ECONOMIC INTEGRATION BETWEEN NORTH MACEDONIA AND THE EURO AREA: COSTS OF JOINING THE EURO

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Abstract

North Macedonia became a candidate country for European Union accession in 2006. Considering its prospective membership and subsequent Euro Monetary Union (EMU) integration, the objective of this research is to fill an empirical gap in investigating the degree of economic convergence between North Macedonia and the EMU. For this purpose, a set of theoretical methods are used i.e. The Optimum Currency Area (OCA) theory and the Maastricht convergence criteria. Data from the empirical analysis shows that North Macedonia has been successfully converging with the EMU in the last 20 years at a slow to moderate paste. The findings steaming from Maastricht convergence criteria reveal that the economy is well prepared to join the EMU i.e. inflation for most of the period is low and stabile, government debt is below the 60% reference value, and the exchange rate is stable at around 61 Macedonian denars. However, continuously increasing government debt, poses a risk which some authors have already identified. The assessment using the OCA criteria does point to some existing challenges, particularly in respect to the structure of the economy, and economic growth. In order to overcome these challenges, introduction of a set of policy measures targeting the real economy should be considered.

Keywords: Optimum Currency Area; Economic convergence; Monetary integration; North Macedonia; Euro adoption; OCA index; Generalized Purchasing Power Parity; Maastricht criteria, Exchange rates.

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List of Abbreviations

ASS – Agreement for Association and Stabilisation

ECB –European Central Bank

EMS – European Monetary System

EMU – European Monetary Union

ERM II – Exchange Rate Mechanism II

ESM – European Stability Mechanism

EU – European Union

EUR – Euro (currency of the European Union)

GPPP – Generalized Purchasing Power Parity

HCIP – Harmonized Consumer Price Index

MFRM – Ministry of Finance of North Macedonia

MKD – Macedonian Denar (currency of North Macedonia)

NBRM – National Bank of North Macedonia

OCA – Optimum Currency Area

SSORM – Statistical State Office of North Macedonia

TEU – Treaty of the European Union

USD – United States Dollar

WTO – World Trade Organization

1 The area of research: A brief introduction

After the introduction of the common European currency (i.e., the euro), members of the EU joined the European Monetary Union (EMU). North Macedonia, which is currently a candidate country for EU accession and awaits the start of the negotiation process for EU accession, will eventually have to adopt the euro as a national currency and subsequently give up its monetary independence. The question of euro adoption is critical for North Macedonia in the period before EMU accession, as monetary authorities will seek to understand the convergence process and identify its current deficiencies, which will help recommend adequate economic policies in a timely manner.

Prior to integration into EMU the country needs to fulfil a set of normative convergence criteria set forth by the Treaty of Maastricht. Fulfilment of these criteria is obligatory for entry into the EMU and therefore North Macedonia has to achieve significant progress. According to the results of the normative assessment, North Macedonia is well prepared to adopt the euro as a national currency i.e. inflation is low and stabile, the exchange rate is stable, and government debt is below 60 percent of GDP.

While assessment of the normative criteria includes valuable information about the soundness of a country's economic fundamentals, this is not entirely sufficient. For that reason, in addition to the normative criteria, economists use a set of real convergence criteria to determine the readiness of a country to adopt a common European currency. These real convergence criteria are included in the Optimum Currency Area (OCA) theory and are frequently used in the assessment of monetary integration. They are helpful in drawing complementary conclusions about a country's degree of economic integration with another country or group of countries and its readiness to join a monetary union. The results from this

assessment also point to an existing process of convergence, where special attention should be paid on the structure of the economy and its competitiveness.

By no means does the current investigation aim to definitively answer the question of whether North Macedonia should adopt the euro as a national currency. Answering that question will require the use of a broader set of economic and political criteria, as the decision to join the euro also depends on the current economic conditions in the EMU, current global conditions and the political willingness of both the country and the EU to support this undertaking.

In the first chapter, the area of research and the corpus of the thesis are presented, while the second chapter assess the degree of nominal convergence between North Macedonia and the EMU using the normative criteria stipulated in the Treaty of Maastricht. The third chapter provides an overview of the main OCA literature and empirical work commonly used in monetary integration research. At the beginning of this chapter relevant recent research on the topic is presented, proceeding with a presentation of alternative adjustment mechanisms, as well as desirable characteristics of monetary unions, later presented in the form of criteria and the endogeneity hypothesis, one of the last and very important contributions to the OCA theory.

The "scope" and "need of independent monetary policy" are investigated in the fourth chapter. Special attention is paid to the exchange rate regime choice, which is determined by the level of "euroistion" and "openness" of the Macedonian economy, the exchange rate pass-through (ERPT), and "business cycles symmetry". The fifth chapter contains an analysis of the degree to which North Macedonia fulfils some of the measurable OCA criteria, using two empirical techniques: the OCA index by Bayoumi and Eichengreen, (1997) later on modified by and Horváth (2007), and Generalized Purchasing Power Parity (G-PPP) by Enders and

Hum (1994). A summary of findings can be found in the sixth chapter, as well as recommendations for a possible set of policy measures to improve economic convergence.

2 The Treaty of Maastricht

For over a century now, monetary integration and exchange rate regimes have been at the forefront of economic research, producing important scientific findings relevant to monetary unions. So far, the EMU has been the mostly studied monetary union. The Euro Area was established in 1999, after the ratification of the Treaty of Maastricht in 1992. Currently a total of 19 states (Euro Area) out of the 27 member states (EU) use the euro as a national currency, while the rest are expected to join at a future date.[1] According to the Treaty of Maastricht, when an EU member state meets the normative convergence criteria after a one-year period of investigation, that member state is obliged to join the EMU. However, some EU member states, many years after joining the EU, are still not members of the EMU. While some have not been able to meet the normative criteria, others have purposely avoided meeting them in order to retain autonomous monetary policy conduct (Deskar-Škrbić et al., 2020). Because of the EMU enlargement experience, there are several reasons behind the decision to maintain independent monetary policy. Some members of the EU have recognized the existing deficiencies of the EMU, which were confirmed during the global financial crisis and the subsequent sovereign debt crisis in Europe. Most, however, feel that they are not sufficiently converged with the economy of the EMU, and therefore feel that losing their monetary independence will be a costly decision. Even though both the EU and the EMU have been subject to major reforms (e.g., revision of the Growth and Stability Pack and the Banking Union, advancements in the conduct of the European Central Bank [ECB], and

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[1] Current member states of the Euro Area are: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain.

introduction of euro bonds, among others) making the union more optimal for its member states, fear of joining has continued to be an issue for some.

Given the current standing of North Macedonia, the position of its government, the standing position of representatives of the NBRM, and public surveys,[2] it is likely that North Macedonia will soon become a member of the EU and seek to join the EMU shortly after. As stipulated in the Treaty of Maastricht, in order for an EU member state to be granted entry to the EMU, it has to meet a set of normative convergence criteria (Treaty on European Union, 1992):

- The inflation rate of the joining country must not exceed the average of the three best-performing EU member states in terms of inflation by more than 1.5 percentage points.[3]

- After joining the exchange-rate mechanism (ERM II) of the European Monetary System (EMS), the joining country must not experience devaluation for two consecutive years and exchange-rate variability maintained within a ±15 percent band.

- The long-term interest rate of the joining country must not be more than 2 percentage points higher than the average long-term interest rates of the three EU member states with the lowest inflation.

- The government budget deficit of the joining country must not be higher than 3 percent of its GDP (unless it shows gradual, continuous, and substantial decline and comes close to the 3 percent norm; or, alternatively, if the deviation from the reference value of 3 percent is exceptional and temporary).

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[2] See Damjanovski (2021), which is the latest survey of public opinion on EU accession.
[3] In the *Convergence Report, 2004* (p.8), the concept of outliers was applied, which implied that EU member states with rates of inflation significantly different from the other members of the Union would be excluded from the calculation of the Maastricht reference value.

- The government debt of the joining country must not exceed 60 percent of its GDP. A country with a higher level of general government debt can still adopt the common European currency, provided its debt level is falling steadily at a satisfactory pace.

2.1 Nominal convergence of North Macedonia

On December 16, 2005, the European Commission granted North Macedonia a candidate country status for EU accession. However, negotiations for EU accession have not yet started, since the country was not able to fulfil several obligations posed by the EU and individual EU member states related to structural reforms and political issues. Fortunately, many of these decade-long political issues have been resolved. (European Commision, 2021) Following the current public discourse on EU enlargement, it is possible that North Macedonia will start the accession negotiations process in the next few years. For this reason, assessment of the nominal convergence criteria is a very important one.

2.1.1 Inflation dynamics

As previously mentioned, price stability is a critical Maastricht convergence criterion. According to this criterion, each prospective member state has to show capacity in maintaining low and stable inflation rates that are close to those of the EU member states. According to the ECB norms, the low and stable inflation rates should be kept at around 2 percent (De Grawe 2018). This is because the ECB believes inflation rates in the Euro Area around 2 percent lead to steady economic growth, while inflation above 2 percent leads to economic instability, lower living standards, purchasing parity and competitiveness, and so on. For this reason, the EMU only grants entry rights to those EU members that can show strong anti-inflationary commitment with a record of low and stable inflation rates.

The analysis related to this criterion shows that North Macedonia is likely to satisfy the inflation criterion. After its separation from former Yugoslavia, followed by a steep drop in production, many major large-scale manufacturing companies were on the verge of closing. Nenovski (2010) points out that the environment in the early nineties was very harsh and had a direct impact on the economic activity and employment which dropped significantly. As a reaction to this the NBRM implemented a monetary strategy and became a lender-of-first resort. This meant that the NBRM started lending large sums of money to large businesses via national commercial banks. While this strategy of the NBRM was able to prevent further decline of economic activity, it did so at the expense of price stability. In 1992, due to such monetary policies, the annual rate of inflation reached 1,198.7 percent, which was North Macedonia's first and last recorded rate of hyperinflation since its independence.

These policies prevailed until 1994/1995, when the NBRM decided to move to new monetary policies targeting price stability. To achieve this, the NBRM started pegging the national currency, the Macedonian denar (MKD), to the Deutsche mark (DM) and later to the euro (EUR). This caused inflation rates to drop below 3 percent. Throughout this period, the monetary policy was backed by sound fiscal policy without which such inflation rates would not have been achieved. Looking at Figure 1, it can be inferred that the average yearly inflation rate between 2001 and 2020 was around 2.3 percent. In the first decade, between the years 2001 and 2009, the inflation rate was much more volatile, ranging from -1.1 percent in 1999 to 7.6 percent in 2008. The period was followed by two military crises: on the territories of North Macedonia's largest trade partners (current Serbia and Kosovo) in the year 1999, and in the country itself in the year 2001.
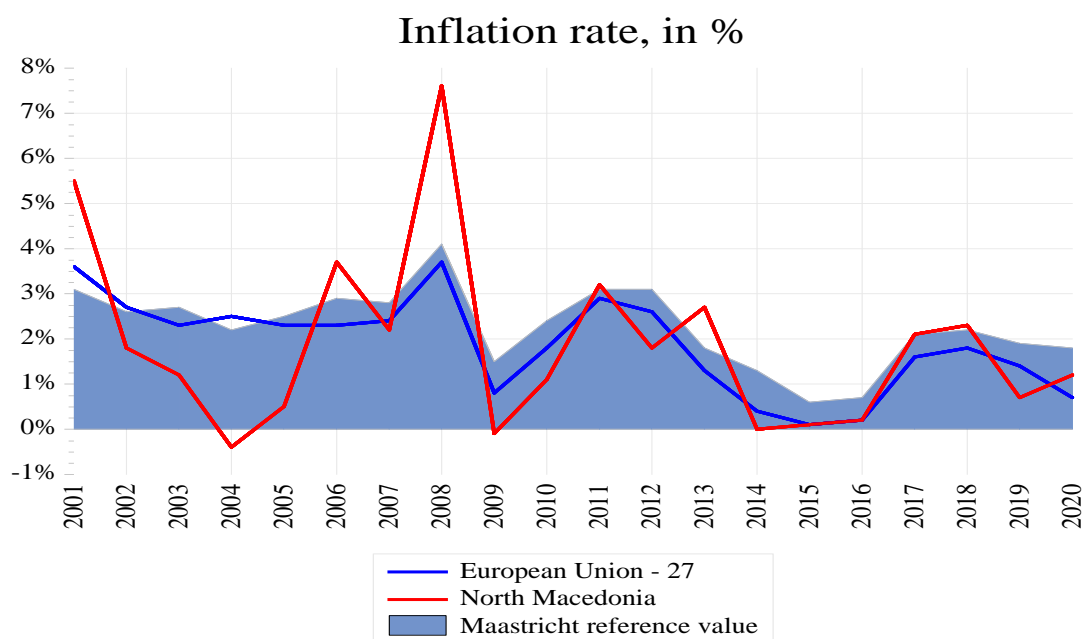
Figure 1: *Inflation rate in North Macedonia, EU, Maastricht reference value (in %), 2001–2020*

Source: Eurostat (2021), NRBM (2021), own calculations

Unfortunately, the process was reversed with the occurrence of the global financial crisis (in the year 2007/2008).[4] In 1999, because of the significant reduction of trade with Serbia due to the war in Kosovo, which was accompanied by bad economic conditions in Europe, economic activity in North Macedonia dropped causing annual deflation of 1.1 percent (NBRM, 2002). The following year, the annual rate of inflation reached 5.8 percent due to the reestablishment of trade linkages with Serbia and Kosovo, as well as the increase in energy prices (oil and electricity) (NBRM, 2002).

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[4] Nenovski (2012) explains in detail the effect these shocks had on the North Macedonian economy.

In 2001, North Macedonia faced insurgency – an armed interethnic conflict – which pushed the annual rate of inflation to drop to 5.5 percent. This was caused by several factors: increased aggregated demand due to psychological factors related to national security and safety, increased demand for foreign currency, increased government expenditures, the introduction of value-added tax, increase in the prices of government-controlled products, and raising food prices (NBRM, 2006).

In the period after the conflicts, between 2002 and 2007, the inflation rate was maintained between -0.4 and 3.7 percent. The inflation rate reduction occurred due to the global decrease food products prices, which is still the largest component of North Macedonia's CPI. Additionally, North Macedonia signed the Stabilization and Association Agreement (SAA) with the EU and another one with the World Trade Organization (WTO), causing further reduction of customs duties (NBRM, 2006) thus reducing the price of imports, and the general price level.

After 2004 North Macedonia, like many other countries, took advantage of global economic expansion, which lead to an inflationary trend reaching 7.7 percent in 2008, mainly due to the raising costs of energy and food products (NBRM, 2009). In 2008/2009 the economy was hit by the global recession, causing the prices of oil and food products to decrease. The large negative output gap caused inflation to drop to -0.1 percent in the year 2009. In the next 10 years between 2009 and 2019, inflation remained low and stable, varying between 0.2 and 3.2 percent, which close to EU member states inflation rates. More importantly, as can be inferred from Figure 1, in the second decade inflation was lower and

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more stable relative to the first decade and the early years of transition and followed the same trend with that of the EU average.[5]

Figure 1 also helps compare the annual rates of North Macedonian inflation against the Maastricht convergence criteria – Maastricht reference value. The data show that North Macedonia fulfils the inflation criterion in 14 out of 20 years, i.e., the annual rate of inflation of North Macedonia is below the Maastricht reference value two thirds of the time. While inflation has been held to satisfactory levels, this doesn't mean that the country will not face difficulties in the mid to long-term. In fact, one, should take into consideration that the acceleration of the real convergence, especially in the later stages of EU accession and before and during the early stages of EMU entry, may trigger a Balassa-Samuelson effect, causing inflation rates to increase significantly and exceed those of the Maastricht reference value.

It the mid-term it is very likely that the global pandemic will increase inflation as the global financial crisis did in the past. In fact, the global financial recession caused great difficulties in maintaining inflation at a satisfactory level, causing significant divergence between EMU member states. While some experienced deflation, others have reached inflation rates above 4 percent. This means that EU member states and potential EMU candidates might have difficulty meeting the inflation criteria due to the current pandemic and future unpredictable economic shocks of similar magnitude. Throughout this pandemic, the Macedonian economy faced several different demand and supply shocks, accompanied by

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[5] For further explanation about price developments in North Macedonia between the years 2016 and 2021 see NBRM's Annual reports (NBRM, 2016, 2021).

expansionary monetary and fiscal policy, causing the rates of inflation to be unstable and significantly high.[6]

2.1.2 Exchange rate dynamics

North Macedonia has had a de facto fixed exchange rate with the euro since it was first introduced in 2001. The exchange rate target was set at 61 MKD for one EUR and has been maintained closely around that parity to this point.

During the early years of transition, the country decided to have a floating exchange rate. The main reason behind this decision was a lack of foreign exchange reserves and the need for expansionary monetary policy. During this period, between the years 1991 and 1994, the exchange rate was floating against its trade partners, causing it to soar.

For that reason, in 1995, the NBRM pegged its currency to the strongest European economy, Germany, as an intermediary target in order to gain credibility and lower inflationary expectations. This decision by the NBRM caused inflation rates to stabilize and drop below 10 percent. In 1997, the NBRM recognized that the currency was overvalued and allowed it to depreciate by 13 percent, from 27 MKD per DM to 31 MKD per DM. Since then, there hasn't been a single devaluation of the currency. Ever since the euro was introduced in 2001, the fluctuation margin of the denar-to-euro exchange rate has maintained ±1 percentage points around its central parity, which is much narrower than the ERM II margin of ±15 percent.

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[6] For further information about price development during the global pandemic, refer to NBRM's 2020 Annual Report. (NBRM, 2021). While the IMF forecasts inflation in Europe to be below 1.8 percent until 2026, governments fear that current fiscal stimuli will lead to higher mid-term inflation.

Nominal exhcange rate MKD/EUR
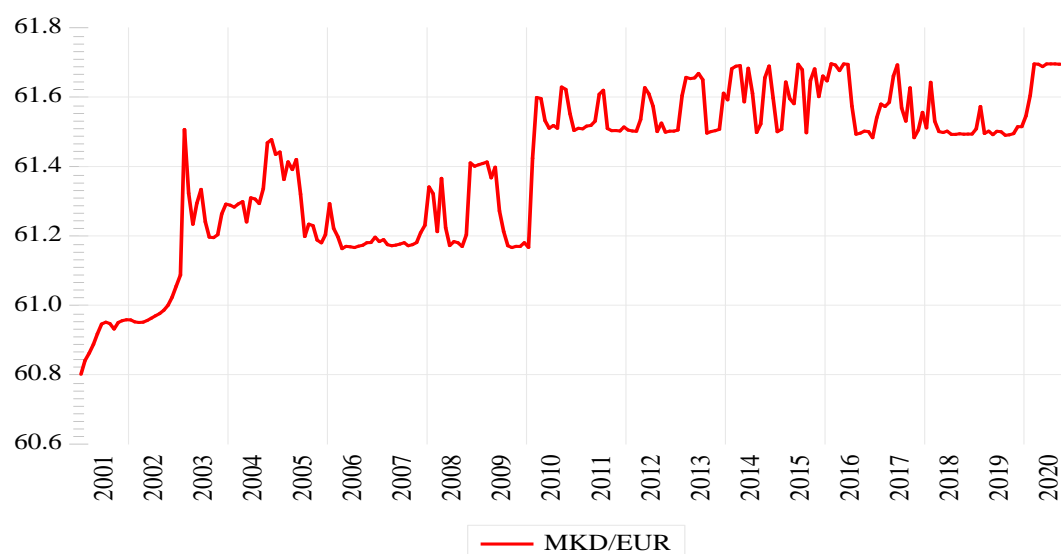
Figure 2 *Bilateral exchange rate between North Macedonia and the Euro Area, 2001–2020*
Source: Eurostat (2021)

Fluctuations after 2003 were significantly higher. However, both in the periods before and after 2003, the variations of exchange rate were sufficiently low, and it does not present an obstacle in fulfilling the Maastricht exchange rate criterion. In the period between 2002 and 2008, when capital markets became gradually liberalized, the day-to-day exchange rate fluctuations have been below ±2 percent. In order for the NBRM to achieve such a high level of nominal exchange rate stability, it uses its foreign exchange reserves in its day-to-day operations. In 2020, the NBRM's foreign exchange reserves amounted to 3.4 billion euro. The foreign exchange reserves predominantly consist of remittances and borrowing on international markets. Unfortunately, foreign direct investments (FDI) are a very small portion of the reserves, and in relative terms are significantly lower than the rest of the West Balkan countries.

While the data suggests that the country will likely not face major challenges to meet the exchange rate criterion when the investigation takes place, there are still concerns that need to be acknowledged. According to De Grauwe (2018), in the later stage of real convergence, increased productivity growth may cause appreciation of the nominal exchange rate. This scenario is plausible when governments decide to preserve price level stability. Nevertheless, De Grauwe (2018) also points out that the ERM-II mechanism gives sufficient flexibility to help meet both criteria simultaneously.

Another important concern is the liberalization of the capital account. When markets become increasingly integrated and the capital account become more liberalized, a monetary policy that focuses on maintaining internal balances may cause greater exchange rate flexibility. Under current market conditions and monetary policy of the NBRM, North Macedonia is unlikely to face such pressures.

While foreign exchange reserves have been stable throughout most of the period, the unstable nature of the current account transfers may cause a need for greater flexibility in the exchange rate.

Finally, increased economic growth due to growth in the tradable sector of the economy will cause inflation to rise. This will lead to appreciation of the real exchange rate, thus putting pressure on the nominal exchange rate. However, as Mussa (1986) points out, countries with fixed exchange rates exhibit less variability of both their nominal and real exchange rates.

2.1.3 Government debt and deficit

When a country is no longer able to use the exchange rate and other monetary policy instruments to help maintain internal and external balances, a proactive fiscal policy is

advised. In fact, prudent fiscal policy protects the stability of the domestic currency, and more so the supranational one when the country is a member of a monetary union.[7] Large budget deficits and high indebtedness incentivize governments to pursue policies that cause unexpected inflation, in order to devalue the current debt and thus pay less to borrowers. This in turn causes bailout and default pressures (Grauwe, 2018).

For this reason, future EMU members should prove that they are engaged in prudent fiscal policy practices (i.e., showing that they have – in accordance with the fiscal criterion – budget deficits below 3 percent of GDP and government debt below 60 percent of GDP). When one of the two ratios is not met, an assessment of the trend and expected future development of the general government debt is performed. Such an assessment checks if the general government debt is following a downward trend (i.e., has been sufficiently decreasing over a given period of time).

From Figure 3 it can be inferred that North Macedonia had budget deficits below 3 percent of GDP, and almost the same as the EU member states for most of the observed period. If the years 2001 and 2002 are excluded from the calculation, an average deficit-to-GDP is 2.1 percent can be calculated for the period between 2001 and 2020.

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[7] An example of the effect lack of prudent fiscal policy has on a single currency is the European debt crisis (De Grauwe & Ji, 2014).

General government deficit, in % of GDP

Figure 3 *General government deficit for North Macedonia, EU, Maastricht reference value (in% of GDP), 2001–2020*

Source: Eurostat (2021), MFRM (2021)

Until 2008, deficit was particularly low. With the start of the global financial crisis a positive trend can be observed that lasted until 2014. From 2015 there was a gradual decline, which lasted until 2019. However, in 2020 due to the global pandemic North Macedonia's deficit-to-GDP reached its peak (8.1 percent). As the global pandemic caused unprecedented negative effects on the economy, the government implemented various fiscal measures that increased the deficit significantly. An additional but less significant negative effect on the deficit was the decline of budget revenues as a result of lower economic activity.

In respect to its indebtedness, it can be inferred that North Macedonia has a moderate level of general budget debt. In the early years of transitions, the country's government debt was particularly high, mainly because North Macedonia inherited financial obligations from Yugoslavia. The settlement period for these obligations was long and difficult; it took the

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country almost a decade to repay the debt obligations to its foreign partners. From its independence up until 2001, the average debt was around 40 percent of GDP.

As can be inferred from Figure 4, between 2001 and 2008 there was a trend of gradual decline. This was a result of coordinated efforts of the NBRM and fiscal authorities to decrease the country's indebtedness. In 2007 the government was able to restore much of its debt obligations and reached a level of indebtedness of around 23 percent of GDP, which is the second lowest level in the 30-year period since its independence (after the one in 2008). One of the main tasks of the government during this period was to reduce external debt. The main factors that affected the debt ratio reduction were the privatization and sell-off the national telecommunications provider and the national electricity company to foreign entities.

Consolidated general government gross debt, in % of GDP

Legend:
- European Union - 27
- North Macedonia
- Maastricht reference value

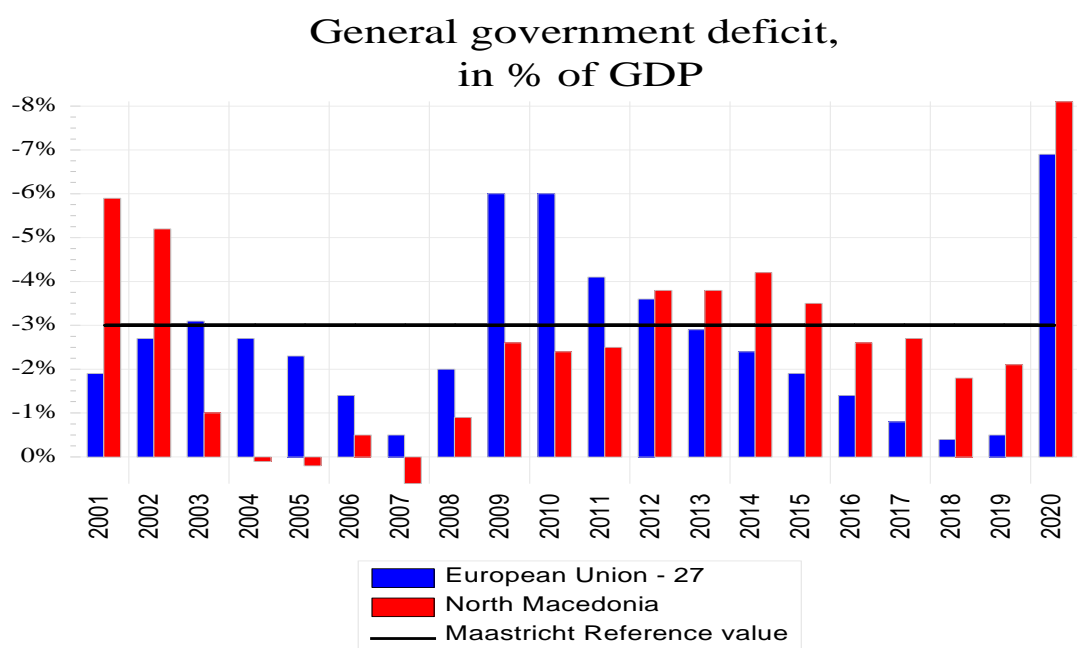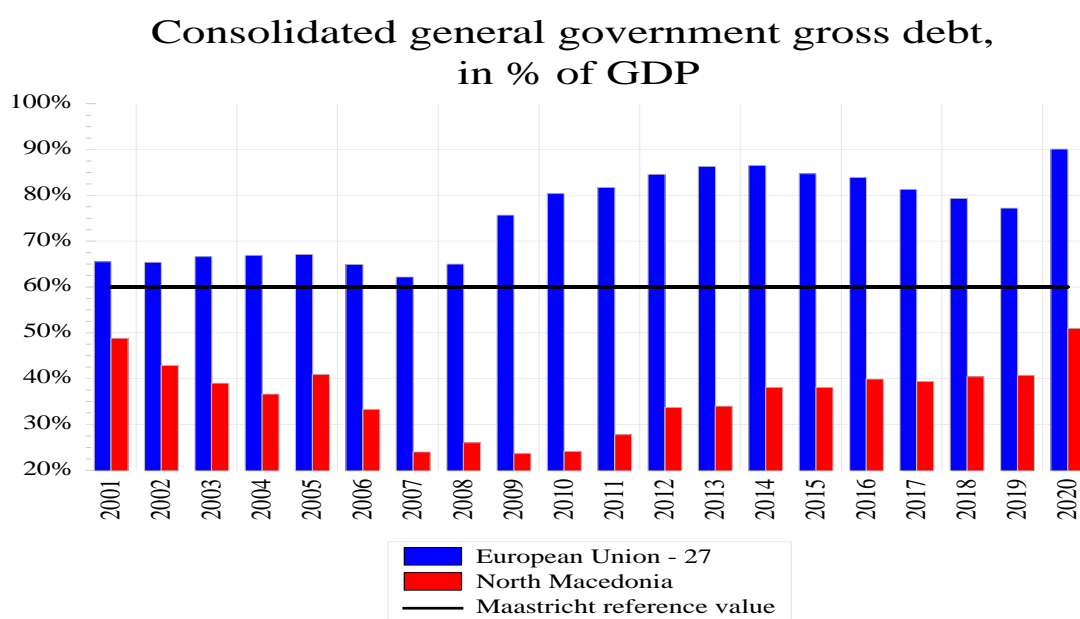*Figure 4: Consolidated general government debt for North Macedonia, EU, Maastricht reference value (in% of GDP), 2001–2020*

Source: Eurostat (2021), MFRM (2021)

From 2009 onward, we can observe a reverse trend – indebtedness is gradually increasing. This is the result of efforts by the central government to support the economic

recovery after the recession. Gorgievski (2013) argues that the pre-crisis conservative fiscal policies helped North Macedonia mitigate the negative effects of the global financial crisis. Early on in the crisis the pressures on the current account imbalances were managed by expansionary fiscal policy, which continued for a significant period of time, thus gradually increasing the debt to GDP ratio. This was because of excessive fiscal spending on infrastructure projects, growth of wages in the public administration sector, subsidies, and pensions (NBRM, 2016).

However, there is still room for the country to engage in further borrowing, because the current debt to GDP ratio is 51 percent, below the Maastricht criteria. Compared to the rest of the EU member states and the current candidate countries, North Macedonia is the least indebted. However, we should also take into consideration that the sustainability of the government debt depends on the structure and successful implementation of policies to boost economic growth. This is especially important in the case of North Macedonia because the fiscal conditions have worsened since the global financial crisis, and particularly now with the global pandemic.

According Trpeski et al. (2020), in the period between 2002 and 2017 public debt was negatively correlated with GDP growth, causing concerns over the sustainability of the debt. When there is no positive relationship between general government debt and economic growth, debt sustainability even under moderate levels of indebtedness is concerning.[8] In small and open economies that exercise fixed exchange rates policy, such as North Macedonia, external shocks can pose a great threat to fiscal sustainability. For that reason, public debt management is primarily focused on external factors such as interest rate development in international markets. The main reason for this is that most of the

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[8] Kjosev et al. (2021) also confirms the negative relationship between the general government debt and GDP growth, which according to him is positive when debt is above 30 percent of GDP.

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accumulated debt is external. Therefore, it is important to assess the relationship between the external debt and fiscal sustainability. Andonova & Stefanova (2015) assess this relationship and find that, in the short-term, external shocks cause lower GDP growth and higher current account deficits, which require foreign financing. In the mid-term, lower GDP growth can be resolved through positive movements in the current account without threatening debt sustainability.

Because the level of sustainable debt in North Macedonia has not been empirically proven, except in relative terms to the Maastricht criteria and the trend analysis, it is useful to look at the primary budget balance. A way to test the sustainability of the debt is to investigate the relationship between the primary budget balance and the movements of the debt ratios, i.e., how the primary budget balance reacts when debt levels change. According to Trenovski & Tashevska (2016), there is a negative relationship in the short-term, and the level of indebtedness does not impact the fiscal position. On the downside, however, in the long-term the primary balance does not change when debt is high, supporting the argument that necessary measures should be taken to assure appropriate adjustment of the balance.

In this respect, as pointed out by Trenovski & Tashevska (2016), in order for the government to ensure sustainability of its debt, continuous good coordination between the fiscal and monetary policy is required, as well as further tax reforms, consolidation of current expenditures, and gradual fiscal consolidation. As a middle-income country, North Macedonia's threshold of debt tolerance is lower, and a relatively lower GDP-to-debt may hinder debt sustainability, especially under declining general fiscal discipline.

3   Optimum Currency Area: Theory and evidence

Entry into the Euro Area by is a condition for each country joining the EU. To do so, said country must fulfil the Maastricht criteria. The best way to measure the level of economic convergence and therefore suitability of monetary integration is to turn our attention to the OCA theory. Surveying the theoretical and empirical literature will help extract the main elements needed for further investigation of the convergence process.

3.1 Costs and benefits of joining the EMU: Old wisdom and new insides

While part of the OCA discussion is related to the benefits and costs associated with EMU accession, this thesis will offer a review of a set of carefully chosen empirical research studies that will provide relevant insight and understanding of current debate on the topic.

Joining the EMU implies certain costs and benefits for member countries. Amongst first major benefits are financial gains coming from elimination of currency convergence costs. The European Commission (1990) report [one of the most cited documents at that time] overestimates the financial gains arising from monetary integration. While the report predicts 0.26 percent of GDP to be saved by each joining country in the form of financial gains, the National Bank of Hungary (2004) estimates a gain of 0.22 percent of GDP. The National Bank of Poland (2004), however, estimates that only 0.14 percent of GDP will be saved in the forms of financial gains.

Mussweiler and Strack (2004) who examine price transparency, argue that prices of products dominated in the same currency help consumers better compare prices, which subsequently leads to price convergence. However, studies have shown that price convergence is not as strong as previously expected. Price discrimination is still present after the euro was initially introduced. However, according to De Grauwe (2018), price

convergence in the years before the euro was introduced was more intensive than it is today. Early studies that analysed price convergence, such as that of Engel and Rogers (2004) and Rogers (2007), argued that price convergence was present in the period before the launch of the euro. However, members of the Euro Area at the very beginning were countries which had started converging long before the euro was introduced. For that reason, current empirical studies that include new member states (NMS) show different results. Macedoni (2021) measures the price convergence of Cyprus, Malta, Slovenia, and Slovakia to the EMU, and finds that bands of inaction of relative prices between this group of countries and the EMU has fallen by 17 percent since the introduction of the euro. These findings were also confirmed by Rogers (2007), García-Hiernaux et al. (2020), and Hałka and Leszczyńska-Paczesna (2019), among other authors who analysed price development in EMU countries, and argue that in recent years price dispersion has been higher relative to that in the 90's. According to Hałka and Leszczyńska-Paczesna (2019) there are different price level patterns between deferent groups of EMU countries. Only between Germany-France-Italy did the author find zero-gap price convergence, while in other countries there is a relative price convergence.

Another important benefit that arises from the adoption of a single currency is the elimination of currency risk, which interrupts foreign trade flows. While at the beginning there was a strong belief that elimination of an exchange rate boosts trade, such as that of Rose (2000), de Nardis and Vicarelli (2003), and others, recent studies, such as that of Glick and Rose (2016) argued that previous findings overestimated the effect, and found no substantive reliable evidence of an existing positive effect of monetary union on trade. Research by Glick & Rose (2015) and Rose (2017) attempt to explain the reasons behind the conflicting results produced by several important studies on the issue, including their own.

They argue that the EMU indeed had a positive effect on exports, but that it was significantly lower that their initial estimates.

In respect to the costs associated with EMU accession, the most important one is the loss of independent monetary policy, as well as debt monetization and currency depreciation for busting exports. Unlike earlier research, new research, particularly that of Akerlof et al., (2000) argues that the Phillips curve is backward-bending and therefore infers that monetary authorities have some control over unemployment, but only when inflation is low and stable, making the benefit of exercising monetary independence lower than previously thought.

3.2 Alternative adjustment mechanisms

Robert A. Mundell (1961) established the theoretical basis for thinking systematically about the desirable characteristics of currency areas in the scientific paper titled "*A Theory of the Optimum Currency Areas*". There he posed an uncommon question: "*What is the suitable domain for a single currency area*?" (657). That is, what microeconomic criteria should be used when deciding whether to become a member of a monetary union?

In Mundell's view, rigidness of nominal prices and wages as a shock absorber can be replaced by mobility of labour and mobility of capital. This implies that the existence of labour and capital mobility between countries diminishes the need for exchange rate adjustment when countries are hit by asymmetric shocks. What this means is that a set of countries having factor mobility should form single-currency unions.

In fact, many empirical studies – mainly those that concern the EMU – show that labour mobility in the EMU has been low but has been improving over time due to labour market integration and adequate labour market policies. If we distinguish between cross-country and regional mobility, it can be inferred that cross-country mobility has been lower

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than regional mobility, and regional mobility has been characterised by short-term rigidity. However, cross-country has been improving since the early 90's, especially after the establishment of the EMU and the subsequent enragements. The main reason for this is the large unemployment differentials between "old" members and the "new" entries. Additionally, demographic analyses show that high-skilled migration has been higher relative to low-skilled migration and native migration. (See: Arpaia et al., 2018; Beyer & Smets, 2015; Furceri et al., 2020; Huber 2018).

As presented in the works of Mundell (1973) and Ingram (1962), the ease with which financial capital may be moved compared to physical capital and labour makes it the most desirable alternative adjustment mechanism. De Grauwe (2018) identified financial market integration as integration of equity markets, government bond markets, insurance markets, and other financial markets.

Economic literature distinguishes two channels that households, enterprises, and the government sector use to insure against economic shocks: private and public channels operating in inter-regional jurisdiction. There are two private channels: the savings channel and the capital market channel. The savings channel refers to international borrowing by enterprises and households to smooth consumption and investment when facing adverse shocks. The capital market channel is associated with private investment portfolios. This channel's function is stronger when the domestic economy hit by an adverse shock is not well integrated with the rest of the economies. Finally, the public channel refers to cross-country fiscal transfers used to smooth adverse economic shocks via output and consumption.

Data on the EMU shows that, before the global financial crisis, around 20 percent of shocks were smoothed through the above-mentioned financial channels. In the period after the crisis, risk sharing smoothed consumption around 60 percent in the most developed EMU

economies. The savings channel played the larger role, and an increasing positive trend can be observed in the cross-border portfolio holdings of corporate and government bonds.[9] The main factors that increased the role of international risk sharing mechanisms as an adjustment tool were the introduction of the European Stability Mechanism (2012) and the European Banking Union (2014).

Aside from the existing legal barriers, other factors that prevent international risk sharing from becoming a more effective tool for smoothing output and consumption are the home bias effect and the wealth difference among households. It is widely observed that around 90 percent of enterprises and households prefer holding financial assets from home, and those which are not wealthy are not exposed to the gains because they are unable to afford holding financial assets either at home or abroad.

Fiscal policy is another alternative adjustment mechanism that was first presented in the work of Kenen (1969), who argued that it is desirable to centralize a significant portion of the national budget. Kenen (1969), argued that centralized budgets work as shock absorbers by transferring funds from one region to another and can be considered an insurance mechanism. However, if the economic shocks are permanent, and prices and wages are not flexible, the depressed region will become dependent on such transfers, causing continuous moral hazard.

3.3 Desirable characteristics of an optimum currency areas

When economies are similar to each other in several aspects, the likelihood of shock asymmetry and the need for exchange rate adjustment is reduced significantly. When

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[9] See: Cimadomo et al. (2020), Alcidi et al. (2017).

speaking of desirable characteristics, what we mean is the level of openness, diversification of the economy, similarity in inflation growth, and business cycle symmetry.

McKinnon (1963) argued that an optimal currency area that has a single currency should also: (i) have a high degree of economic openness, and (ii) be small in size. According to his reasoning, factor mobility should be considered ex-post, after a currency union is established, implying that attention should by paid to enactment of appropriate economic policies to overcome factor immobility since it is an important adjustment mechanism for mitigating asymmetric shocks and disturbances.

Kenen (1969) expanded the work of the previous authors by emphasizing the importance of diversification of production. A high degree of diversification of production and consumption tends to average out the negative effects of external shocks on the economy, reducing the need for nominal exchange rate adjustment. The empirical evidence, according to Francesco Paolo, et al. (2016), shows that EMU economies have been diversifying over time thanks to greater trade integration. None of the Euro Area countries had high level of industrial concentration that exposed their economy to adverse economic shocks. While there is a difference between core economies and the "new" numbers, they are not that large to constitute an issue.

The OCA theory was revived at the beginning of the 1990's as a consequence of the European monetary integration. As Tavlas (1993) points out, the "new" OCA theory indicates that countries face fewer costs to integration, as use of independent monetary policy conduct is less effective due to the slope of the Phillips curve, and there are benefits in the form of gains in credibility for countries with higher inflation instability.

De Grauwe (2018) also presents the important contribution by Fleming (1971) and later Ishiyama (1975), which talk about similarities of inflation rates among members of a

monetary union. When inflation is stable and similar across members of a monetary union, trade will be more stable and will decrease the occurrence of current account imbalances.

When a country has higher inflation in relative terms, its real exchange rate will appreciate. This will raise the need for nominal exchange rate depreciation/devaluation to restore the foreign trade imbalance. The supra-national authority will have to decide what is more important: unemployment or inflation. Empirical evidence, such as that of Weber and Beck (2005), shows that inflation rates were convergent. However, the nonlinearity of convergence seems to indicate that inflation speed decreases over time. Becker and Hall (2009) came to the same conclusion, arguing that price convergence before the establishment of the euro was higher than in the period after and until 2007. They also argue that the inflation rates between the NMS moved closer to each other than those of the EMU in the later years of their sample, and there are several groups of countries whose inflation rates have harmonized. Karanasos et al. (2016) come to a similar conclusion, arguing that price inflation among a group of founding members of the EMU has been converging, and is divided into three absolute convergence groups, while the NMS showed a divergent tendency.

While labour market institutions may be a reason for most of the difference in the development of prices, labour productivity differences are also an issue. The difference in the growth of labour productivity, as previously stated in the nominal convergence section of the first chapter, can be a source of price level divergence, as explained by the Balassa-Samuelson effect. According to this effect, catching-up economies experiencing booms in the tradable sector due to productivity growth leads to wage increases in the tradable sector, which spills over to the non-tradable sector, causing non-tradable sector wages to rise and subsequently increase the general price level. The increase of inflation is a cause of productivity growth and doesn't hinder the level of competitiveness between the catching-up economy and the developed trade partners.

The debate mostly focuses on the relationship between the degree of economic integration and the level of convergence, and whether monetary integration leads to asymmetric shocks or a greater level of convergence. According to De Grauwe (2018), the debate has two viewpoints: "the view of the European Commission" and "Krugman's view". The former view argued that monetary integration would lead to greater trade integration via intra-industry trade, i.e., asymmetric shocks are less likely to occur as a result of close trade integration. In contrast, the latter view argued that as a result of greater trade integration economies of scale would lead to concentration of industrial activities. Empirical evidence has refuted Krugman's view, showing that there is a positive relationship between bilateral trade intensity and cross-country bilateral correlation of shocks.

The far most important criterion is the similarity of shocks among members of a monetary union, examined by business cycle symmetry. Numerous factors have been estimated to impact business cycle synchronization: monetary integration, trade relations, specialization, fiscal policy, and fiscal relations.

The initial literature (see: Frankel & Rose, 1998; Halpern & Wyplosz, 1997), argued that integration would lead to a greater degree of business cycle synchronization among members of the monetary union, independent of the situation prior to accession. Other studies indicate the opposite (see: Papageorgiou et al., 2010), arguing that business cycles before the introduction of the euro were converging, and started diverging after 2010. A recent study by Caporale et al., (2015) argues that the divergence of business cycles among EMU members observed by previous studies is due to the difference between the core and periphery countries i.e. the core-periphery paradigm (see: Caporale et al., (2015). There is an explicit difference between economies of the core and peripheral member countries. This means that benefits for small and open economies, which are much less developed than the core countries, can decrease after joining the euro.

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The studies show that all the factors contributing to business cycle synchronization have been strong in the EMU except for fiscal policy, which has gradually changed after the global financial crisis in 2008.

3.4 Endogeneity hypothesis in a monetary union

The European Commission (1990), one of the most cited reports on European monetary integration, in line with the work of Papageorgiou et al. (2010), argues that monetary integration will lead to greater trade integration, causing trade to increase by a significant percentage, which will positively affect the degree of symmetry of business cycles. The first major problem in this assumption is related to the extent of trade monetary integration will provoke. As previously stated in this chapter, the creation of the EMU had a very small effect on trade integration (recent studies confirm an increase of 5–20 percent). The second major problem relates to the argument about the existing relationship between trade integration and economic activity. Moving trade barriers is assumed to increase intra-industry trade integration, because firms will be able to exploit economies of scale and diversification of the economy, making the economies of members of the monetary union more similar to each other and less susceptible to asymmetric shocks.

Krugman (1993), using the experience of the USA, argued that greater trade integration, in this case as a result of monetary integration, would lead to regional specialization of production causing greater shock asymmetry, i.e., business cycle divergence or de-synchronization.

However, the literature on the effect of trade on business cycle synchronization has not reached consensus. It seems that synchronization might have increased between the core countries of the EMU, and decreased in the peripheral countries and NMS (De Grauwe, 2018). Nevertheless, the share of the service sector as a part of GDP for many of the EMU

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economies is significantly higher than that of industry (services in EMU represent 70 percent of gross value added). As services do not tend to follow the specialization hypothesis, their constant growth as a percentage of GDP will neutralise the effect of regional industrial concentration on business cycle symmetry.

4 Scope and need for independent monetary policy in North Macedonia

When a country is hit by negative economic shocks a few alternative adjustment mechanisms, as presented in the previous chapter, can help their absorption. However, for many countries the exchange rate remains an important tool for adjusting relative prices when the country is hit by a negative economic shock. It is particularly important when prices and wages are rigid. The degree to which external price flexibility of the economy will be an effective tool for absorbing negative economic shocks depends on several characteristics of the economy, such as: (i) openness of the economy, (ii) euroisation, and (iii) ERPT, among others. These characteristics in fact determine the countries' choice of exchange rate regime.

The choice of an appropriate exchange rate regime is one of the most important decisions in the mandate of monetary authorities. This is particularly important for post-transition economies that are small and open, such as North Macedonia. However, monetary authorities can also choose to have an exchange rate regime that is not necessarily fixed or flexible. This type of intermediate exchange rate regime can have a different level of flexibility. On one side of the spectrum, we have a pure float, while on the other we have a currency board or full euroisation, and everything in-between – an intermediate group – that is a combination of both. The intermediate group consists of several exchange rate regimes: conventional fixed peg, pegged exchange rate within horizontal bands, and crawling pegs and managed floats.

Halpern and Wyplosz (1997), argue that in the early years of transition, the objective of price stability is the most important one, for which reasons, countries adopt fixed exchange rates. However, North Macedonia decided to adopt more flexible exchange rate regime because it lacked a sufficient volume of foreign exchange reserves to maintain the exchange

rate at a curtain parity, forcing her to go to the other extreme: moving from a managed float to a conventional peg. (see: APPENDIX: Table 10).

Sachs (1996), in line with Halpern and Wyplosz (1997), argued that economies in the first phase of transition should adopt fixed exchange rates in order to commit to stabilization, especially of the general price level. In the second phase, after bringing down inflation and maintaining price stability, and having learned how to defend the economy from economic shocks, it is advisable to adopt a flexible exchange rate.

Other factors that influenced the choice of exchange rate regime are the liberalisation of the trade and the capital market, restructuring of production and diversification, unemployment, and size of the economy, among others (Szapáry & Jakab, 1998).

According to the Calvo and Reinhart (2002), many countries are still stuck between the two extreme solutions. By investigating the movement of their foreign exchange reserves, interest rates, prices of goods, and monetary aggregates, Calvo and Reinhart (2002) argued that the low variability of the exchange rate was not due to a lack of real and nominal shocks, but a result of monetary policies aimed at maintaining a stable exchange rate. If we look at the exchange rate in Table 10, it can be noted that for most of the post-transition economies, Including North Macedonia, the volatility is particularly low, which can indicate the existence of fear of floating. In order to understand the fear of floating phenomena, attention should be paid to the factors leading to it, such as trade openness of the economy, euroisation, and exchange-rate pass-through.

The euroisation of the economy analyzes and measures the circulation and presence of euros in the economy. North Macedonia, like many other post-transition economies, has a lot of euros circulating in its economy because market agents frequently use euros as a medium of exchange. One of the main reasons for this is the instability in the early years of transition.

According to Brown and Stix (2014) the preferences of households, as the dominant segment of bank deposit euroisation, are primarily driven by the instability of the domestic currency in the past, which is the result of policies conducted by the central bank and the quality of the institutions. In theory, the way to measure euroisation is to count either: (i) circulation of foreign currency in the domestic economy and (ii) foreign currency deposits and loans. The only available empirical research that measures the circulation of euros in North Macedonia was conducted by Krstevska et al. (2001). According to their finding, there were 680 million euro circulating in the Macedonian economy, which was at that time around 330 euro per capita. Today's volume is expected to be much higher, however there is no public information available to confirm this. Another way to measure euroisation of the economy is to look at financial euroisation which is the measure of foreign currency deposits relative to total bank

Looking at Figure 5, in can be inferred that North Macedonia is highly euroized. However, there has been a slight process of de-euroisation. This process was interrupted by the global financial crisis and has since dropped from 58 percent in 2009 to 40 percent in 2020. According to Heenan (2012), the loan euroisation in North Macedonia can be attributed to several factors. Inflation and real exchange rate depreciation volatility present one of the factors. Since exchange rate volatility in North Macedonia is low compared to inflation volatility, it is better for the country to use the foreign exchange risk instead of inflation. Many (more than 90 percent) of the borrowings in foreign currency by the bank clients are not hedged.

The main factor that drove the process of de-euroisation was the implementation of the "Dinarization Strategy". According to a report by the NBRM (2018), two groups of measures were introduced.

Foreign currency deposits/Total deposits, in %
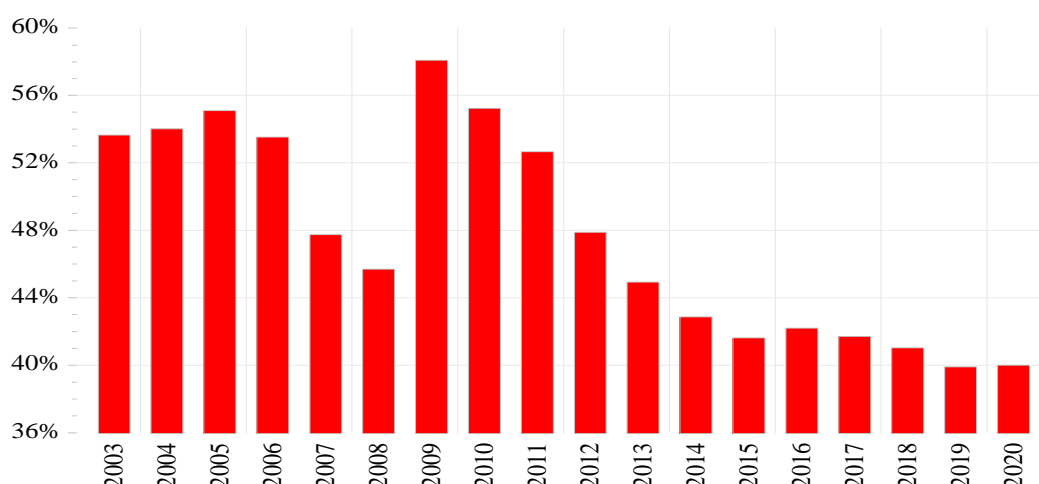
Figure 5 *Euroisation of the North Macedonian economy presented as FX deposits/total bank deposits (in %), 2003 -2020*

Source: NBRM (2021), own calculations

The first group consisted of monetary and fiscal policy measures that aimed at strengthening the macroeconomic environment and maintaining the stability of the financial sector. The second group consisted of special targeted measures, which are classified in five groups: (i) macro-prudential stability, (ii) structural/institutional policies, (iii) other measures, (iv) transparency in the NBRM's operations, and (v) financial education. However, the report argues that the Macedonian economy is likely to remain highly euroised for a long period of time.

Exchange rate pass-through is one of the main monetary transmission channels in small and open economies, such as North Macedonia. Economic literature defines it as the reaction of domestic prices to changes in the exchange rate. "Domestic price" usually refers to consumer prices, import prices, and producers' prices, but when measuring the ERPT consumer prices and import prices are usually used. ERPT is a very important indicator, which reveals whether exchange rate flexibility that alters the relative price differential can

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cause an expenditure-switching effect. The effect is defined as the adjustment of relative demand to nominal exchange rate fluctuations. This in turn influences the adjustment of the current account balance, subsequently influencing inflation, inflationary expectations, and overall economic growth. Since price level stability is the primary objective of monetary authorities, the ERPT channel is a very important one.

Empirical research suggests that the ERPT has been particularly high in North Macedonia. Besimi et al. (2006), who analysed the effect of the transmission mechanisms both in the short and long-run, argued that a unitary increase in the exchange rate causes prices to increase by 0.4 percent, i.e., a 10 percent exchange rate devaluation or revaluation will cause prices to adjust by 4 percent. A similar conclusion is derived in the study of Velickovski and Pugh (2011) (0.45 percent), Fetai (2013) (0.52 percent), and Kurtović et al. (2018 and 2019) (0.35 percent), and all share the opinion that the ERPT's effect on inflation has not changed over time. The results lead to the conclusion that an introduction of a different exchange rate strategy would negatively affect internal price stability, while having no significant positive effects on the economy. In other words, North Macedonia, which has a high exchange rate pass-through, should avoid exchange rate flexibility because it would cause enormous difficulty in maintaining price level stability, which as previously stated is the primary goal of monetary authorities.

After understanding the scope of conduct independent monetary policy, it can be concluded that its impact in this case is particularly low. Euroisation and ERPT are both high, which prevents the NBRM from using the exchange rate as an instrument for absorbing economic shocks. If these constraints are overcome, the next dilemma would be whether it is necessary to conduct independent monetary policy. This can be answered by looking at the business cycle synchronization and its convergence over the years. When business cycles of North Macedonia and the EMU are low and converging, it is unlikely that the national

authorities will seek to have independent monetary policy since the supranational monetary policy will serve as a macroeconomic stabilizer.

According to OCA theory, one of the most desirable features of a currency union is business cycle symmetry, i.e., member states should exhibit similar economic shocks and they should be of the same magnitude.

If shocks do not have these two features, we consider them asymmetric. In order to assess the degree of synchronization of economic shocks, a simple statistical analysis will be conducted in following chapters.

4.1.1 Symmetry of business cycles

In economic literature "business cycles" refer to the movement of economic activity over a defined period of time. Two different types of business cycles exist: classical cycle and growth cycle. I will focus on the growth cycle, which is a cyclical (detrended) component of GDP around its long-term trend. The data on real gross domestic product is taken from IMF database. It is a quarterly database of real seasonally adjusted GDP (base year 2010) for North Macedonia and the Euro Area. The data is converted into a logarithmic scale. Since the data still contains random components, I use the Hodrick-Prescott (HP) filter to isolate them.

Next, in accordance with Ravn and Unhil (2002), I take a smoothing parameter in the value of $\lambda = 1600$ since the data is of quarterly frequency. After extracting the trend using the HP filter, we can find the cyclical component, which can be considered as the output gap. The output gap is tested for stationarity with the augmented Dickey-Fuller test, which includes an intercept. The test shows that both series are stationary in level.
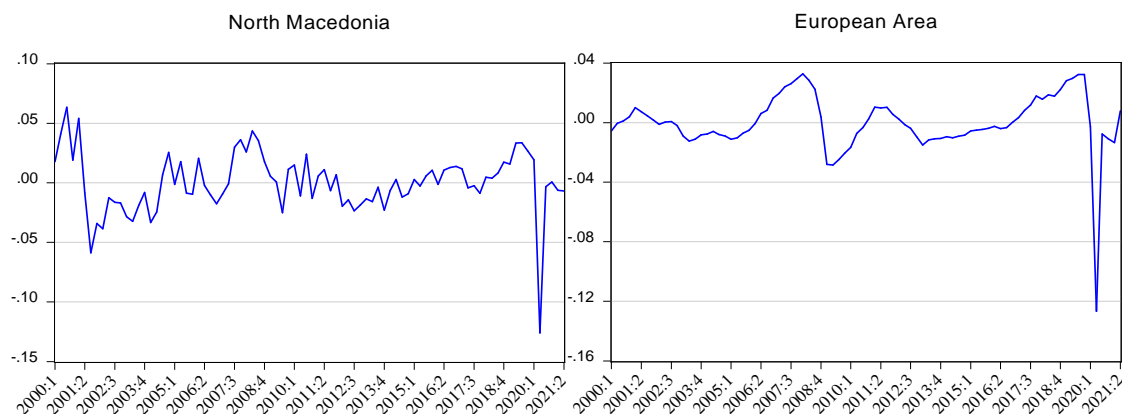
Figure 6: *Business cycles of North Macedonia and the Euro Area*

Figure 6 is a graphic representation of the output gap of North Macedonia and the Euro Area, which at first glance shows that the business cycles seem to be synchronized, and that the volatility of the Macedonian output is higher than that of the Euro Area. Table 1 shows that the volatility of the business cycles, which is measured as the standard deviation of the output gap, is higher in North Macedonia than in the Euro Area (SD$_{MK}$=1.97 and SD$_{EA}$=1.43), with a tendency to decrease in North Macedonia and a tendency to increase in the Euro Area starting with the beginning of the global financial crisis.

The strength of the relationship between the movement of the output gaps can be determined with the Pearson correlation coefficient. The value of the relationship for the period 2000:Q1–2021:Q2 is 0.67, and is statistically significant at level of 1 percent. The correlation index suggests that business cycles between North Macedonia and the Euro Area

are moderately correlated. Table 1 summarizes the correlation coefficients for different subperiods (pre-crisis period, crisis I period, between-crisis period, and crisis II period).[10]

Table 1: *Business cycle synchronization with the Euro Area, 2000: Q1–2021: Q2*

	Pre-crisis period*	Crisis I period	Peak of crisis I	Between-crisis period	Crisis II period	End period*
Correlation	0.2879	0.5342	0.1284	0.9098	0.9845	0.6669
Variability MK	2.50	1.71	/	3.12	/	1.97**
Variability EA	1.14	1.43	/	3.23	/	1.43**

Note: (*) indicates that 2001 is excluded from the dataset because the asymmetric domestic shock in North Macedonia was caused by an armed insurgency, which can be considered as an outlier. (**) indicates that the period excludes the period of the global Covid-19 pandemic (2020: Q1–2021: Q2), which skews the variability significantly.

Dividing the sample into subsample periods can help show whether synchronization of business cycles has increased, decreased or remained the same. The specific periods are characterized by external and country-specific shocks, like the global financial crisis and the COVID-19 global pandemic.

The first period (2000:Q1-2007:Q4) is characterized by the lowest degree of business cycle correlation. One of the major factors that influenced the gradual increase was the trade integration process, which started with the agreement on trade and trade-related matters between North Macedonia and the EU in 2001, and with the SAA which became effective in 2004.

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[10] Pre-crisis period is 2001:Q1–2007:Q4; Crisis I period refers to the global financial crisis and is the period 2008:Q1–2015:Q4 with a peak in 2008; Between-crisis period is 2016:Q1–2019:Q4; and Crisis II refers to the COVID-19 global pandemic and is in the period of 2020:Q1–2021:Q2.

During the global financial crisis and the subsequent EU debt crisis, the business cycles converged even further, reaching an average of 0.5342. During this period, 2009 was the roughest year for both North Macedonia and the Euro Area, which caused the business cycles to decouple to 0.1284. The reason for the decoupling can be attributed to differences in the financial sectors of the two economies. The financial crisis in North Macedonia started a bit later and the exposure of the Macedonian economy to international financial markets was significantly lower than the economy of the Euro Area. These findings are confirmed in a study by Filipovski et al. (2018), who argued that business cycles' convergence was temporarily reversed during the peak of the global financial crisis. They also found that economic shocks coming from the EU were transmitted immediately into North Macedonia's economy, and the magnitude of the transmission was particularly high. The non-liner TAR method used in the study also indicates that the EU contraction affected domestic contraction less than the EU contraction affected expiation. Gouveia (2014) confirms these findings, adding that North Macedonia was among the Balkan countries with the highest level of business cycle synchronization, and that the synchronization pattern in North Macedonia remained the same over the observed period.

Looking into the literature concerning the determinants of business cycle synchronization, one should pay attention to the effect of trade as well as consumption, financial integration, and similarity of economic policies, among others. Looking at the international trade statistics, it can be inferred that international trade, even though limited, had highest impact on business cycle synchronisation. Even though 77 percent of exports go to the EU, and imports are roughly 46 percent of total imports, evidence shows that exports (which are considered to be the superior driver of business cycle synchronization) have been performing worse than imports. Consumption, for which GDP per capita in PPP can be used, is presently at 38 percent relative to that of the Euro Area and 44 precent relative to the EU

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average, making it less likely to be a strong indicator of business cycle synchronization, with the possibility of increasing its role as North Macedonia approaches the Euro Area's average.

The same can be argued for the role of investments in business cycle synchronization. In the period between 1995 and 2020, the FDI has been 3.85 percent of GDP, and it has not exhibited a significant tendency to increase. In respect to financial linkages as an indicator for business cycle synchronization, it can be argued that this channel has a modest strength. This was confirmed during the global financial crisis, when the North Macedonia's financial sector was hit with much less severity than that of the Euro Area. Even though the Macedonian economy relies on foreign capital (i.e., in 2020 the banking sector's foreign assets accounted for 72 percent of total assets, and 11 out of the 15 banks are foreign owned), conservative lending and lack of sophisticated financial instruments prevented the further spread of the financial crisis into the Macedonian banking and financial sector. In fact, the main transition channel was trade, as both exports and imports fell significantly, causing the economy to go into recession. This demonstrated how vulnerable the Macedonian economy was to the economic conditions in the Euro Area and how economic shocks are transmitted via the trading sector. Unlike in more developed countries, in North Macedonia the real sector caused the crisis in the financial sector, not the other way around, as it would be expected.

There is hardly any literature on the effects remittances have on business cycle synchronization.[11] Hildebrandt and Moder (2015) measured the business cycle synchronization between West Balkan countries and the European Union, and confirmed that,

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[11] One of the first major works on this topic was that of Barajas et al. (2012), which confirmed a positive relationship between business cycle synchronization and remittances. This means that countries which receive a considerable volume of remittances are more connected and vulnerable to external shocks. When remittances are procyclical it is assumed that they are driven by self-interest, and when they are countercyclical it is assumed that they are driven by altruism.

among other factors, remittances sent from Europe had a significant effect on business cycle synchronization – they were procyclical and caused business cycles to decouple. Bucevska (2011) analysed the role of remittances in the financial crises, arguing that remittances are strongly correlated with the business cycle and they are procyclical, in support of the aforementioned study. As remittances are an important source of financing and income, their role in business cycle synchronization should be further investigated.

However, more sophisticated analysis is required to measure the exact degree of correlation between the two economies and the nature of shocks. This type of analysis will help identify supply and demand shocks and allow differentiation of shocks from responses.

5   Testing the Optimum Currency Area theory for North Macedonia

Conducting empirical research on the OCA theory is a challenging task as there is no single methodological framework to precisely measure the degree of convergence between the economies of North Macedonia and the Euro Area. Most of the empirics are based on techniques that measure indicators which are closely connected to the OCA theory such as exchange rate, business cycles, economic shocks, and trade. In this section I will present some of the techniques commonly used in this type of research and will conduct analysis based on the two most widely used ones.

The first method, called the OCA index, was established by Bayoumi and Eichengreen, (1997). The OCA index connects the variability of the exchange rate to the main OCA criteria: business cycle synchronization, export diversification, bilateral trade, and size of the economy. The OCA index is based on the following equation:

$$SD(e_{ij}) = a + b_1 SD(\Delta Y_i - \Delta Y_j) + b_2 DISSIM_{ij} + b_3 TRADE_{ij} + b_4 SIZE_{ij}$$

(1)

Other authors, such as Horváth (2007), replace the size variable with trade openness and financial sector development. For a robustness check, two more variables are commonly used: differences in rates of inflation between the two countries as supported in the work of Ingram (1962), and the dollar exchange rate as a proxy for the international exchange rate regime.

The second method measures the degree of business cycle synchronization. For this method, different techniques are used to detrend GDP, which is then used to measure a pairwise correlation coefficient that also includes specific VAR analyses to test for several

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features of the economic shocks. One of the techniques commonly used in the literature was employed in the previous chapter.

The third method is the G-PPP theory, developed by Enders and Hum (1994), which measures the convergence of real exchange rates and checks for stationarity. According to this method, even though it can turn out that fundamentals determining real exchange rates are not stationary, and subsequently cause the real exchange rates to be non-stationary, if the fundamentals are integrating then the real exchange rate will follow a similar trend. In other words, the method checks if the exchange rates are moving towards a long-term equilibrium and how fast this process is. The method is based on the following equation:

$$r_{12t} = \beta_0 + \beta_{13t} r_{13t} + \beta_{14t} r_{14t} + \ldots + \beta_{1mt} r_{1mt} + \varepsilon_t \tag{2}$$

The fourth method is the gravity model, which is used for indirectly measuring the endogeneity of the OCA criteria by connecting trade to explanatory variables including output, distance between the countries, and land areas. The gravity equation is typically specified in the following way, and is consistent with the work of Rose (2000):

$$\ln(X_{ij}) = \beta_0 + \beta_1 \ln(Y_i Y_j) + \beta_2 \ln(\frac{Y_i}{Pop_i} \frac{Y_j}{Pop_i}) + \beta_3 \ln(Area_i Area_j) + \sum_{k=1}^{n} \beta_{3+k} D_k \cdots \tag{3}$$

In addition to this, most authors add several dummy variables to capture the common characteristics of these countries, such as common language, common border, distance, colony, nominal exchange rate volatility, and common trade agreements.

This research will attempt to use two of the methods described above (the G-PPP method and the OCA index) to measure the optimality of the currency union between North Macedonia and the Euro Area.

5.1 The Generalized Purchasing Power Parity for North Macedonia

In the OCA literature, one of the most widely used methods for testing the optimality of a currency union is the theory of G-PPP. The theory, which was developed by Enders and Hum (1994), is based on the idea first proposed by Mundell (1961), who argued that regions constitute optimum currency areas when their real economic disturbances are similar to each other. The work of Enders and Hum (1994) found that a sufficient level of integration of the fundamentals of these countries causes real exchange rates to converge. The stationarity of the real exchange rates implies that, for this set of countries, the PPP holds (i.e., prices of these two countries are mirrored in the nominal exchange rates). This means that their capital and goods markets are strongly linked to each other, causing their economies to converge. A common trend may exist in the long run, even though the exchange rates are non-stationary, which is a sign of a convergence. The long-term relationship is commonly tested with the help of G-PPP theory, and the Equation (2) presented in the work of Enders and Hum (1994). A number of empirical studies have used the G-PPP to test if a group of countries form an OCA, such as that of Papazoglou et al. (2016) and Caporale et al., (2015) for the Baltics, and Sideris (2011) for the NMS.

In order to test if a set of countries constitute an optimum currency area, Equation (2) should be used to check if a long-term relationship between the bilateral exchange rates exists. The equation is specified in the following way: r_{2jt} is the logarithm of the bilateral real exchange rate between two countries i and j for a given period t; i is a constant term; and B_{ijs} is the degree of co-movement of the real exchange rates, for which different parameters of cointegration vectors are used. E is a stochastic error term.

This way, we can measure the interdependencies of the group of economies being considered. The β coefficients, according to empirical research, are found to be connected to the aggregate demand function of the price of goods at which supply is equal to demand. The greater the similarity between the aggregate demand functions, the lower the value of the β coefficient should be.

5.1.1 The data set

The real exchange rate's main purpose is to measure the price of foreign goods relative to the price of domestic goods. Mathematically we calculate the real exchange-rate (r) by multiplying the nominal exchange rate (s) with the ratio of the foreign price level (p^*) and the domestic price level (p). The data for calculating the real exchange rate was taken from Eurostat NewCronos database. The data set consists of Harmonized Consumer Price Indices (HCPI) bilateral exchange rates with 2015 as the base year (2015=100). Data for the period 2009:Q1 and 2021:Q11 is taken, and not earlier one because of the break each of the series exhibit due to the global financial crisis. Both the HCPI and the nominal exchange rates consist of monthly observations, and the nominal exchange rate is a period average. Data is collected for North Macedonia, Serbia, and Croatia because these two countries are among the largest trade partners of North Macedonia. Croatia is currently under ERM II investigation and soon to join the EMU, while Serbia is a candidate country for EU accession.

5.1.2 Unit root test

The next step is to check for stationarity of the individual data sets.
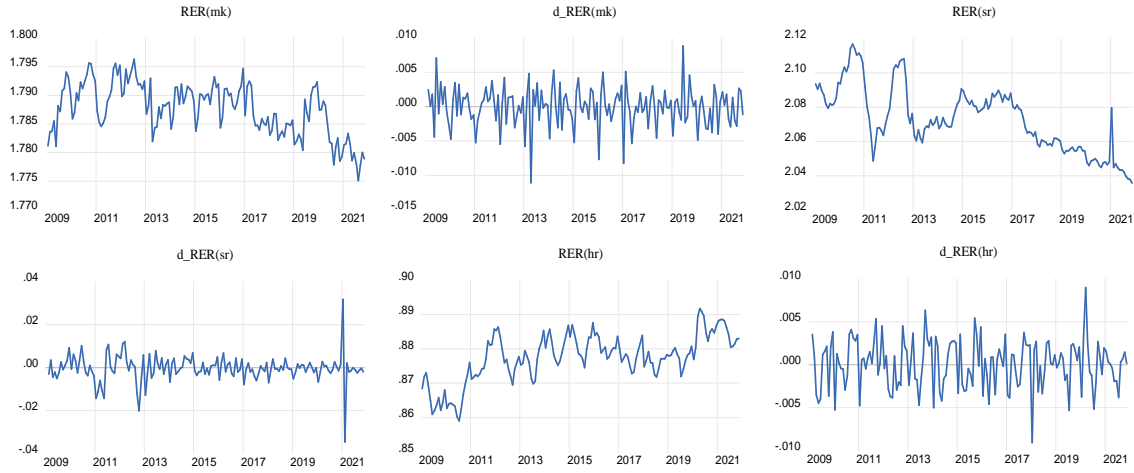
Figure 7: *Real exchange rate dynamics of North Macedonia, Serbia, and Croatia against the euro, 2009:M1-2021:M11*

`The time series are given in Figure 7, where the logarithms of the bilateral exchange rates to the euro are plotted into separate graphs including levels and first differences. From visual inspection, it can be inferred that all series are non-stationary and with observable trend.

In order to formally test for stationarity, I use the Elliott-Rothenberg-Stock (ERS) test individually for each of the series. The Schwarz Information Criterion (SIC) is used to select the lag length. The results are calculated using the ordinary least squares (OLS) AR special method, and the deterministic term for testing stationarity consists of a constant and a trend depending on the results. This is in line with the work of Papazoglou et al. (2016), which used the same methodology to check for presence of G-PPP in Baltic countries. Similar studies use other unit root tests, and the results vary according to the test that was performed.

According to the results, the exchange rate of Croatia (r_{hr}) is stationary, while those of North Macedonia (r_{mk}) and Serbia (r_{sr}) are non-stationary. Performing a unit root test on the first difference, the series of both North Macedonia and Serbia become stationary, implying that we can move on to the cointegration analysis. Results of the unit root test are reported in Table 2.

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Table 2: *Real exchange rates of Macedonia, Croatia, and Serbia vis-à-vis the euro, ERS unit root test, 2009:M1-2021:M11*

	Levels				**1st differences**			
Variable	**D. term**	**P-stat**	**Crit. val. (5%)**	**lag**	**D. term**	**P-stat**	**Crit. val. (5%)**	**lag**
r_{mk}	C,T	7.07	5.65	0	C,T	*0.93*	5.65	1
r_{hr}	C,T	*3.08*	5.65	1	C,T	1.55	5.65	0
r_{sr}	C,T	5.85	5.65	0	C,T	*1.24*	5.65	0

Notes: C – Constant, T – Linear Trend, D. term – Deterministic term, Crit. val. – Critical value, P-stat – P-statistics.

5.1.3 Testing for G-PPP using cointegration analysis

In order to test if a long-term equilibrium G-PPP relationship between the real exchange rates exists, the Johannes Cointegration VAR methodology is used. The number of lags for the VAR is 1, and it is determined by the SIC. SIC showed the most precise results out of all lag selection criteria when the lag order selection analysis was conducted. The diagnostic statistics for all three VARs are satisfactory. To identify the number of cointegrations, I use both Johansen's trace and maximum eigenvalue test. In addition, I use no intercept and no trend when VAR analysis is performed. This is due to the results obtained by performing the VAR analysis with different determinant trend assumptions. According to the results shown in Table 3, it can be inferred that a G-PPP relationship exists between the bilateral real exchange rates of the respective countries and the euro, and there is one cointegrating vector.

This may imply that these three countries operate as an optimum currency area; i.e., the exchange rates are closely related and form a G-PPP relationship, and together the bilateral exchange rates of North Macedonian, Croatia, and Serbia are stationary. The reason for this is that after transition and pre-crisis period the countries: (i) were able to improve their trade relations with the EMU countries, (ii) had stable nominal real exchange rates with the

euro given their exchange rate regimes, and (iii) did not experience major asymmetric economic shocks.

Table 3: Real exchange rates of Macedonia and Serbia vis-à-vis the euro, Cointegration analysis

Rank	Maximum eigenvalue	Crit. val. (95%)	p-value	Trace	Crit. val. (95%)	p-value
R = 0	***21.33***	21.34	0.01	***25.85***	24.27	0.03
R = 1	4.26	4.27	0.58	4.32	12.32	0.64
R = 2	0.24	0.39	0.68	0.24	4.13	0.68

Table 3 shows the cointegration coefficients of the vector that expresses the G-PPP between the euro exchange rates for the period after the peak of the global financial crisis. As noted in Sideris (2011), following a study by Juselius (2006), the trace tests are more robust than the maximum eigenvalue test. For that reason, only the results of the trace test are included in the cointegration analysis. In addition to this, the data is normalized on the Macedonian denar to euro real exchange rate for easier interpretation. Since logarithms are used, interpretation of the elasticities can be made with regard to the long-term equilibrium relationship. According to Enders and Hurn (1994), low values of the cointegration parameters are an indicator of significant homogeneity of the economies and shouldn't be confused with interaction between the real exchange rates. This also implies that the aggregate demand structure of these economies is similar, because it is reflected in the movement of the output.

According to the results presented in Table 4, a 1 percent change of the Macedonian denar to euro real exchange rate is associated with a 0.99 percent decrease (increase) in the Serbian denar to euro real exchange rate, and -0.44 percent decrease (increase) of the Croatian krona to euro real exchange rate.

Table 4: Johansen cointegration analysis of the real exchange rates between North Macedonia, Serbia, and Croatia with the euro, 2009:M1-2021:M11

	r_{mk}	r_{hr}	r_{sr}
Coefficient	1.00	-0.989	-0.444
Standard error		0.110	0.046
	Adjusted coefficient	**T-statistics**	
Δr_{mk}	0.019	0.550	
Δr_{hr}	0.142	4.401	
Δr_{sr}	0.136	1.788	

Table 4 also estimates the adjusted coefficients of each of the bilateral real exchange rates. The adjusted coefficients indicate the speed at which the bilateral real exchange rates adjust towards the long-run equilibrium rate in response to any shock or deviation from G-PPP. If the variables are not statistically significant, this implies that the G-PPP does not influence the short-term dynamics of the variable. According to the estimates, the euro-based Macedonian real exchange rate adjustment is not statistically significant, implying that this exchange rate is poorly exogenous to the cointegration system. There may be several reasons behind this, most notably the regulatory framework of the national authorities, and constant interventions in the foreign exchange market by the NBRM that may influence the dynamics of the real exchange rate.[12] Further analysis should be undertaken to establish the factors influencing the movement of the real exchange rate. The Croatian krona to euro real exchange rate adjusts towards the long-run equilibrium at a monthly rate of 14.2 percent, while the Serbian denar to euro real exchange rate adjusts at a monthly rate of 13.6 percent.

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[12] See the analysis of Bogoev et al. (2008) about the exchange rate dynamics in North Macedonia for the period before the global financial crisis. That study finds no presence of the Balassa-Samuelson effect, and the depreciation of the real exchange rate is stipulated to be influenced by an inverse quality effect, as argued in the work of Loko and Tuladha (2005).

Finally, an analysis of the period during transition and from the early post-euro period until the wake of the global financial crisis can help determine the effect of the introduction of the euro and the upcoming changes arising from a potential significant increase in policy convergence.

5.2 The OCA index for North Macedonia

Bayoumi and Eichengreen (1997) provided another method to estimate the OCA criteria. As mentioned above, the variables observed are exchange rate, output, trade, and exports, and they are presented using the variables from Equation (1).

SD(E$_{ij}$) is the standard deviation of the change in the logarithm of the end year bilateral exchange rate between countries *i* and *j*; *SDY$_{ij}$* is the standard deviation between the difference of the logarithm of real output between countries *i* and *j*; *DISSIM$_{ij}$* is the sum of the absolute difference in the share of agricultural, mineral, and manufacturing trade (SITS- 7 categories classification) in total merchandise trade; *TRADE$_{ij}$* is the mean of the ratio of bilateral exports to domestic GDP for the two countries; and *SIZE$_{ij}$* is the mean of the logarithm of the two GDPs measured in euros. The more these criteria are fulfilled, the smaller the OCA index is expected to be – low volatility of the nominal bilateral exchange rate between EMU and North Macedonia.

5.2.1 Calculating the OCA index criteria

To measure the OCA index for North Macedonia, I followed Bayoumi and Eichengreen (1997) and applied the formulas below to calculate each of the variables. The analysis covers the period between 2002 and 2020 for which annual date was used. The annual data was created from monthly and quarterly data. Except for the trade variable, which

was obtained from the State Statistical Office of the Republic of North Macedonia electronic database, all other variables' data comes from Eurostat's electronic database.

Exchange rate variability is calculated by drawing the standard deviation of the end-of-year nominal bilateral exchange rate movement from period t to t -1. The differential of the log of the nominal bilateral exchange rate is estimated on a quarterly basis. For each year, the standard deviation is calculated using the quarterly estimates.

$$SD(e_{ij}) = SD[\Delta(\log e_{ij})]$$

Economies' size consists of measures of the log transformations of real GDP expressed in euros. It is the sum of the logarithms of the two GDPs expressed in euros.

$$SIZE_{ij} = \frac{1}{T}\sum_{t=1}^{T}\left(\log y_{it} + \log y_{jt}\right)$$

Trade intensity is measured as the sum of the ratios of total bilateral trade relative to their GDPs at market prices. ex_{jit} is the current exports from country i to country j, ex_{jit} is the current exports from country j to country i at time t, and y_{it} and y_{jt} are the GDPs at market prices at time t for country i and country j, respectively.

$$TRADE_{ij} = \frac{1}{T}\sum_{t=1}^{T}\left(\frac{ex_{ijt}}{y_{it}} + \frac{ex_{jit}}{y_{jt}}\right)$$

Business cycle synchronization is the standard deviation of the differences between the log differential of country i's (y_i) and county j's (y_j) real output, where t-1 denotes real GDP of the period before. For each year, standard deviation is calculated using the quarterly estimates.

$$BSC_{ij} = SD(\Delta y_i - \Delta y_j)$$

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Dissimilarity of export commodity structure is measured using the sum of the absolute differences of the relative shares of each of the seven SITS categories between country i and j. Notations A_{it} and A_{ij} are the relative shares of category-one merchandise at time t, B_{it} and B_{jt} are the relative shares of merchandise export belonging to category two. The same applies for the relative shares of merchandise categories three, four, five, and six, for which notations D, E, F, and G are used, respectively.

$$\text{DISSIM}_{ij} = \frac{1}{T} \sum_{t=1}^{T} \left[\left| A_{it} - A_{jt} \right| + \left| B_{it} - B_{jt} \right| + \left| C_{it} - C_{jt} \right| \right]$$

While a majority of the empirical studies used regression panel analysis, for which a data set of multiple countries is included, for this empirical study a time series regression analysis is used employing the ordinary least square (OLS) method. While unconventional, for such a small time series it will produce the same results. When putting together the data matrix, I follow the advice of Bayoumi and Eichengreen (1997a, b, and 1998a), which argued that time series should be divided into several sub-periods which can help measure convergence. Additionally, it should be noted that the OCA index in this case does not fully assess the preparedness of North Macedonia to adopt the euro but helps us understand the dynamics in play and the effect each of the OCA criteria has on the variability of the exchange rate.

5.2.1.1 *Methodological problems of measurement and analysis of each variable*

While it may show some similarities between the economic structures of North Macedonia and the EMU, reasons to be careful with our final interpretation include imperfect data accuracy, a short time series, and possible measurement mistakes. These issues and

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others may influence not only the coefficients of the independent variables, but also the slope and intercept of our regression model.

Before moving forward with the testing of the relationship between the nominal exchange rate variable and the OCA criteria included in our analysis, a brief analysis for each of the criteria is made.

Table 5 *Exchange rate volatility of MKD/EUR, based on monthly data*

SD nominal exchange rate	2001 – 2010	2011 – 2020	2001 – 2020
North Macedonia - Euro Area	0.0736	0.0712	0.0721

Note: Volatility is the standard deviation of the change in logarithm of the bilateral trade, based on monthly data.

From Table 5 it can be inferred that the volatility of the exchange rate has been decreasing. In the second period between 2011 and 2020 a slight improvement can be observed – the variability of the exchange rate dropped from 0.0736 to 0.0712. Looking at each annual value, it can be concluded that the real exchange rate does not follow any specific trend. The differences in the two periods stem from events such as the armed conflict in 2001/2002 and the global financial crisis between 2008 and 2010, peaking in 2009.

Table 6 *Business cycle symmetry between North Macedonia and Euro Area*

SDY variable	2001 – 2010	2011 – 2020	2001 – 2020
North Macedonia – Euro Area	0.030	0.017	0.023

Note: Symmetry of shocks is calculated as the standard deviation of the difference in the logarithm of real output between North Macedonia and the Euro Area.

The response of the economies when facing demand and supply shocks, as previously stated, is crucial when assessing the readiness of an economy to adopt a single currency. If economies' business cycles are symmetrical, and converge over time, it is a good sign that they should establish a monetary union. The correlations between the business cycles of

North Macedonia and the EMU are depicted in Table 6. The lower the value of the variable, the greater the degree of synchronization of business cycles between North Macedonia and the EMU. Like the other variables, this one was divided into two periods. In both periods the business cycles are synchronized, which was also confirmed by the business cycle analysis in the previous chapter. One of the reasons for such favourable development is the gradual trade integration with the EU. Considering that trade integration, among other forms of economic integration, will probably continue exhibiting the same positive trend, though less pronounced than previously, business cycles are likely to continue synchronizing.

Table 7 *Economic size of North Macedonia and the Euro Area*

SIZE variable	2001 – 2010	2011 – 2020	2001 – 2020
North Macedonia - Euro Area	10.744	10.904	10.824

Note: Size is the average of the sum of the logarithm of the GDD of North Macedonia and the Euro Area in euros.

Other benefits of adopting the euro may arise from the size of the Macedonian economy. These benefits are large for small economies like North Macedonia because the need to use separate currency in transactions is very small. Looking at Table 7, it can be inferred that the value of transactions has been increasing over time. The results show that the size of the two economies has been increasing over the 20-year period.

Table 8 *Bilateral trade between North Macedonia and the Euro Area*

TRADE variable	2001 – 2010	2011 - 2020	2001 – 2020
North Macedonia - Euro Area	0.173	0.292	0.232

Note: Bilateral trade is the mean of the ratio of exports to GDP between North Macedonia and the Euro Area.

The trade variable shown in Table 8, which depicts the bilateral trade between North Macedonia and the EMU, indicates that while the economy is structurally converging with the

EMU, the degree of trade integration has been increasing as well. Although the values do not convey any meaningful information on their own, together they reveal a positive trend. Looking at the annual values, it can be inferred that both exports to and imports from the EU have been gradually increasing over time. The average bilateral trade is larger in the second decade than in the first. The raw data also shows that around 70 percent of the total trade of North Macedonia is with EMU member states.

Table 9 *Dissimilarity of exports between North Macedonia and the Euro Area*

DISSIM variable	2001 – 2010	2011 – 2020	2001 – 2020
North Macedonia - Euro Area	1.161	0.552	0.857

Note: Dissimilarity is the absolute difference of the share of same group commodities between to total export between the North Macedonia and the Euro Area

Table 9 shows the dissimilarity of export commodity structure. As for most of the variables, the absolute values are difficult to interpret, and we can only look at them in relative terms. The downward trend indicates that the export commodity structure of North Macedonia is becoming more similar to that of the EMU. However, there are still major differences. The largest change in North Macedonian commodity exports can be observed in the machinery and transport equipment category, which has also been the dominant merchandise category throughout the entire period.

5.2.2 Statistical analysis of the OCA criteria

Testing the variability of the bilateral nominal exchange rate between North Macedonia and the EMU, using the OCA index of Bayoumi and Eichengreen we employ OLS regression analysis using the following econometric model, Formula (1):

$$SD(e_{ij}) = a + b_1 SD(\Delta Y_i - \Delta Y_j) + b_2 DISSIM_{ij} + b_3 TRADE_{ij} + b_4 SIZE_{ij}$$

Since the aim of the investigation is to infer if a relationship between the proxies of the independent theorized variables and the exchange rate variability is present, and if that relationship became stronger over the years, I will not perform common tests included in OLS analysis. Due to the small sample size and possible outlier like the years 2001 and 2009, and the nature of the variables, the model is expected to suffer from multicollinearity, autocorrelation and perhaps heteroskedasticity. The simple OLS analysis provides us with the following results (see Appendix: Table 11):

$SD(E_{ij}) = -0.0365 + 0.005SDY_{ij} - 0.0005DISSIM_{ij} + 0.0036SIZE_{ij} - 0.00765TRADE_{ij}$

$$N = 20, R^2 = 0.37$$

Two issues are evident from our regression analysis. Only trade and size are statistically significant at $p=0.05$, while business cycle symmetry and dissimilarity are statistically unsignificant. All variables except for dissimilarity have the sign predicted by the OCA theory. When we divide the set into two periods, 2001-2010 and 2011-2020, all variables become statistically insignificant, and their signs remain the same.

Because the trade variable is highly correlated with the rest of the variables thus having a significant impact on the results, I will use Horváth (2005) method and replace it with openness variable (OPEN). While trade should be robustly correlated with exchange rate variability because trade linkages significantly decrease exchange rate variability, we might expect economic openness to improve the existing model. Economic openness is defined as:

$$OPEN_{ij} = \frac{1}{T} \sum_{t=1}^{T} \left(\frac{ex_{it} + im_{it}}{y_{it}} + \frac{ex_{jt} + im_{jt}}{y_{jt}} \right),$$

which is the sum of international trade to GDP ratio between country i and j. According to theory greater openness is associated with smaller exchange rate variability, however in many

studies the sign of openness varies greatly. According to what was said in the previous chapter, the relationship between economic openness and the low exchange rate variability can be explained by the fear of floating as the sign of the beta coefficient is negative implying that increased openness of the economy leads to fear of floating. The results of the new model are the following (see Appendix: Table 12):

$$SD(E_{ij}) = -0.0997 + 0.0073SDY_{ij} + 0.0002DISSIM_{ij} + 0.0097SIZE_{ij} - 0.0261OPEN_{ij}$$

$$N = 20, R^2 = 0.32$$

According to the results of the model, only trade openness and size of the economies are statistically significant at $p = 0.05$. However, unlike in the previous model in this all variables have a sign in line with the theoretical assumptions made by the OCA theory. This means that the variability of the exchange rate can be explained by the OCA criteria., and the model we use is more appropriate than the previous one. Additionally, we divide the data into two period, and perform the same analysis as previously, and are able infer that only SIZE and OPEN are statistically significant and only economic diversification variable changes its sign from positive to negative.

Nevertheless, keeping in mind that the variability of the exchange rate over the last 20 years has marginally decreased, and this can be explained by the behavior of the OCA criteria which have been moving towards a positive direction, the low variability of the exchange rate can also be explained by the continuous intervention of the monetary authorities. In order to incorporate the interventions of the NBRM into our model I will use the model presented in Horváth (2005), where instead of $SD(E_{ij})$ as a dependent variable he uses:

$$Pressure_{ij} = SD\left[\lambda\Delta(\log(e_{ij})) + \eta(Intervention_i - Intervention_j) + \mu\Delta r_{ij}\right]$$

which includes the effects the interventions of the central bank and the interest rates differential have on the exchange rate variability, where the weight of each of the composite variables is multiplied by the parameters λ, η and μ what are determined as the inverse of the variance of each of the variables. Such analysis can help us understand which of the OCA criteria creates the highest pressure on the monetary authorities to intervein and attempt to stabilize the exchange rate. The Interventions which is part of the pressure variable is calculated using the following formula:

$$Intervention_i = -\frac{\Delta(\mathrm{Re}\,s_i)}{M0_i}$$

where *Res* are the foreign exchange reserves and M0 aggregate is base money. *r* is the difference between the money market short term interest rates. All variables were taken from the NBRM's database and Eurostat. Since data on foreign exchange reserves and short-term interest rates is limited, I only use the period 2006–2018 for the analysis.

In addition to this the author also adds a new variable named *FIN* and it represents the financial development between the two countries. The variable is calculated using the following formula:

$$FIN_{ij} = \frac{1}{T}\sum_{t=1}^{T}\left(\frac{M2_{it}}{y_{it}} + \frac{M2_{jt}}{y_{jt}}\right),$$

where *FIN* is the sum of the Monetary aggregate *M2* as a share of nominal output *y* of the two countries. The new model provides us with the following results (see Appendix: Table 13):

Pressure$_{ij}$ = –4247.5 - 1836.5SDY$_{ij}$ +35.9DISSIM$_{ij}$ +403.7SIZE$_{ij}$ – 106.6OPENE$_{ij}$ + 57.3FIN

$$N = 13, R^2=37$$

According to the results only economic openness is statistically significant at p=0.05 and all variables have the desired sign. Also, the R^2 of the last model is highest, greatest explanatory power. The results from the second two equations which were taken as important for our analysis show similar features in respect to economic diversification. It seems that industry specific shocks are not an important factor for monetary authorities. In both regression models the beta coefficients of the diversification variable have the lowest values.

In addition to this, it seems that business cycle is the most important determinant in the models. The sign and its coefficient tell us that differences in business cycles create high pressures on monetary authorities to intervene. The positive sign of financial development, according to Horváth (2005) is a sign that financially developed countries are able to withstand greater exchange rate pressures.

5.3 Conclusion

The study of the G-PPP aimed to analyse the degree of convergence of North Macedonia with two of its largest trade partners, which in the past were members of one confederation. One of these countries (Serbia) is a candidate country for EU accession which is at similar stage of EU integration with North Macedonia, while the other (Croatia) is currently under ERM II investigation. The analysis examines whether the three countries form an OCA with the EMU. The analysis shows that the three countries are converging and are on their way to forming an OCA with the EMU.

This is achieved by employing a G-PPP analysis consisting of a cointegration test that examines the joint behaviour of the exchange rates in respect to the euro in the long-run, using the period after the peak of the global financial crisis, which in the case of North Macedonia was 2009. The results provide evidence of the OCA. One explanation of this behaviour is the increased trade integration between the countries and between them as a

group and the EMU. An additional source of convergence is the synchronization of their macroeconomic policies with those of the EMU, in pursuit of euro-based exchange rates. A final cause is the structural changes these countries went through in the past two decades, which are less observable if one looks at the last decade alone.

An important observation arising from the results of the cointegration test is that the short-run dynamics of the exchange rate of Serbia and Croatia converge towards its long-term equilibrium and this is influenced by the G-PPP. For North Macedonia, however, this was not the case. There may be several reasons behind this, most notably the regulatory framework of the national authorities and the constant interventions in the foreign exchange market by the NBRM. Further analysis should be conducted to determine the causes of the dynamics of the North Macedonian real exchange rate.

Next, the OCA index methodology is used to investigate the factors influencing the dynamics of the variability of the nominal bilateral exchange rate between North Macedonia and the EMU. The factors included in the analysis are proxies of the OCA criteria that were discussed in this thesis. The analysis confirms that North Macedonia has achieved a significant level of structural convergence with the EMU. While we are unable to measure the exact effect on each of the OCA criteria when determining the variability of the exchange rate, we can draw several conclusions by looking at the variables and the regression models. First, we can conclude that the variability of the exchange rate has been very low, and at a very slow pace it has been becoming less variable. Second, by examining each variable independently, it can be inferred that the direction of change has been positive for all. More precisely, economic diversification has shown the most progress, making the economy much less susceptible to asymmetric industry-specific shocks. The degree of business cycle symmetry, while high, has been increasing over the years, showing a gradual trend of

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convergence. The same can be said for bilateral trade, the level of economic openness, and the level of financial development.

While it is not possible to measure the exact effect each of the variables have on variability of the exchange rate, because several of them are statistically insignificant when plotted into our regression model, the direction in which they influence the variability of the exchange rate can be inferred. The signs of the coefficients of the variables are as expected from the OCA theory literature. This implies that these variables indeed influence the exchange rate variability in the right direction – they explain the dynamics of exchange rate variability and knowing that they have been improving over the years confirms the presence of economic convergence with the EMU. This can be interpreted as a signal that the economic costs associated with monetary integration are decreasing over time.

The second regression model, which measures the pressures of these OCA criteria proxies on nominal exchange rate variability, adjusts the previously used dependent variable to policymaker intervention and the interest rate differential. The results of the analysis suggest that these variables have the expected effect on exchange rate variability. While unable to measure the exact effect because all the variables, except for one, are statistically insignificant, the direction in which they pressure the variability of the nominal exchange rate can be inferred and their strength in relative terms to each other can be inferred. According to the results, except for openness, all other variables are positively-effecting pressures. This means that the intervention of the policymakers is positively linked to the drivers of business cycle movement for the North Macedonian economy in respect to the EMU. Under conditions when the economy exhibits changes in the level of openness, and the more open it is, the greater the pressures on the exchange rate become. When the financial development of the economy increases, the pressures on the exchange rate become more tolerable. When the commodity structure of exports becomes more similar, the exchange rate pressures decrease.

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The strength of the pressure reveals that policymakers are most concerned with the co-movement of the GDPs, which is an aggregate measure of economic conditions in both economies; policymakers are the least concerned with industry-specific shocks.

Finally, further investigation may consider a broader period, which can help us measure the effect the euro adoption had on the level of convergence of North Macedonia with the EMU, using the OCA-index methodology. In addition to this, measurement of the relative level of convergence could be helped by a cross-country assessment that would include North Macedonia and a selected group of current EU, EMU, and candidate countries – which are closely linked to each other in terms of trade and level of economic development.

6   Conclusion and policy recommendations

The aim of this thesis is to assess the degree of economic convergence between North Macedonia and the EMU in an attempt to measure the costs associated with euro adoption. To do this an investigation of the nominal and real convergence using the Maastricht criteria and the OCA theory as a benchmark is used.

The nominal convergence analysis, which is a "normative" prerequisite for a country to become eligible to join the EMU, reveals that significant progress has been made in the last twenty years and the Macedonian economy will potentially have no difficulty in meeting the Maastricht criteria. However, there are some minor credible concerns which could hinder the process of monetary integration. The first and by far most important is price stability. Even though the rate of inflation – which is correlated to that of the EMU – for most of the period has been below the Maastricht reference value, in the later stages of real convergence inflationary pressures may appear which can negatively affect the fulfilment of this criterion. While older empirical research from 2005 reveals that the Balassa-Samuelson effect is not

present in North Macedonia, and real exchange rate depreciation can be explained by the reverse-quality effect, productivity growth in the tradable sector may cause inflation to rise now and in the coming years. An assessment of the long-term interest rate convergence was not performed because the Macedonian economy only recently started issuing T-bills with 10-year maturity. However, an assessment of the fiscal criteria was conducted, and it found that government debt and deficit management have been conservative. For most of the period, the government deficit was below 3 percent of the GDP, and the government debt has never exceeded 60 percent of the GDP. The current trend, however, shows that the debt-to-GDP ratio is gradually increasing, and debt sustainability indeed has become an issue which should not be overlooked. The exchange rate stability criterion was fulfilled, and since the Macedonian denar is fixed to the euro, a policy which is unlikely to ever change, meeting this criterion will not pose a challenge to monetary authorities.

Next, an assessment of the necessity and scope for independent monetary policy, conduct of the NBRM is performed, in order to measure the largest cost associated with euro adoption – the loss of monetary autonomy. The analysis shows that, at this stage, the NBRM has little monetary autonomy because is Macedonian denar is fixed to the euro. That is based on the high levels of euroisation of the Macedonian economy, high ERPT, and degree of trade openness. Since inflation and inflation expectations have been anchored using a fixed exchange rate, the NBRM has neglected the need to obtain higher economic growth rates and lower levels of unemployment. A decision to focus more on economic growth and unemployment while being able to keep inflation low and stable would require a comprehensive strategy of de-euroisation of the economy and development of the trading sector. At this late stage of EU accession, such policies are unlikely to be promoted by policymakers, because they may not succeed and on the other hands carry the potential to cause economic instability. For this reason, it can be safely assumed that the highest cost

associated with the loss of monetary policy independence resulting from EMU accession is currently low and will likely remain this way until North Macedonia joins the EMU.

The assessment of real convergence, which takes into consideration the OCA theory criteria, employs two empirical approaches. The first empirical approach uses the G-PPP to investigate the long-term exchange rate dynamics of the North Macedonian denar in relation to the Serbian dinar and the Croatian krona. The investigation shows that the three economies are on the way to become optimum currency area with the EMU, i.e., North Macedonia and the two other countries are all converging towards the EMU. The cointegration analysis of the exchange rates show that the short-term dynamics of the Serbian denar and the Croatian krona are explained by the long-run G-PPP relationship. The short-term dynamic of the real MKD/EUR exchange rate is, however, not explained by the long-run relationship. A plausible reason for this might be the regulatory framework of the national authorities and the constant interventions in the foreign exchange market by the NBRM.

The second empirical approach is the OCA index, which consists of an analysis of the factors influencing the variability and pressures on the exchange rate. The factors used in the study are proxies of the commonly accepted OCA criteria. According to the individual descriptive analysis of the each of the variables, it can be concluded that OCA criteria have been improving, which is an indication of real economic convergence. In fact, looking at the signs of the coefficients in their relationships with exchange rate variability, we can also infer that the direction they affect the exchange rate is in accordance with what the OCA theory predicts. This is evidence of convergence in a right direction. In addition, when we look at the pressures, they exert on policymakers controlling exchange rate variability, by using a different dependent variable we can conclude that business cycles are the most important determinant for exchange rate pressures and industry-specific shocks are the least important to policymakers. Next step would be to conduct a cross-country assessment and compare the

results of all countries included in the sample as it was done in the research of the cited authors.

6.1 Policy recommendations

From these findings we are able to draw several policy recommendations which can be used by policymakers to improve the conditions for EMU accession. These recommendations are in line with the cost-benefit analysis stemming from euro adoption. In order for the country to ensure costs remain low and potentially decrease over time, the analysis shows that business cycles should become more synchronized with the EMU, thus decreasing the occurrence of temporary symmetric shocks. Temporary shocks will continue to exist, but this does not mean the economy will not be able to adjust to the shocks properly. Before moving to the alternative adjustment mechanism, we should note that there is a high likelihood that North Macedonia has exploited the benefits of trade integration, which have significantly improved business cycle synchronization. Empirical research suggests not only that the endogeneity hypothesis is not as strong as previously thought, but that clusters of countries within the EMU exist whose business cycles converge towards each other. The best scenario for the Macedonian economy would be to adopt policies which will improve diversification of its economy with a production structure similar to that of the core EMU. That way we can minimize the instances of misalignment between national and supranational monetary policy preferences. If this is not achieved, any policy intended to prevent business cycle synchronization with a cluster of countries that tend to diverge from the core EMU economies should be considered.

The existence of alternative adjustment mechanisms, including labour and capital mobility, must be considered when an economy is hit by a temporary asymmetric shock. Labour market reform should be focused on solving rigidity, especially in relation to

improving mobility both between and within industries, inside state borders and internationally. The international dimension requires consideration of factors that are much more difficult to fulfil, including overcoming language barriers and cultural differences. Capital mobility, particularly financial mobility because its costs are significantly lower, should perhaps be one of the main objectives of the fiscal authorities. A gradual liberalization of the capital account is the first step in the right direction. In addition, any effort to improve capital markets' integration and capital market development (which are currently low), and policies to increase FDI, should be considered as a goal of policy makers.

Existence of an efficient macroprudential fiscal policy framework can also be used to alleviate the negative effects of temporary asymmetric shocks. However, fiscal policy if poorly managed can also be a source of instability causing the costs of monetary integration to significantly increase. For that reason, fiscal discipline must be taken seriously, especially for North Macedonia, which has increased its debt to a point that may become unsustainable. A good example of this is the case of Greece, which due to low fiscal discipline was on the verge of bankruptcy and possible Grexit. North Macedonia should be concerned with how fiscal authorities manage public finances, in order to prevent a Greek scenario, especially knowing that "Maexit" will not help NBRM achieve its economic goals by regaining monetary independence. In fact, experience shows that exchange rate devaluation in North Macedonia so far has had no positive effect on the economy, due to low elasticity of domestic demand to exchange rate changes. This might change in the years to come, but we should not rely on it as an excuse to maintain low fiscal discipline.

Finally, the question of early or late accession should be considered. Even if policy makers are unable to achieve significant progress in the policy areas mentioned above, keeping in mind that the economy sufficiently converges with the EMU, benefits from early

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accession will not be reaped because of endogeneity, but because of a strong signal to the markets.

Systematic representation of the policy recommendations is available in Figure 8 and it should be addressed to the Central Bank and the Macedonian government, including the Ministry of Economics, Ministry of Finance and Ministry of Social Policy.

Policy area	Action	Goal	Priority
Nominal convergence			
Government debt and deficit	Public debt management strategy	Establishment of fiscal rules, reduction of public debt, debt sustainability	High
Inflation	Reframing from increasing indirect taxes and administrative prices.	Maintaining low inflation and price stability	Medium
Exchange rate	///	Maintaining exchange rate stability	Medium
Interest rates	More frequent release of long-term T-bills with lower interest rates	Decreasing long-term interest rates	High
Alternative adjustment mechanisms			
Labour market	Decrease of labour market rigidity	Policy aimed at increasing employability, internal and external mobility	High
Capital market	Financial integration	Reduction of asymmetric shocks via greater financial integration and close monitoring of EMU economic policy reactions	High
Desired characteristics			
Economic diversification and economic competitiveness	Increased diversification of the overall economy	Attracting investment especially in industries with	High

		higher added value	
GDP growth	Active labour productivity policies	Special focus on trading sector policies to improve labour productivity	Medium

Figure 8: Policy recommendations

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8 Appendices

Country	Exchange rate regime[1]		Monetary policy framework	Volatility[4]	Flexibility direction[5]
	Period I	Period II			
Albania	Free floating		Inf. target	1.31	=
Bulgaria[2]	Free floating	Currency board	ER anchor	9.58	<
B & H	Currency board		ER anchor	0	=
Croatia[2]	Free floating	Stabilized arrangement	ER anchor	0.92	<
Czechia	Conventional peg	Free floating	Inf. target	1.70	>
Estonia[3]	Currency board		ER anchor	0	=
Hungary	Conventional peg	Managed floating	Inf. target	2.20	>
Kosovo	Unilateral euroisation		ER anchor		=
Latvia[3]	Free floating	Conventional peg	ER anchor	1.59	<
Lithuania[3]	Free floating	Currency board	ER anchor	2.03	<
Montenegro	Unilateral euroisation		ER anchor		=
N.Macedonia	Manage float	Stabilized arrangement	ER anchor	0.99	<
Poland	Managed float		Inf. target	2.44	=
Romania	Free floating	Managed floating	Inf. target	3.60	=
Serbia	Managed float	Stabilized arrangement	Inf. target	26.56	<
Slovakia[3]	Conventional peg	Managed float	Inf. target	1.30	>
Slovenia[3]	Managed float		Inf. target	9.43	=

Table 10*: Exchange rate regimes in post-transition economies, 1992-2020*

Notes: (1) Period I refer to the years 1992-1995, and Period II refers to 1996-2020 (2) ER arrangement in 2020 or before EMU entry or ERM II participation. (3) Country is a member of the EMU or under ERM II. (4) Volatility is the standard deviation of period 1995–2020, for which monthly data (end of period) is used. (5) > ER flexibility increased, < ER Inflexibility decreased, = ER flexibility unchanged.

Source: IMF "Annual report of exchange rate arrangements and exchange restrictions 1992 –2020", and ECB.

Table 11: Regression model 1

Sample: 2001 2020
Included observations: 20

Variable	Coefficie	Std. Error	t-Statistic	Prob.
C	-0.036543	0.015752	-2.319858	0.0349
SD_Y_	0.005479	0.005421	1.010692	0.3282
DISSIM	-0.000534	0.000297	-1.796554	0.0926
SIZE	0.003611	0.001493	2.418468	0.0288
TRADE	-0.007432	0.002477	-3.000698	0.0090

R-squared	0.379634	Mean dependent var	0.000491	
Adjusted R-squared	0.214202	S.D. dependent var	0.000253	
S.E. of regression	0.000225	Akaike info criteri	-13.75270	
Sum squared resid	7.56E-07	Schwarz criterion	-13.50377	
Log likelihood	142.5270	Hannan-Quinn crit	-13.70411	
F-statistic	2.294814	Durbin-Watson stat	2.679690	
Prob(F-statistic)	0.107155			

Table 12: Regression model 2

Sample: 2001 2020
Included observations: 20

Variable	Coefficie	Std. Error	t-Statistic	Prob.
C	-0.060684	0.025199	-2.408171	0.0294
SD_Y_	0.002961	0.005452	0.543207	0.5950
DISSIM	7.56E-05	0.000227	0.333445	0.7434
SIZE	0.005978	0.002435	2.455179	0.0268
OPEN	-0.002001	0.000762	-2.625615	0.0191

R-squared	0.319837	Mean dependent var	0.000491	
Adjusted R-squared	0.138460	S.D. dependent var	0.000253	
S.E. of regression	0.000235	Akaike info criteri	-13.66068	
Sum squared resid	8.29E-07	Schwarz criterion	-13.41175	
Log likelihood	141.6068	Hannan-Quinn crit	-13.61209	
F-statistic	1.763382	Durbin-Watson stat	2.636848	
Prob(F-statistic)	0.188765			

Table 13: *Regression model 3*

Sample: 2006 2018
Included observations: 13

Variable	Coefficie	Std. Error	t-Statistic	Prob.
C	-4247.508	4357.069	-0.974854	0.3621
SD_Y_	-1836.532	1285.856	-1.428257	0.1963
DISSIM	35.92130	42.09225	0.853395	0.4217
SIZE	403.7525	410.1792	0.984332	0.3577
OPEN	-106.6603	82.27043	-1.296460	0.2359
FIN	57.30462	67.82429	0.844898	0.4261

R-squared	0.378143	Mean dependent var	30.64228
Adjusted R-squared	-0.066041	S.D. dependent var	22.60029
S.E. of regression	23.33464	Akaike info criteri	9.441793
Sum squared resid	3811.537	Schwarz criterion	9.702538
Log likelihood	-55.37165	Hannan-Quinn crit	9.388198
F-statistic	0.851320	Durbin-Watson stat	2.559934
Prob(F-statistic)	0.555115		