

Towards a stronger monetary union for The Netherlands

Which EMU countries should The Netherlands form a currency union with, according to the Optimal Currency Area theory criteria?

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ABSTRACT

For many years now, a lot of economists have stated that the Economic Monetary Union (EMU) is not an optimal currency area (OCA). They argue that the EMU should be reformed. One way of doing this is by splitting it into two or multiple regions. This work aims to add to this discussion by being the first to quantitatively analyze which EMU countries The Netherlands could best form a currency area with. The criteria that are used to measure this are: similarity in economic structure, monetary policy coordination, openness to trade and labor mobility. These criteria are extracted from the OCA theory. This work shows that it would be most beneficial for The Netherlands to form a currency area with Belgium, Germany, France and Luxembourg, instead of staying a part of the current EMU. This emphasizes the importance of keeping the discussion on the viability of the EMU alive.

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1. INTRODUCTION

1.1. The problem defined

After the Second World War, many European countries agreed that cooperation between them should become a priority (Schütze, 2015). They started with three organizations, which then became three communities, and later formed the European Union (EU). Currently, the EU has established an internal market in which goods, services, capital and persons can move freely (Baimbridge & Whyman, 2015). The big driver behind this internal market was the political desire to abolish borders between regions, by fully integrating them. However, an internal market was thought not to be enough for total integration. After all, different currencies yielded transaction costs and uncertainty, which could still form a barrier to free trade. Hence, forming an Economic and Monetary Union (EMU) in which the participating countries would have a single currency aimed to solve this ‘problem’.

As mentioned above, the main driver behind the creation of the EMU was the political desire to fully integrate the EU countries (Baimbridge & Whyman, 2015). Thus, a big political will to create an EMU existed, but the question was whether it was also economically viable (Hall, 2012). One major red flag before implementation was the warning from economists that the EMU would not be an optimum currency area (OCA) (e.g. Eichengreen, 1997; Fratianni & Von Hagen, 1992; Ghosh & Wolf, 1994; Frieden et al., 1998). The first to mention OCAs was Mundell (1961). Thereafter, many others added to the discussion on what OCAs are. In short, the OCA theory argues that geographical areas should only adopt a single currency if it maximizes the area’s economic efficiency (Broz, 2005). To determine economic efficiency, certain characteristics of the area should be analyzed. If this analysis then implies that the currency area’s costs of abolishing a (floating) exchange rate regime as an internal instrument of adjustment are outweighed by the benefits of adopting a single currency, one should form a single currency area (Ishiyama, 1975).

However, the OCA theory’s outcome that the EMU would not be an OCA was largely ignored. Some said that the theory was wrong, others viewed it as irrelevant or said that certain reforms could still make the EMU an OCA (Acemoglu et al., 2012). Therefore, ignoring the OCA theory’s warning, the EMU was still founded (Baimbridge & Whyman, 2015). After its foundation, many investigated again whether the EMU was an OCA or not. Among economists, there seems to be consensus that the EMU is not an OCA (Artis & Zhang, 2001). However, what this means for the future of the EMU is not completely agreed upon: some are in favor of an EMU separation, while others think that changing the EMU’s structure should be enough to let it become an OCA. Furthermore, regarding a possible EMU separation, different opinions exist. Some think that it should be divided into multiple regions, while others think that it should completely cease to exist and all countries that participate in it should get back their own currency. However, it is questionable

whether complete separation is the best option. Perhaps, regions within the EMU fulfill the OCA criteria very well, as opposed to the EMU as a whole. If this really is the case, it seems rather desirable to not abolish the EMU completely, but to split it into multiple regions. In this work, focus is put on The Netherlands and which EMU countries it fulfills the OCA theory criteria best with. Therefore, this work answers the following research question:

“Based on the optimal currency area theory criteria, which EMU countries could The Netherlands best form a currency area with?”

This question is analyzed by using existing data to calculate which EMU countries the Netherlands has fulfilled the OCA theory criteria best with during the period 1980-2016. These countries are then summed up and are called, together with The Netherlands, ‘NLD-OCA’.

1.2. The work’s relevance

Even though many economists agree that the EMU is not an OCA (Artis & Zhang, 2001), it is questionable what this means for the future of the EMU. In this work, the OCA theory is used to find out whether it would be beneficial for The Netherlands to form a new currency area with only a part of the EMU countries instead of all of them. This could then help providing an answer to the ‘bigger’ question, namely whether or not it would be beneficial to completely abolish the EMU, split it into two or multiple regions, or to keep it the way it is. This is something which many people, especially politicians, often talk about. One can for example think about the French president Macron, who has emphasized that the EMU is currently failing and therefore should be reformed (Reuters, 2017). So, answering this work’s research question could add to the current debate on the viability of the EMU. Furthermore, it adds to the existing literature, as it is – to the best of my knowledge – the first to specifically focus on the countries that The Netherlands fulfills the OCA criteria best with.

1.3. The remainder

The remainder of this text consists of multiple chapters. The first chapter explains this work’s *theoretical framework*. It provides an historical overview of the OCA theory, and explains the most important criteria that OCAs should fulfill. It also touches upon the EMU’s current situation and it explains its functioning. This is followed by the *data & methodology* section. This starts with explaining the data selection process. Following, it explains what methods this work uses to analyze the extent to which the OCA criteria are fulfilled by the EMU countries, with reference to The Netherlands. Lastly, this section explains the

descriptive statistics. Next, the results of the data analysis process are presented in the *results* section. Firstly, each OCA criterion is analyzed separately. In such analysis, a list of possible currency area partners for The Netherlands is set up. EMU countries are listed when they fulfill that OCA criterion above average and/or belong to the criterion's top 5 highest values. Next, the NLD-OCA is formed by summing up these lists for the different criteria and picking the countries that are on all criteria's lists. The analysis is based on data for the period 1980-2016. This includes a time before and a time after the exchange rates of the EMU countries had been fixed, as this happened in 1999 (Baimbridge & Whyman, 2015). Following, in the *conclusion & discussion* section, the results are used to answer the research question. Moreover, in this section, the work's shortcomings and recommendations for further research are discussed.

2. THEORETICAL FRAMEWORK

2.1. An historical overview of the development of the OCA criteria

As mentioned above, this work uses the OCA theory for its analysis. This theory states that a certain area should only implement a single currency if it maximizes the area's economic efficiency (Broz, 2005). Mundell (1961) was the first to mention OCAs and to state that an OCA's borders do not necessarily need to coincide with state borders. Nonetheless, as long as a state's production factors are very mobile, especially labor, it is not necessary to implement different currencies within that state. Therefore, he emphasized that especially a high degree of labor mobility was crucial within a currency area. His reasoning behind this was that a high degree of labor mobility would reassure a balance of payments equilibrium, as labor would move towards the region that increased its demand and would move away from the region that lowered its demand. This would then reassure fast internal adjustment to economic changes (e.g. a shift in demand for products in region A to products in region B), and, hence, unemployment or inflation pressure would not occur. Consequently, there would be no need for those regions to have their own currency anymore, but a common monetary policy would be beneficial to them. Therefore, he argued, a high degree of labor mobility would be in favor of forming a single currency area. Hereafter, other economists also argued that a high degree of labor mobility was important in order for an area to become an OCA. The first big contributor was McKinnon (1963), who distinguished two types of factor mobility: factor mobility among regions (which is the one Mundell talked about) and factor mobility among industries. He concluded that both types of factor mobility should be analyzed as to determine a currency area's optimality. Kenen (1969) also elaborated on labor mobility. He argued that perfect interregional labor mobility needs perfect occupational mobility. This means that workers should be able to move from one job to the other without any trouble. This can only occur, however, when labor within the area is

relatively homogenous. He emphasized that this will very unlikely be the case within a currency area. He therefore stressed that reaching perfect labor mobility within a currency area is implausible.

McKinnon (1963) also made another important point: he noted that for small open economies (SOE) it could be desirable to have their exchange rate fixed to that of a big trading partner. The intuition behind this is that for such SOE, in which 'open' means that trade with foreign countries comprises a relatively big part of total GDP, changes in exchange rates influence that country's real GDP a lot due to changes in real prices. If for example the currency depreciates, this means that products become relatively cheap for foreign countries, which increases the demand for the home country's products. This in turn drives up the prices within the home country. This could mean a permanently increasing price level. In that case, the costs of giving up monetary policy autonomy are relatively low compared to the benefits of having a stable exchange rate (and thus a relatively stable price level) towards that important trading partner. As there is only one currency within a currency area, this can be viewed as having a fixed exchange rate within the currency area. Therefore, a high degree of openness advocates the formation of a currency area.

Moreover, Kenen (1969) introduced product diversification as an important OCA criterion. He argued that countries with a higher degree of product diversification can more easily adjust to demand shocks without a change in exchange rate being necessary to neutralize these shocks. He explained that the more diversified an economy is, the less severely the terms of trade will change due to price changes of certain tradable goods, as the great number of other products compensates for these changes. Hence, well-diversified economies are more suited for abolishment of their national exchange rate and forming a single currency area. What is more, he mentioned that high fiscal integration between regions within a currency area is important, as it can then use fiscal transfers to diminish the magnitude of diverse shocks that hit the currency area.

Another very important contributor was Ishiyama (1975). He mentioned that the 'traditional approach' was that a single economic characteristic should be able to answer what the appropriate domain of a currency area is. However, according to Ishiyama, each of these proposed criteria reflect only a part of the total costs and benefits of implementing a single currency. Therefore, he suggested that all criteria should be analyzed. In this way, a total cost-benefit analysis could be executed. This view is also used in this work, as this work analyzes multiple criteria to find out what countries should form the NLD-OCA.

The above-mentioned authors are said to be the ones that formed the original view on OCAs (Broz, 2005). It took multiple years after their contributions before the OCA theory was widely discussed again (Tavlas, 1993). This 'rebirth' probably mainly occurred as plans were formed to establish the EMU (Broz, 2005). Another important change was the developments in macro theory, like Tavlas (1993) recognized.

According to De Grauwe (1992) these macro theory developments opened up new possibilities for evolution of the original OCA theory into a “new” OCA theory.

A first important point that many authors discussed was the effectiveness of an independent monetary policy. Corden (1972) had explained that direct control over monetary policy and the exchange rate would go lost when a country would join a currency area. Artis & Zhang (2001) agreed with Corden (1972) and argued that it was therefore important to search for economic parameters that could measure how much possible currency area members’ monetary policies are alike. After all, if countries’ monetary policies were much alike, the costs of losing their independent monetary policy as an instrument to dampen economic shocks would be relatively low compared to countries with very diverse monetary policies. According to them, the degree of synchronization in the nominal interest rate level (NIRL) could be a useful parameter to investigate countries’ equality in monetary policy. After all, a part of monetary policy is setting the nominal interest rate such that the desired inflation rate will hopefully be reached. Hence, correlation of the NIRLs between two countries can be interpreted as an indicator of coordination in monetary policy between those two countries. If this coordination is relatively high, monetary policies are likely relatively equal, and, thus, the costs of losing an independent monetary policy are rather low.

Alesina et al. (2002) added to this argument that the costs of giving up monetary policy independence are lower when shocks hit countries within a currency area more equally. After all, the same type of monetary policy can then be used to dampen these shocks. Hence, different types of monetary policy to keep economic stability would not be necessary anymore. As shocks are thought to hit countries relatively more equally when their economic structure is more similar, the degree of similarity in economic structure between the countries of a possible currency area should be investigated to determine the desirability of forming an OCA.

As explained before, McKinnon (1963) was the first to mention that it could be beneficial to form a currency area for countries which are relatively open to trade. He focused on small countries, as these would more likely be very dependent on one or more big trading partners. Baldwin & Wyplosz (2006) generalized McKinnon’s trade openness point. They explained that prices for countries which are very open to trade are very volatile, as they are highly dependent on changes in the exchange rate. Hence, having a stable exchange rate, and, consequently, experiencing more price stability, seems desirable for such countries. Furthermore, a high degree of trade between the members of a currency union, called intraregional trade, is thought to decrease the exposure of member countries to asymmetric shocks. This is because it increases integration of product markets within the currency union, which in turn influences economic integration via closer trade links.

Also, a very important contribution to the “new” OCA theory is the endogeneity hypothesis. This argues that even if a country did not satisfy the OCA theory criteria when it entered a single currency area, it can still satisfy the OCA criteria after it has already entered the currency area (Frankel, 1999). More specifically, this means that found values for the OCA theory criteria are not completely fixed but can change over time due to further trade integration and income correlation. Mongelli (2002) added to this that endogeneity has to do with much progress under multiple OCA properties, so not only trade integration and income correlation. He therefore argued that endogeneity should be interpreted in a broader sense. As a consequence, in his next work with De Grauwe, De Grauwe & Mongelli (2004) emphasized the importance of the endogeneity of economic integration, the endogeneity of financial integration, the endogeneity of symmetry of shocks and the endogeneity of product and labor flexibility. Also, Blanchard & Wolfers (2000) showed the importance of the endogeneity of labor market institutions. Moreover, Issing (2001) put emphasis on the endogeneity of political integration. It therefore seems that a certain currency area can develop itself towards a genuine OCA after having formed a currency area. This emphasizes the importance of analyzing the degree of fulfillment of the OCA criteria for a certain currency area over multiple years and using the latest data possible. This work uses that strategy.

2.2. The EMU and its functioning

Now that the development of the OCA theory is discussed, a closer look should be taken at the EMU and its current functioning. First of all, the EMU officially consists of 19 countries, that are all also part of the EU (Minenna et al., 2016). Those countries are: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Portugal, Slovakia, Slovenia and Spain. They all have the same currency, the euro. Furthermore, only Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, The Netherlands, Portugal and Spain already joined the EMU in 1999. The other eight joined between 2001 and 2015.

The foundation of the EMU was seen as the last step in abolishing trade barriers between the EU countries, as exchange rates could no longer form a barrier to trade (Baimbridge & Whyman, 2015). This would then in turn stimulate sustainable economic growth and high employment via a single economic and monetary policy. Monetary policy for the euro area is managed by the European Central Bank (ECB), in cooperation with the national central banks of the EMU countries. Together this is called the Eurosystem. However, important to note is that the EMU is not a fiscal union (Laruffa, 2014). This means that member countries are still responsible for their own collection and expenditure of taxes, and (almost) no fiscal transfers occur between the member states. As noticed by O’Rourke & Taylor (2013), when looking at the

share of the local income shock that is offset by federal transfers this is only 0.5%, while this is about 30% in the United States. Hence, the EMU scores very low for the fiscal integration criterion. Kenen (1969) explained, however, that high fiscal integration could be very helpful in order to become an OCA. Furthermore, O'Rourke & Taylor (2013) argued that there seems to be no appetite within the EMU to change this and become a fiscal union. All of this taken into account, analyzing the fiscal integration criterion does not seem very insightful for determining which EMU countries The Netherlands can best form a currency union with. After all, this value seems negligibly low and will therefore most likely not show significant differences for the different EMU countries.

What is more, ever since its creation, many have questioned whether the EMU should keep existing in its current form. After all, only a few years after its foundation, the EMU was hit by a tough economic crisis, which had severe negative effects for the EMU countries (Sanchis i Marco, 2014). Some therefore wondered whether the EMU should break up entirely. Others suggested that a partial breakup, in the form of a separation into two or more EMU regions with each their own currency, would be most beneficial for the EMU countries. Whether this is really true is questionable. However, it seems at least desirable to look into this possibility. Hence, this work aims to find the most beneficial currency area within The EMU from the point of view of The Netherlands: the NLD-OCA.

2.3. The most important criteria for determining the NLD-OCA

As follows from subchapter 2.1., the OCA theory has a long history during which different authors mentioned different criteria that should be investigated before forming a currency area. However, it is very important to note that other factors besides the ones that were mentioned in subchapter 2.1 could influence the desirability of establishing a currency area as well (e.g. labor market centralization (De Graauwe, 2003), the different countries' initial economic positions (Mélitz, 1991)). Nonetheless, due to this work's limited scope, it merely analyzes the most prominent criteria from the literature on OCAs. For a more complete overview of all mentioned OCA criteria in the literature, Broz (2005) can be read. Furthermore, as explained in subchapter 2.2., in this work 'fiscal integration' is not used as a criterion to determine what countries should form the NLD-OCA, as fiscal integration seems to be negligibly low across the EMU and therefore cannot provide much insightful information (O'Rourke & Taylor, 2013). Another criterion that is not measured in this work is 'product diversification'. Although high product diversification tends to help dampen asymmetric economic shocks, product diversification seems rather high in the whole EMU, using the Herfindahl-Hirschman index (HH index) to measure this (UN, 2017). Furthermore, the HH index is very similar for all EMU countries. It therefore does not seem very insightful to compare the indexes

among the different EMU countries as to determine what countries could best form the NLD-OCA. Yet, the other criteria that were explained in subchapter 2.1. are measured in this work.

The most prominent criteria, mentioned in subchapter 2.1., can roughly be divided into two groups: the first group has to do with reducing the exposure of member countries to asymmetric shocks and the second group covers the criteria regarding adjustment to asymmetric shocks (Jager & Hafner, 2013). Asymmetric shocks occur when one part of the economy is hit more by an economic event than another part. The first three criteria that this work analyzes belong to the first group of OCA criteria, as they all focus on dampening the exposure of member countries to asymmetrical economic shocks. The first criterion is *similarity in economic structure*, mentioned by Alesina et al (2002). The second criterion is *monetary policy coordination*, which was mentioned by Artis & Zhang (2001). The third criterion is *openness to trade*, which was at first explained by McKinnon (1963) and later more generally by Baldwin & Wyplosz (2006). The last criterion that this work analyzes focuses on coping with asymmetric shocks as well as possible, and thus belongs to the second group of OCA criteria. This criterion is *labor mobility*. Mundell (1961) explained that labor mobility between countries should be high within the currency area. According to Kenen (1969), high labor mobility between sectors was also very important. However, in this work, only labor mobility between countries is investigated. After all, this work aims to find out which different EMU countries The Netherlands should form a currency area with, and therefore mainly wants to measure how easily workers can move between an EMU country on the one hand and The Netherlands on the other hand.

3. DATA & METHODOLOGY

3.1. Data selection process

Now that the OCA theory is explained, in order to answer to the main research question, empirical analysis needs to be done. For this, secondary data needs to be collected and examined. This work uses four different data sources. The first data source is the Jordà-Schularick-Taylor Macroeconomic history database (2017). This database provides extensive long-run data on all kinds of macro-economic variables (e.g. Gross Domestic Product (GDP), Consumer Price Index (CPI) inflation). The second data source is the World Integrated Trade Solutions (WITS). The first dataset from this source that this work uses contains the value (in US Dollars) of total exports and total imports of all countries in the world. The second dataset comprises the value of goods and services that The Netherlands has exported to other countries and total value of goods and services that The Netherlands imported from other countries. Hence, this second dataset zooms in at values for imports and exports between The Netherlands and one other country, while the first dataset provides information on countries' total values of exports and imports to all other countries. The third data

source that is used in this work is the public statistical database from the Organisation for Economic Co-operation and Development (OECD). From this database two datasets are taken. The first offers information about the total amount of people moving to country X in a certain year, while they were born in another country than X. The second dataset provides all countries' total populations. The fourth data source that is used is a Dutch national statistics database, which is called 'Centraal Bureau voor de Statistiek' (CBS). Two datasets are extracted from the CBS for this work. The first dataset contains data on the inflows of people that move to The Netherlands in a certain year but were born in country X (excluding The Netherlands). Hence, from the point of view of The Netherlands, this dataset contains information about the inflow of immigrants in The Netherlands in a certain year. The second dataset shows data on the outflows of people that were born in The Netherlands but decide to move to a certain country X in one year. Therefore, from the point of view of The Netherlands, this dataset contains information about the number of Dutch emigrants that move to a specific country in one year. Moreover, each dataset does not only provide statistics about EMU countries, but also about other countries. Therefore, it is necessary to filter the data for only EMU countries. Hence, the statistics for all the other countries are omitted from the datasets that this work uses. Furthermore, not for every EMU country data is available for all variables. The countries for which no data is available are omitted from the analysis of the criterion that the variable tries to measure.

For the different criteria, multiple variables need to be analyzed. Annual GDP growth, CPI inflation rate, total GDP and the NIRLs for all EMU countries are extracted from the Jordà-Schularick-Taylor Macroeconomy database (2017). Statistics on the total value of exports and imports of goods and services for all EMU countries and total value of trade between The Netherlands and each EMU country originate from the WITS database. The total amount of foreign-born people moving to an EMU country in a certain year, and EMU countries' total population numbers are taken from the OECD. Lastly, statistics about the number of people that move to The Netherlands in a certain year but were born in another EMU country, and the number of people that were born in The Netherlands but move to another EMU country in a certain year are taken from the CBS.

Moreover, for all datasets a specific time range needs to be chosen. In 1999 the exchange rates of the various EMU countries got fixed (Baimbridge & Whyman, 2015). As this is only 20 years ago, it is desirable to also use data from before the exchange rates were fixed. After all, the data analysis' outcome is then probably more reliable, as outliers less likely influence the outcome than for a smaller period of time. Therefore, this work analyzes data from 1980 until 2016 - which is the last year available in the Jordà-Schularick-Taylor Macroeconomy database (2017). However, not for all variables data is already available from 1980. In these cases, this work analyzes data for the earliest year available until 2016.

3.2. Measuring the OCA criteria

As explained in the theoretical framework, this work analyzes four different OCA theory criteria as to determine which countries The Netherlands could best form a currency area with. The different methods that this work uses to analyze these four criteria are explained below. For all of these methods, The Netherlands is chosen as reference country, as it is the center country of the currency union.

3.2.1. Similarity in economic structure

The first characteristic that should be analyzed is similarity in economic structure (Alesina et al., 2002). As performed in Artis & Zhang (1997), this work measures cross-country correlation coefficients for GDP growth and CPI inflation rates to determine this similarity. After all, prices and GDP are important factors when it comes to describing an economy's structure. Thus, when these factors are highly correlated between two countries, they likely have relatively similar economic structures. In this work, both types of cross-country correlations are measured as Pearson correlation coefficients for all EMU countries, with reference to The Netherlands.

3.2.2. Monetary policy coordination

As explained in subchapter 2.1., one part of central banks' monetary policies is setting the nominal interest rate such that a certain inflation rate is targeted. Hence, if countries execute similar monetary policies, they most likely have relatively similar NIRLs as well. Therefore, this work analyzes Pearson cross-country correlations of NIRLs, with reference to The Netherlands, to determine the degree of similarity in monetary policy between the Netherlands and each EMU country.

3.2.3. Openness to trade

The third investigated criterion is openness to trade. This can be divided into international and intraregional trade. A common measure for international trade is the openness index. This adds total imports and exports in goods and services of the countries of interest, and then divides this sum by total GDP of the countries of interest. However, as this work beforehand only takes as given that The Netherlands partakes in the currency area, only trade values of The Netherlands and the EMU country of interest can be added. Therefore, the trade values of The Netherlands can influence the openness index greatly. This especially happens when international trade is measured for The Netherlands and a country with a relatively small GDP, as the index is then dominated by trade value of The Netherlands. Hence, in this work, as a measure for international trade, total imports and exports of an EMU country are measured as a share of that EMU

country's GDP. Next, intraregional trade is measured. This is again divided into two sub-measures. The first one measures total value of exports and imports between a certain EMU country and The Netherlands as a share of total trade between the EMU countries and The Netherlands. This indicates how important trading with a certain EMU country is for The Netherlands. The more important a trading partner, the more open to trade the Netherlands is towards that country and the more its GDP depends on trade with that country. As follows from McKinnon (1963), this is in favor of a currency union formation. Furthermore, intranational trade II measures total value of exports and imports between a certain EMU country and The Netherlands, as a share of that EMU country's GDP. The values for this measurement method will most likely be much lower than the values for international trade, as now only trade between a certain EMU country and The Netherlands is zoomed in at instead of trade with all other countries. Also, it differs from the intranational trade I value, as international trade II measures an EMU country's trade with The Netherlands as a share of that EMU country's GDP instead of an EMU country's trade with The Netherlands as a share of total EMU trade with The Netherlands. This can be depicted by the following formulas:

1. **International trade** = $\frac{\text{Total Imports}_{EMU,X} + \text{Total Exports}_{EMU,X}}{\text{GDP}_{EMU,X}} \times 100\%$
2. **Intranational trade I** = $\frac{\text{Total Imports}_{NLD \rightarrow EMU,X} + \text{Total Exports}_{NLD \rightarrow EMU,X}}{\text{Total imports}_{NLD \rightarrow EMU} + \text{Total exports}_{NLD \rightarrow EMU}} \times 100\%$
3. **Intranational trade II** = $\frac{\text{Total Imports}_{NLD \rightarrow EMU,X} + \text{Total Exports}_{NLD \rightarrow EMU,X}}{\text{GDP}_{EMU,X}} \times 100\%$

In all formulas from this subchapter, 'EMU,X' stands for a random EMU country, not being The Netherlands. 'NLD' stands for The Netherlands. In the second formula, only the value of goods and services that The Netherlands exported to and imported from another EMU country are counted, and not the value of goods and services that that EMU country exported to and imported from The Netherlands are counted, as this would mean that the exact same amount would be counted twice. After all, if The Netherlands exports something to another EMU country, this is adding to import value in that EMU country.

3.2.4. Labor mobility

The fourth OCA criterion that is measured is labor mobility. As explained in subchapter 2.4., this work only measures the degree of labor mobility between countries. According to Mundell (1961), labor mobility is the ease with which people can move to another country to work there. This paper uses three types of methods to get an indication of an EMU country's degree of labor mobility. The first method is the one that is used in O'Rourke & Taylor (2013). It measures the number of foreign-born people that move to a certain EMU country in one year as a share of that EMU country's current population. This indicates the relative

ease with which all foreigners can move to a certain EMU country. However, as this is a very country-unspecific measurement, it is important to also find more country-specific measurement methods. Hence, the second and third method zoom in at the degree of labor mobility between one EMU country and The Netherlands. More specifically, the second method measures the amount of people from a certain EMU country 'X' that move to The Netherlands in a certain year, as a share of country X's total population. Furthermore, the relative share that each EMU country contributes to the total number of EMU movers in a certain year is measured and put between brackets. This provides new insights, as it explains an EMU country's relative willingness to move from their country to The Netherlands. Moreover, the third method measures the amount of Dutch people that move to another EMU country 'X' in one year, as a share of the total Dutch population. The number of Dutch people moving to EMU country 'X' in one year, as a share of total Dutch movers within the EMU in one year, is measured and shown between brackets. This provides a more tangible measure of the Dutch citizens' willingness to move to a certain EMU country. The last two labor mobility measurement methods will likely provide smaller values than the first, as these specifically measure the number of foreigners from one country instead of all countries. All formulas are shown below:

1. **Labor mobility** $_{EMU,X:general} = \frac{\text{Total foreign-born people inflow}_{EMU,X}}{\text{Total population}_{EMU,X}} \times 100\%$
2. **Labor mobility** $_{EMU,X \rightarrow NLD} = \frac{\text{Foreign-born people inflow}_{EMU,X \rightarrow NLD}}{\text{Total population}_{EMU,X}} \times 100\%$
 $\left(\frac{\text{Foreign - born people inflow}_{EMU,X \rightarrow NLD}}{\text{Total foreign - born inflow}_{EMU \rightarrow NLD}} \times 100\% \right)$
3. **Labor mobility** $_{NLD \rightarrow EMU,X} = \frac{\text{Dutch outflow}_{NLD \rightarrow EMU,X}}{\text{Total population}_{NLD}} \times 100\%$
 $\left(\frac{\text{Dutch outflow}_{NLD \rightarrow EMU,X}}{\text{Total Dutch outflow}_{NLD \rightarrow EMU}} \times 100\% \right)$

3.2.5 Forming the NLD-OCA

In the end, it should be determined which countries The Netherlands should form a currency area with. In the results section, each criterion is measured as explained above. For every measurement method, the top five countries with the highest values and the countries with above average values are listed as possible currency area partners for The Netherlands. Thereafter, for every criterion the lists from the different measurement methods are compared. If and only if a trading partner is on the lists for all that criterion's measurement methods, it is recorded as a possible NLD-OCA candidate. Lastly, the possible NLD-OCA candidates from all criteria are compared. If and only if an EMU country is on the list of all OCA criteria, and thus fulfills all OCA criteria very well with reference to The Netherlands, it is added to the NLD-OCA.

Table 3.1. Descriptive statistics of the four OCA criteria.

	N (years)	Min	Max	Mean	St. dev
Similarity in economic structure	(1980-2016)				
a. GDP growth correlation (0-1)	37	0.488	0.876	0.685	0.132
b. CPI inflation correlation (0-1)	37	0.120	0.795	0.541	0.219
Monetary policy coordination	(1980-2016)				
a. NIRL correlation (0-1)	37	0.664	0.999	0.847	0.125
Openness to trade	(1988/1992-2016)				
a. International trade (%)	29	47.22	268.55	111.73	62.71
b. Intranational trade I (%)	25	0.06	42.29	5.56	10.77
c. Intranational trade II (%)	25	1.12	18.64	3.24	4.00
Labor mobility	(1984/1995-2016)				
a. Total foreign-born in EMU (%)	33	0.01	2.73	0.60	0.66
b. Residents from EMU to NLD (%)	22	0.00	0.35	0.07	0.08
c. Residents from NLD to EMU (%)	22	0.00	0.04	0.01	0.01

Sources: Jordà-Schularick-Taylor Macrohistory database (2017), OECD (2019a), OECD (2019b), CBS (2019), WITS (2019a), WITS (2019b), WITS (2019c), WITS (2019d).

3.3. Descriptive statistics

Before an in-depth analysis of the four OCA criteria can take place, it seems rather helpful to analyze some descriptive statistics. After all, this can help getting a broad idea about the values that can roughly be expected for each criterion. The descriptive statistics can be found in table 3.1.

First of all, as to measure similarity in economic structure, both cross-country GDP growth and CPI inflation correlation with reference to The Netherlands for the period 1980-2016 are investigated. Regarding GDP growth, it is clear that a positive relationship exists between GDP growth in an EMU country and GDP growth in The Netherlands. So, on average GDP growth seems to follow the same pattern in The Netherlands as in the other EMU countries over the years. Moreover, the highest GDP growth correlation coefficient between The Netherlands and another EMU country is 0.876. This shows a fairly strong relationship. However, the lowest GDP growth correlation coefficient with reference to The Netherlands is 0.488, which does not show a very strong relationship in GDP growth for The Netherlands and that particular EMU country. Hence, not for all EMU countries cross-country correlation for GDP growth with reference to The Netherlands is very strong. Regarding CPI inflation correlation with reference to The

Netherlands, we also observe a positive relationship. Thus, for CPI inflation The Netherlands and the other EMU countries on average also seem to follow the same pattern over the years. The highest correlation coefficient is 0.795, which represents a fairly strong relationship in CPI inflation patterns between The Netherlands on the one hand and the other EMU countries on the other hand. Nonetheless, not between every EMU country and The Netherlands a strong relationship in their CPI inflation patterns exist. This follows from the minimum value of 0.120.

The second OCA criterion is monetary policy coordination, which is measured by cross-country NIRL correlation for the period 1980-2016. Table 3.1 shows that, on average, the Netherlands and other EMU countries observed very similar patterns regarding their NIRLs for the period 1980-2016. This is especially supported by the highest NIRL correlation coefficient of 0.999. After all, this correlation coefficient is almost equal to 1, which would mean a perfect positive NIRL relationship between The Netherlands and that EMU country. This nearly perfect positive relationship is not very surprising though, as all EMU countries' NIRLs are determined by a common ECB policy (Baimbridge & Whyman, 2015). Hence, in the results section, a separate analysis is performed for each EMU country for the period 1980 – entering the EMU, as this is probably more insightful as to whether or not the different EMU countries would have synchronized NIRLs if they were not driven by the common ECB's policy.

The third criterion, openness to trade, is split into international and intraregional trade. Regarding international trade, added values for exports and imports of the EMU countries on average exceeded their GDP during in a year during the period 1988-2016. This means that EMU countries are generally very open to trade. For the country with the highest import plus export value, it even more than doubles its GDP. However, the table also shows that not all EMU countries have very high values for trade as a share of GDP, as the minimum value is less than half of a certain EMU country's GDP. Next up is intranational trade. As explained, this is split into two measurement methods: intranational trade I and intranational trade II. Firstly, regarding international trade I, on average, each EMU country's trade with The Netherlands contributed to 5.56% of total trade between the EMU countries and The Netherlands in one year during the period 1992-2016. This makes sense, as this is equal to 100% - which is equal to total EMU trade with The Netherlands – divided by 18 – the number of EMU countries minus The Netherlands. More interestingly however, is that table 3.1. clearly shows that a big spread exists between the percentages that each EMU country makes up from total EMU trade with The Netherlands. After all, the EMU country that contributes the least on average only contributes 0.06% to total EMU trade with The Netherlands, while the EMU country that contributes the most on average contributes 42.29% to total EMU trade with The Netherlands. Furthermore, according to intranational trade II, on average, each EMU country's trade with The

Netherlands made up for about 3.24% of that EMU country's GDP during the period 1992-2016. As forecasted in paragraph 3.2.3, this value is much lower than the average value for international trade, as now only trade between one EMU country and The Netherlands is zoomed in at. It also, as forecasted, differs from the intranational trade I value. According to table 3.1., for the country with the lowest intranational trade II value, trade with The Netherlands on average only made up for 1.12% of that country's GDP during the period 1992-2016. This differs much from the maximum value, which is 18.64%. Furthermore, this seems like a relatively high value, definitely when it is compared to the average of 3.24%.

Moreover, as explained before, labor mobility is measured using three different methods. The first method shows that the average inflow of foreign-born people in a certain year in an EMU country is equal to 0.60% of that country's current population. For the country with the lowest labor mobility value, it is only 0.01% and for the country with the highest labor mobility value, it is 2.73%; this shows a big spread between the different EMU countries. The second method shows that during the period 1995-2016, on average, 0.07% of an EMU country's population immigrated from their country to The Netherlands in a certain year. Furthermore, according to the third method, on average, 0.01% of the Dutch population immigrated from The Netherlands to a specific EMU country in a certain year during the period 1995-2016. Based on this, it seems that, for the period 1995-2016, EMU citizens who were not born in The Netherlands on average tended to move relatively more often to The Netherlands in a year than Dutch citizens moved to other EMU countries in a year. Also, in at least one EMU country, citizens of that country on average did (almost) not move at all to The Netherlands in a certain year during 1995-2016, as the minimum value for the second labor mobility measurement method is 0.00%. This also holds for Dutch people moving to a certain EMU country, as the minimum value for the third labor mobility measurement method is also equal to 0.00%. Furthermore, as the maximum percentage of people from an EMU country moving to The Netherlands in one year is 0.345%, and the maximum percentage of Dutch people moving to a specific EMU country in one year is 0.04%, it seems that labor mobility is not very high within the whole EMU. This is in line with earlier research on the OCA criteria (e.g. (O'Rourke & Taylor, 2013)).

Lastly, for all criteria the standard deviation coefficients seem rather high. This means that a lot of spread in EMU countries' values for the different criteria exists. This shows that the EMU countries on average differ a lot, which indicates that the EMU as a whole most likely does not fulfill the OCA criteria very well. This emphasizes the importance of analyzing which EMU countries The Netherlands could most beneficially form a currency area with, according to the OCA theory criteria.

4. RESULTS

4.1. The four OCA criteria

4.1.1. Similarity in economic structure

In table 4.1., for each EMU country – except for Cyprus and Malta – the values of the CPI inflation and GDP growth correlation coefficients with reference to The Netherlands for the period 1980-2016 can be found.

Table 4.1. CPI inflation correlation and GDP growth correlation for each EMU country, with reference to The Netherlands.

Country	CPI inflation correlation (1980-2016)	GDP growth correlation (1980-2016)
Austria	<i>0.780**</i>	<i>0.876**</i>
Belgium	<i>0.702**</i>	<i>0.786**</i>
Cyprus	-	-
Estonia	0.558*	0.542**
Finland	0.582**	0.728**
France	0.677**	0.827**
Germany	<i>0.795**</i>	0.714**
Greece	0.366*	0.556**
Ireland	<i>0.746**</i>	0.488**
Italy	0.655**	0.822**
Latvia	0.225	0.543*
Lithuania	0.190	0.519*
Luxembourg	<i>0.765**</i>	0.729**
Malta	-	-
Portugal	0.446**	0.768**
Slovakia	0.460*	0.524*
Slovenia	0.120	0.760**
Spain	0.595**	0.779**

Source: Jordà-Schularick-Taylor Macrohistory database (2017).

* $p < 0.05$; ** $p < 0.01$; correlation coefficients represent Pearson correlation coefficients between 0 and 1; average CPI inflation correlation = 0.541, average GDP growth correlation = 0.685: above average correlation values are in italic; top five countries with the highest CPI inflation correlation and top five countries with the highest GDP growth correlation are in bold.

As follows from the table, the five countries with the highest CPI inflation correlation coefficients are Germany, then Austria, followed by Luxembourg, next is Ireland and, lastly, Belgium. For all of these countries, the correlation coefficients are between 0.7 and 0.8. These values reflect a relatively strong relationship. Thus, it seems that The Netherlands on the one hand and each of those five EMU countries on the other hand on average have experienced quite similar patterns in CPI inflation in 1980-2016.

Secondly, regarding GDP growth correlation, the five countries with the highest GDP growth correlation values are Austria, then France, followed by Italy, fourth is Belgium, and fifth is Spain. The values of these correlation coefficients are approximately between 0.78 and 0.88. This relationship seems to be even stronger than for CPI inflation. Hence, The Netherlands and those EMU countries seem to have experienced fairly similar GDP growth patterns on average for the period 1980-2016.

As follows from table 4.1., Austria and Belgium are in the top five countries for both CPI inflation correlation and GDP correlation. Furthermore, Finland, France, Germany, Italy, Luxembourg and Spain all have above average correlation values for CPI inflation and GDP growth. Hence, according to the similarity in economic structure criterion, all of these countries are possible candidates for the NLD-OCA.

4.1.2. Monetary policy coordination

In table 4.2., for every country – except for Cyprus, Estonia and Malta – the values of the NIRL correlation coefficients for the period 1980-2016 can be found. Interestingly, for this criterion, it seems that a division into two groups within the EMU exists: one with very high NIRL correlation coefficient values, and one with very low correlation coefficient values.

The countries with the highest NIRL correlation coefficients are firstly Austria, followed by Germany, then Finland, next is Portugal and, lastly, Belgium and Luxembourg. For Belgium and Luxembourg, the same values are used for the calculation of the NIRL correlation. The reason behind this is that these countries formed the Belgian-Luxembourg Union (BLEU) and therefore only showed international trade statistics as a combined entity until 1999 (Kreins, 2003). Furthermore, as follows from the table, the NIRL correlation values for the top five countries show a very strong relationship in NIRL values with respect to The Netherlands, as the correlation coefficients are very close to 1. Apart from the top five countries, France and Spain also score above average correlation coefficient values with reference to The Netherlands. Apart from Spain, all of the above-mentioned countries have NIRL correlation coefficients above 0.9. These coefficients are very high.

Table 4.2. NIRL correlation coefficients for each EMU country, with reference to The Netherlands.

Country	NIRL correlation (1982-2016)	NIRL correlation (1982 - entering EMU)
Austria	<i>0.999**</i>	<i>0.999**</i>
Belgium	<i>0.932**</i>	<i>0.787**</i>
Cyprus	-	-
Estonia	0.709**	0.392
Finland	<i>0.953**</i>	<i>0.909**</i>
France	<i>0.921**</i>	<i>0.752**</i>
Germany	<i>0.991**</i>	<i>0.969**</i>
Greece	0.664**	0.033
Ireland	<i>0.917**</i>	<i>0.748**</i>
Italy	<i>0.863**</i>	0.571*
Latvia	0.667**	0.520*
Lithuania	0.665**	0.591*
Luxembourg	<i>0.932**</i>	<i>0.787**</i>
Malta	-	-
Portugal	<i>0.943**</i>	<i>0.905**</i>
Slovakia	0.699*	0.013
Slovenia	0.806	0.091
Spain	<i>0.876**</i>	<i>0.633**</i>

Source: Jordà-Schularick-Taylor Macrohistory database (2017).

* $p < 0.05$; ** $p < 0.01$; correlation coefficients are Pearson correlation coefficients between 0 and 1; the average NIRL correlation for the period 1982-2016 = 0.847; the average NIRL correlation for the period 1982-entering the EMU (only significant values at 5%-significance level used for calculation) = 0.741; for Luxembourg the same values are used as for Belgium; above average correlation values are in italic; top five countries with the highest correlation values are in bold.

As explained before, the short-term NIRLs for EMU countries are driven by the ECB's common policy (Baimbridge & Whyman, 2015). Therefore, a separate analysis is performed for the period between 1982 and entering the EMU. As the table shows, for the 5 countries that were in the top 5 for the period 1982-2016, the correlation coefficients dropped somewhat in value - except for Austria. Nonetheless, Austria, Finland, Germany and Portugal still have NIRL correlation coefficients of above 0.9. Hence, it can be concluded that also during the period before entering the EMU, The Netherlands and those EMU

countries observed very similar NIRL values. Moreover, Belgium and Luxembourg still show fairly high correlation coefficients, as the coefficients are close to 0.8. What is more, Ireland and France also still have above average correlation coefficients, which show a decent NIRL relationship with The Netherlands for the period before entering the EMU. On the other hand, Slovenia, Slovakia and Greece show extremely low NIRL coefficients, as these are very close to 0. So, before the EMU was founded, these countries on the one hand and The Netherlands on the other hand did not seem to have the same NIRLs at all. One can therefore wonder whether it was beneficial for The Netherlands to add these countries to the EMU. Of course, more OCA criteria exist than just monetary policy coordination, but based on this criterion, it seems rather disadvantageous for The Netherlands to be a part of a currency union with these countries. All in all, based on the monetary policy coordination criterion, it seems that Austria, Belgium, Finland, France, Germany, Ireland, Luxembourg and Portugal are good potential NLD-OCA participants.

4.1.3. Openness to trade

As mentioned earlier, openness to trade is divided into two sub-categories, namely: international trade and intranational trade. Next, intranational trade is once again divided into two sub-categories: intranational trade I and intranational trade II. The outcome of the analysis for this OCA criterion is shown in table 4.3.

Something that was already noted when we took a look at the descriptive statistics, is that there is a big spread in EMU countries' international trade values. Whereas Luxembourg trades more than 2.5 times its GDP value, Italy does not even trade 0.5 times its GDP value. The five countries with the highest values – in order from highest to lowest – are: Luxembourg, Malta, Ireland, Estonia and Slovakia. Other countries with above average values are Belgium, Slovenia, Cyprus and Lithuania. All of these values more than exceed the countries' GDP values. Even though this measurement represents openness to trade to some extent, it needs to be interpreted cautiously. After all, if a country has a relatively high GDP it is way harder for the country to export and import more than its GDP value than for countries with relatively low GDP values. Hence, an EMU country's international trade value is determined a lot by the value of its GDP.

Furthermore, from table 4.3., it follows that Germany, Belgium, France, Italy and Spain make up for the greatest part of all trade between the EMU countries and The Netherlands. What immediately stands out is that Germany makes up for more than 40% of all trade between The Netherlands and the other EMU countries. Belgium and France also comprise a big part of total trade between The Netherlands and the other EMU countries, as they make up for 20.75% and respectively 14.45% of total trade. All the other countries add less than 10% to total trade between The Netherlands and the other EMU countries.

Table 4.3. International trade and intranational trade measurements for each EMU country.

Country	International trade* (1988-2016) (%)	Intranational trade I** (1992-2016) (%)	Intranational trade II*** (1992-2016) (%)
Austria	85.62	1.95	2.09
Belgium	136.83	20.75	18.64
Cyprus	117.21	0.09	1.57
Estonia	143.01	0.17	2.63
Finland	68.13	1.87	3.59
France	51.30	14.45	2.34
Germany	63.18	42.29	4.84
Greece	49.45	0.93	1.12
Ireland	155.86	2.10	4.39
Italy	47.22	7.78	1.36
Latvia	98.77	0.18	2.09
Lithuania	117.07	0.25	1.80
Luxembourg	268.55	0.37	3.77
Malta	235.74	0.06	2.20
Portugal	66.04	1.19	1.61
Slovakia	137.14	0.41	1.40
Slovenia	118.99	0.22	1.54
Spain	51.08	4.97	1.38

Sources: Jordà-Schularick-Taylor Macrohistory database (2017), WITS (2019a), WITS (2019b), WITS (2019c), WITS (2019d).

*International trade is measured as an EMU country's total trade (=imports + exports) value as a percentage of its GDP, averaged over the period 1988-2016; average value for international trade = 111.73%; **intranational trade I is measured as a certain EMU country's trade value of exports and imports to and from The Netherlands as a percentage of total trade value between the Netherlands and other EMU countries, averaged over the period 1992-2016; average value for intranational trade I = 5.56%;***intranational trade II is measured as an EMU country's trade value of exports and imports to and from The Netherlands as a percentage of its GDP, averaged over the period 1992-2016; average value for intranational trade II = 3.24%; above average correlation values are in italic; top five countries with the highest correlation values are in bold.

What is more, all EMU countries' value of trade with The Netherlands as a share of their GDP is below 5%, except for Belgium. For Belgium, trade with The Netherlands comprises almost 20% of its GDP. The next four countries with the biggest intranational trade values are Germany, followed by Ireland, then Luxembourg and, lastly, Finland. For all of these countries, the values are between 3.5% and 5% of GDP. This does not sound very high. However, bearing in mind that The Netherlands is only one of many (possible) trading partners, one cannot expect these values to be very high for all EMU countries.

Taking all of this into account, it is hard to immediately state which countries are very open to trade with reference to The Netherlands and which are not. The only country that obviously fulfills the openness criterion is Belgium, as it has above average values for all three types of trade measurements. Furthermore, Germany seems to be a very important trading partner of The Netherlands and is in the top five countries for intranational trade II. However, Germany scores relatively low on the international trade criterion. A look at the data shows, however, that Germany has the highest GDP value out of all EMU countries, which can therefore explain why it is relatively harder for Germany to get a high value for the international trade measurement. Hence, even though Germany doesn't score very high for the international trade measurement, it seems that it still fulfills the openness to trade criterion with reference to The Netherlands. Moreover, Ireland scores above average for the international trade subcategory and the intranational trade II subcategory. Also, Ireland is on average The Netherlands' sixth greatest trading partner within the EMU over the period 1992-2016. Taking all of this into account, Ireland does seem to score quite well on the openness to trade criterion. The next country that also seems to do well regarding the openness criterion is Luxembourg. After all, it has the highest value for international trade, averaged over the period 1988-2016. Also, its value of EMU trade with The Netherlands belongs to the top 5. Nonetheless, Luxembourg does not seem to be a very important trading partner of The Netherlands, as it only makes up for 0.37% of total trade between EMU countries and The Netherlands. This needs to be put in perspective, however, as Luxembourg is a relatively very small country within the EMU. It can therefore not be expected that this country makes up for a very big part of total trade between the EMU and The Netherlands. The last country that is thought to fulfill the openness criterion quite well is France. After all, it is the third biggest trading partner of The Netherlands within the EMU, with its share of almost 15% of total EMU trade with The Netherlands. Furthermore, it has the seventh highest value for international trade II. However, its value of total trade as a share of GDP is relatively low. Important to note here, though, is that France's GDP is the second highest out of all EMU countries, which explains why it is relatively hard to get a high score for this measurement. Therefore, it can still be argued that France fulfills the openness to trade criterion with reference to The Netherlands quite well. All in all, after taking the values of the three different

measurement methods and all external factors into account, we can say that Belgium, France, Germany, Ireland and Luxembourg seem to score best. So, based on the openness to trade criterion, Belgium, France, Germany, Ireland and Luxembourg are good possible NLD-OCA participants.

4.1.4. Labor mobility

As explained before, labor mobility, is divided into three groups: general labor mobility, labor mobility regarding people that move from an EMU country to The Netherlands and labor mobility regarding people that move from The Netherlands to an EMU country. Table 4.4. shows the outcome of this analysis.

First of all, the values for the general labor mobility method give an indication of the ease with which foreign-born people can enter that EMU country. The countries that scores the highest on general labor mobility are Luxembourg, followed by Austria, then Germany, next is Slovenia and fifth is Belgium. Moreover, Luxembourg scores very high relative to the other EMU countries. It is important to note here, however, that Luxembourg is a relatively small EMU country, so when foreigners decide to move to the country, they rather quickly make up for a relatively big part of Luxembourg's total population. For the other four countries, the values are more or less between 0.6% and 1.2% of the country's total population.

The second measurement method measures labor mobility with respect to movers from EMU countries to The Netherlands. The five countries with the highest values for this are Belgium, followed by Germany, then Portugal and Luxembourg, and, lastly, Ireland. Especially Belgium's value seems to be very high compared to the others. After all, it shows that every year, averagely 0.35% of Belgium's population moved to The Netherlands during 1996-2016, while for the other four countries from the top 5, the average values were only between 0.10% and 0.13% of their populations. What is more, as follows from the values between brackets, on average almost half of the EMU immigrants came from Germany each year between 1996-2016. Next up is Belgium with almost 17%. Spain, Italy and France each make up for more than 8% of all EMU immigrants that move to The Netherlands in one year. Together, these five countries averagely make up for more than 90% of the total EMU population that moved to The Netherlands every year between 1996-2016. This emphasizes that these five countries, and then particularly Germany, made up for almost all EMU citizens that moved to The Netherlands between 1996-2016.

Table 4.4. General labor mobility and EMU – NLD specific labor mobility for each EMU country.

Country	Labor mobility general* (1984-2016) (%)	Labor mobility EMU to NLD** (1996-2016) (%)	Labor mobility NLD to EMU*** (1996-2016) (%)
Austria	1.21	0.07 (2.65)	0.00 (1.94)
Belgium	0.684	0.35 (16.98)	0.04 (36.10)
Cyprus	-	0.04 (0.15)	0.00 (0.185)
Estonia	0.18	0.03 (0.19)	0.00 (0.06)
Finland	0.23	0.05 (1.11)	0.00 (0.51)
France	0.22	0.03 (8.06)	0.01 (10.80)
Germany	0.97	0.13 (49.11)	0.03 (29.44)
Greece	0.34	0.08 (3.85)	0.00 (1.24)
Ireland	0.01	0.10 (2.01)	0.00 (1.85)
Italy	0.36	0.03 (8.48)	0.00 (2.83)
Latvia	0.15	0.06 (0.49)	0.00 (0.07)
Lithuania	-	0.06 (0.73)	0.00 (0.07)
Luxembourg	2.73	0.12 (0.26)	0.00 (0.80)
Malta	-	0.06 (0.11)	0.00 (0.29)
Portugal	0.33	0.12 (5.63)	0.00 (2.15)
Slovakia	0.13	0.00 (0.08)	0.00 (0.17)
Slovenia	0.92	0.00 (0.03)	0.00 (0.07)
Spain	0.60	0.00 (8.58)	0.01 (11.43)

Sources: OECD (2019a), OECD (2019b), CBS (2019).

*General labor mobility is measured by the number of foreign-born people that move to a certain EMU country in one year as a percentage of that EMU country's population, averaged over 1984-2016; average value of general labor mobility for all EMU countries = 0.60%; **labor mobility EMU to NLD is measured as the percentage of an EMU country's population that moves to The Netherlands in one year, averaged over 1996-2016; average value of labor mobility EMU to NLD = 0.07%; between brackets for labor mobility EMU to NLD is the share that a certain EMU country's immigrants make up from the total amount of EMU immigrants in The Netherlands in one year, averaged over the period 1996-2016;***labor mobility NLD to EMU is measured as the share of people out of the total Dutch population that move to an EMU country in one year, averaged over 1996-2016; between brackets for labor mobility NLD to EMU is the percentage of Dutch people out of the total amount of Dutch immigrants that move to a certain EMU country in one year, averaged over the period 1996-2016; average value for labor mobility NLD to EMU = 0.01%.

The third measurement method is comparable to the second one, the only difference being that this involves labor mobility regarding Dutch people moving from The Netherlands to other EMU countries. The top five countries for this measurement method are Belgium, Germany, Spain, France and Italy. As the values for this measurement method are very low, it seems more insightful to take a look at the values between brackets. First of all, more than 36% of all Dutch emigrants moved to Belgium between 1996-2016, followed by almost 30% to Germany. Next up is Spain with more than 11% of total Dutch emigrants. Spain is then closely followed by France, which amounted to almost 11% of total Dutch emigrants. The next country is Italy, with almost 3%. It seems like there is a big gap between first of all Germany and Belgium and the other countries, but also France and Spain and the other EMU countries. It is very clear that the Dutch population has certain countries that it prefers to move to. Furthermore, what is rather interesting is that France is closer in distance to The Netherlands than Spain. Yet, on average, more Dutch people move to Spain than to France. This could very well be due to all the Dutch retirees that move to Spain (Gehring, 2016). This implies that possibly more Dutch people migrate to France for work than to Spain.

If we take all of this into account, it seems that Germany and Belgium definitely meet the labor mobility criterion, as they are in the top five countries for all three labor mobility measurement methods. Furthermore, France, Italy and Spain also seem to fulfill the labor mobility criterion quite well. Even though they do not score very high on the general labor mobility criterion and on the regular labor mobility EMU to NLD measurement method, they are in the top 5 countries for labor mobility NLD to EMU and for the amount of EMU movers to The Netherlands. This indicates that Dutch people relatively prefer to move to those EMU countries and that people from those EMU countries make up for a big part of total EMU immigrants in The Netherlands. Hence, it seems relatively easy to move between those EMU countries and The Netherlands. Lastly, Luxembourg seems to be a relatively labor mobile country as well, as it scores the highest for the general labor mobility measure and is in the top five countries regarding the regular measure for labor mobility EMU to NLD. Furthermore, as the Luxembourg is very small compared to most other EMU countries, it is not very surprising that its movers do not make up for a big part of total EMU immigrants in The Netherlands and that it receives relatively little Dutch emigrants each year. All in all, based on labor mobility, Belgium, France, Germany Italy, Luxembourg and Spain seem good possible NLD-OCA participants.

4.2. NLD-OCA

Now that all OCA criteria are analyzed, their outcomes can be merged as to determine what countries should form the NLD-OCA. In table 5.5., an overview is provided of the analyses in subchapter 5.1. This shows that Belgium, France, Germany and Luxembourg seem to fulfill all OCA criteria very well. As explained

before, only when this is the case, they are chosen as NLD-OCA participants. This means that, based on this work's study, the NLD-OCA would consist of Belgium, France, Germany, Luxembourg and The Netherlands. Interestingly, these five countries are all very close to each other in distance. Germany and Belgium are even direct neighbor countries of The Netherlands. The countries being so close to each other in distance is not very surprising. After all, this makes traveling, and therefore moving and trading, easier. It also likely diminishes cultural differences, which lessens trade and moving barriers even more. Hence, the outcome that The Netherlands should form a currency area with these four countries is not very surprising.

Table 4.5. Lists* of possible currency area partners for The Netherlands according to each OCA criterion.

<i>Similarity in economic structure</i>	<i>Monetary policy coordination</i>	<i>Openness to trade</i>	<i>Labor mobility</i>
Austria	Austria		
Belgium	Belgium	Belgium	Belgium
Finland	Finland		
France	France	France	France
Germany	Germany	Germany	Germany
	Ireland	Ireland	
Italy			Italy
Luxembourg	Luxembourg	Luxembourg	Luxembourg
	Portugal		
Spain			Spain

*Lists are based on the separate analysis for each OCA criterion from subchapter 5.1.

5. CONCLUSION & DISCUSSION

5.1. Conclusion

Already before the EMU's foundation, many economists warned that the EMU would not be an optimal currency area (e.g. Eichengreen, 1997; Fratianni & Von Hagen, 1992; Ghosh & Wolf, 1994; Frieden et al., 1998). However, this warning was largely ignored, and the EMU was still founded. Ever since its foundation, many people have argued that the EMU should either go back to the situation in which each country has its own currency or that it should be split into two or multiple regions. This work has aimed to contribute to this discussion by quantitatively analyzing the following: "Based on the optimal currency area theory criteria, which EMU countries could The Netherlands best form a currency area with?" The analyzed OCA

criteria in this work are: similarity in economic structure, monetary policy coordination, openness to trade and, lastly, labor mobility. For similarity in economic structure, GDP growth correlation and CPI inflation correlation with reference to The Netherlands are investigated. Monetary policy coordination is measured by NIRL correlation with reference to The Netherlands. Furthermore, openness to trade is determined by three sub-criteria. The first sub-criterion is international trade, which is measured by calculating an EMU country's total trade as a share of that country's GDP. The second criterion is intranational trade, which is measured as the percentage of trade that a certain EMU country covers out of total trade between all EMU countries and The Netherlands. The third sub-criterion is another way of measuring intranational trade, namely measuring what share of a particular EMU country's GDP trade between The Netherlands and that EMU country adds up to. The fourth criterion, labor mobility, is also divided in three sub-categories. The first one is general labor mobility, which is measured by the number of foreign-born people that move to a certain EMU country in one year as a share of that EMU country's GDP. The second and third sub-categories are more Netherlands-specific. The second one is measured by calculating the share of a certain EMU country's population that moves to The Netherlands in one year. The third sub-category is measured by calculating the share of the Dutch population that moves to a certain EMU country in one year.

All OCA criteria are calculated by using secondary data on EMU countries. The data originates from multiple data sources, namely the Jordà-Schularick-Taylor Macrohistory database (2017), WITS (2019a), WITS (2019b), WITS (2019c), WITS (2019d), OECD (2019a), OECD (2019b) and CBS (2019). Regarding similarity in economic structure, Austria, Belgium, Finland, France, Germany, Italy, Luxembourg and Spain score the best. Monetary Policy coordination seems to be fulfilled best by Austria, Belgium, Finland, France, Germany, Ireland, Luxembourg and Spain. Furthermore, Belgium, France, Germany, Luxembourg and Ireland seem the most open to trade with reference to The Netherlands. Moreover, according to the labor mobility criterion, Belgium, France, Germany, Italy, Luxembourg and Spain should form a currency area together. All of this is added together, and the countries that are listed for all criteria are chosen as NLD-OCA participants. Therefore, the following is concluded: *based on the OCA theory criteria, The Netherlands could best form a currency area with Belgium, France, Germany and Luxembourg.*

5.2. Discussion

This work has certain shortcomings that need to be addressed. First of all, this work's used data is not perfect. After all, for equality in economic structure, no data could be found for Malta and Cyprus. What is more, no data could be found for Malta, Cyprus and Estonia regarding the monetary policy coordination criterion. As these three countries scored poorly on the other criteria, it does not seem like a very big

problem for this work, but for the completeness of the analysis, data for these countries with respect to those two criteria should be analyzed as well. Furthermore, this work aimed to analyze all criteria for the period 1980-2016, as the results become more reliable when a greater time period is analyzed. However, it was not possible to analyze this time period for all criteria. After all, for the trade openness and the labor mobility criterion, data was only available for a smaller timeframe. What is more, for some countries no data was available for the first few years of the analyzed timeframe. This could, however, have biased the measurement's value for that certain country. If for example the country scored much better during the later years in the timeframe, this can influence the measurement's outcome upwards. Luckily, for Belgium, France, Germany and Luxembourg - the countries that The Netherlands should form a currency area with according to this work – data was available for every criterion's whole analyzed timeframe. Nonetheless, it can be concluded that the data was incomplete. Hence, in further research other data sources with more complete data should be searched for.

Apart from this, it needs to be admitted that this work is quite limited. After all, only four OCA criteria are analyzed. However, as follows from the theoretical framework, more criteria exist. It would therefore have been better to analyze more criteria in order to get a more complete view on what countries The Netherlands could best form a currency area with. Moreover, due to this work's research question, all analyses were very Netherlands-centered. Hence, completely based on The Netherlands' point of view, a certain 'optimal' currency area is established. Nonetheless, this does not mean that that currency area is optimal from the other NLD-OCA countries' point-of-view as well. Their point-of-views should therefore also be addressed in future research regarding the optimality of the EMU. What is more, this work only analyzes the period 1980-2016 in its entirety but does not perform other analyses to see the extent to which the OCA criteria have developed for all EMU countries with reference to The Netherlands during the years. This could, however, provide a good indication of the extent to which the endogeneity hypothesis, mentioned by Frankel (1999), holds. Hence, a recommendation for further research is to also analyze how the OCA criteria have developed themselves during multiple smaller time frames.

All in all, this analysis supports the idea that the EMU most likely is not an OCA. After all, already solely from the Dutch point of view, it seems to be more beneficial to be part of a currency area with just a few of the EMU countries rather than all EMU countries. This work therefore emphasizes the importance of investigating the EMU's future as a whole. Perhaps it would be better to split the EMU in multiple regions. One of those regions could then be The Netherlands, Belgium, France, Germany and Luxembourg, which follows from this work's analysis. Thus, keeping the discussion on the EMU and its viability alive seems rather important. Also, more in-depth analysis of possible alternatives for the EMU seems necessary.

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