated 9 December 2015; 6 December 2016 and 5 December 2017.

foreign exchange facility within Reserve Options Mechanism (ROM) was lowered from 60 per cent to 55 per cent and reduced all tranches by 6 points each at the beginning of November. In addition to this decision, Turkey`s Central Bank allowed for the repayment of rediscount credits whose maturities are until 1 February 2018, to be made in Turkish lira, provided that they are paid at maturity.

3. Conclusion

The aim of the paper was to assess the degree to which the Republic of Turkey, as the official candidate country to join the European Union and subsequently the Eurozone, is economically integrated with the EMU "core" countries - Austria, Belgium, France, Germany and Netherlands. Germany was taken as a benchmark to evaluate economic performance of the countries observed. Three Optimum Currency Area (OCA) criteria and five Maastricht convergence criteria as the indicators of real and nominal convergence processes were assessed with respect to Turkey. For the OCA criteria the selected time series was the period over 1999-2017, while the time range for the Maastricht criteria was determined by the period 2010-2017.

Having analysed the fulfillment of OCA criteria by the Republic of Turkey, the following results were obtained: it was found out that there exists a strong and statistically significant correlation between the business cycle of Turkey and that of Germany, which in turn means that Turkey as a potential member state of a single currency area will not bear large costs to mitigate the negative effects of asymmetric shocks. It is essential for all member states of a currency union to have highly synchronized business cycles due to relinquishing of independent monetary policy and flexible exchange rate regime. In other words, the common monetary policy must be effective for all participants of the monetary union.

As regards the openness to trade criterion, among all six countries observed, Turkey obtained the smallest value implying low degree of trade integration with the "core" countries of the Eurozone. But interpretation of the results on this criterion requires to be cautious as the extent of economy`s openness depends on numerous factors like geographical size, proximity from potential trade partners, size of export sector, membership in customs union, presence of common currency as well as historical linkages between countries. Frankel and Rose (1998, p.1019) emperically proved a strong and negative relationship between distance and trade intensity. Countries, which share a common language or are neighbours tend to trade more.

According to the results obtained, Germany, the largest economy of Eurozone, is also insufficiently integrated into intra-euro area trade, but this fact is explained by intensive trade with the countries outside the single currency area.
Having analysed the values of Herfindahl index for Turkey, its production sectors are not highly specialised taking into account the decrease of the specialisation index over the observed period. Countries of Eurozone showed higher levels of specialization of their economic sectors, which can be explained by higher trade intensity and deeper business cycle synchronisation within the currency area.

Thus, it can be concluded that the Republic of Turkey on behalf of its close economic and trade relations with the countries of European Union can achieve a greater degree of business cycles synchronization, trade integration and industry specialization ex post. In other words, after the entrance to the Eurozone and adoption of a common currency, Turkey`s economy is more likely to converge with economies of the monetary union`s member states.

The analysis of Turkey`s eligibility to join the Eurozone on the base of the Maastricht criteria showed that over the period 2010-2017 the Republic of Turkey could not meet the economic requirements regarding the price stability, convergence of long-term interest rates and exchange rate stability. Only fiscal Maastricht criteria – the ratio of government debt and deficit with respect to GDP were fulfilled.

To conclude, the Republic of Turkey over the observed periods did not have a solid economic performance to meet the criteria of the Maastricht Treaty as well as those proposed by the OCA theory. However, Frankel and Rose (1998) noted that any country willing to join a single currency area has more chances to fulfill the criteria ex post rather than ex ante.

References

Artis M.J&Zhang (2001). Core and Periphery in EMU: A Cluster Analysis. Economic issues,Vol.6,Part2,September2001
http://www.economicissues.org.uk/Files/2001/201dArtis.pdf

Baldwin R.&Wyplosz C. (2009). The Economics of European Integration. McGraw-Hill Higher Education. https://epdf.pub/queue/the-economics-of-european-integration.html

Bartlett, W., & Prica, I. (2016). Interdependence between Core and Peripheries of the European Economy: Secular Stagnation and Growth in the Western Balkans. *SSRN Electronic Journal*. doi: 10.2139/ssrn.2729882

Boreiko, D. (2003). EMU and accession countries: Fuzzy cluster analysis of membership. *International Journal Of Finance & Economics*, *8*(4), 309-325. doi: 10.1002/ijfe.216

Cesaroni, T., & de Santis, R. (2015). Current Account 'Core-Periphery Dualism' in the EMU. *SSRN Electronic Journal*. doi: 10.2139/ssrn.2587206 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2587206

Drastichová, M. (2012). The relations of real and nominal convergence in the EU with impacts on the euro area participation. *Ekonomická Revue - Central European Review Of Economic Issues*, *15*(2), 107-122. doi: 10.7327/cerei.2012.06.03

Fatas, A. (1996). EMU: Countries or Regions? Lessons from the EMS Experience. https://faculty.insead.edu/fatas/emucou.pdf

Fidrmuc Jarco (2001). The Endogeneity of the Optimum Currency Area Criteria, IntraIndustry Trade, and EMU Enlargement. Discussion Paper 106/2001 https://www.econstor.eu/bitstream/10419/75001/1/dp106.pdf

Frankel, J., & Rose, A. (1998). The Endogeneity of the Optimum Currency Area Criteria. *The Economic Journal, 108*(449), 1009-1025. Retrieved from http://www.jstor.org/stable/2565665

Frankel, J., & Rose, A. (1996). The Endogeneity of the Optimum Currency Area Criteria. http://www.nber.org/papers/w5700

Grubel, H. (1970). The Theory of Optimum Currency Areas. *The Canadian Journal of Economics / Revue Canadienne D'Economique, 3*(2), 318-324. doi:10.2307/133681

Hodrick, R., & Prescott, E. (1997). Postwar U.S. Business Cycles: An Empirical Investigation. *Journal of Money, Credit and Banking,29*(1), 1-16. doi:10.2307/2953682 https://www.jstor.org/stable/2953682

Imbs, J. (2004). Trade, Finance, Specialization, and Synchronization. *The Review of Economics and Statistics, 86*(3), 723-734. Retrieved from http://www.jstor.org/stable/3211793

Krugman, P. (1993). Lessons of Massachusetts for EMU — Economics E-Journal. http://www.economics-ejournal.org/economics/journalarticles/2008-8/references/Krugman1993

Krugman, P. (1991). Increasing Returns and Economic Geography. *Journal Of Political Economy*, *99*(3), 483-499. doi: 10.1086/261763 https://www.journals.uchicago.edu/doi/pdfplus/10.1086/261763

McKinnon, R. (1963). Optimum Currency Areas. *The American Economic Review, 53*(4), 717-725. Retrieved from http://www.jstor.org/stable/1811021

Mundell, R. (1961). A Theory of Optimum Currency Areas. *The American Economic Review, 51*(4), 657-665. Retrieved from http://www.jstor.org/stable/1812792

OECD (2011), "Trade openness", in OECD Science, Technology and Industry Scoreboard 2011 , OECD Publishing, Paris. https://www.oecd-ilibrary.org/docserver/sti_scoreboard-2011en.pdf?expires=1566218089&id=id&accname=ocid195691&checksum=59D0459BCFFA29BFAEB72577E7457B6C

Ravn, M., & Uhlig, H. (2002). On Adjusting the Hodrick-Prescott Filter for the Frequency of Observations. *The Review of Economics and Statistics, 84*(2), 371-376. Retrieved from http://www.jstor.org/stable/3211784

Rose A. K & C. Engel (2000). Currency Unions and International Integration. Working paper 7872. https://www.nber.org/papers/w7872

Triandafil, C. (2013). Sustainability of Convergence in the context of macroprudential policies in the European Union. http://www.workingpapers.ro/2013/wpince130618.pdf