UNIVERSITY OF LJUBLJANA

SCHOOL OF ECONOMICS AND BUSINESS

MASTER'S THESIS

THE ADOPTION OF THE EURO IN CROATIA FROM AN OPTIMUM CURRENCY AREA THEORY PERSPECTIVE

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LIST OF ABBREVIATIONS

EU - European Union
OCA - Optimum Currency Area
EMU - European Economic and Monetary Union
EMS - European Monetary System
ECB - European Central Bank
EC - European Community
ECU - European Currency Union
EMI - European Monetary Institute
ESCB - European System of Central Banks
ERM - European Exchange Rate Mechanism
ERM II - European Exchange Rate Mechanism II
FDI - Foreign Direct Investment
The Fed - US Federal Reserve
SGP - Stability and Growth Pact
BCS - Business cycle synchronisation
LOLR- Lender of last resort
OECD - Organisation for Economic Co-operation and Development
SMP - Single Market Programme
UN - United Nations
GFC - Global financial crisis
US - United States
UK - United Kingdom
HNB - Hrvatska Narodna Banka
CBS - Croatian Bureau of Statistics
WB - World Bank
IMF - International Monetary Fund
GBI - Grubel-Lloyd Index

INTRODUCTION

The inclusion of any European Union (hereinafter: EU) member state in the European Economic and Monetary Union (hereinafter: EMU) is a historic and unprecedented event. Croatia is on its way to introducing the euro as its official currency on January 1st, 2023, and the entire process has been a long, thorny one, not without its problems and merits. Croatia is expected to enter the EMU during the Covid-19 pandemic and is successfully fulfilling the Maastricht criteria even though the euro area inflation rose to its highest level in history (8.9% YoY in July 2022). Many of the benefits and costs of the euro's introduction are hard to measure, but the most used tool for such an analysis is the Optimum Currency Area theory (hereinafter: OCA).

The OCA theory, introduced in the 1960s, has been under great scrutiny and has endured substantial criticism from many economists. In times when globalisation is peaking, when trade is becoming even more important (especially during the Covid-19 pandemic, the resulting supply-chain bottlenecks and record-high inflation rates throughout the world), it is paramount that any EU member state that will join the euro area be analysed also through the lenses of OCA theory to see if the candidate country does or does not form an OCA with the EMU.

Some of the OCA criteria are problematic and often lead to misleading results, but the theory is among the most important tools for economic analysis that economists use frequently. As the benefits and the costs of the euro introduction vary and depend on various other parameters (such as the size of the acceding country or its openness to trade), the OCA theory is a tool to combine those benefits and costs (de Grauwe, 2007, pp.108).

The fascinating part of OCA theory is the phenomenon of endogeneity, which states that even if the EMU (or any other area that shares a common currency) is not an OCA (does not fulfil some of the criteria to a satisfactory level) ex-ante, it can become an OCA ex-post as some of the OCA criteria might be endogenous. This has massive implications for Croatia, the country we analyse, since it could mean that even if it currently does not satisfy all the OCA criteria (one of the criticisms regarding OCA theory is that it does not specify how to give a favourable or a negative mark when a country (or an area) is satisfying some, but not all, of the criteria), it could satisfy these same criteria at some point in the future.

The endogeneity principle means that due to the euro, Croatia's trade with the euro area could significantly increase, which could lead to a higher business cycle synchronisation (hereinafter: BCS) between its economy and the euro area economy (Frankel & Rose, 1996; Darvas & Szapáry, 2008, Bayoumi & Eichengreen, 1996).

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The OCA theory tries to answer whether it makes economic sense for a given country to abandon its independent monetary policies and create a currency union. The theory develops different economic and politic criteria that recognise that the real economic cost of giving up monetary independence arises when asymmetric shocks are present and do not affect all member states in the same manner.

The Canadian economist Robert Mundell (1961) laid down the foundations for the OCA theory, with subsequent contributions by Robert McKinnon (1963), Peter Kenen (1969), Jeremy Frankel and Andrew Rose (1996, 1997), George Tavlas (1993), Yoshihide Ishiyama (1975) and Francesco Paolo Mongelli (2002, 2008), among others. By checking whether Croatia successfully fulfils the OCA criteria, the thesis will try to conclude whether Croatia is suitable for joining the EMU.

The thesis will discuss the stages of EMU integration after the Maastricht treaty, as well as Croatia's monetary system developments after its independence to create a historical link and figure out the developments that led to Croatia choosing to join the EU and the EMU, with the predicted date of the euro introduction being the 1st of January 2023. I will address to what extent the OCA criteria are fulfilled in Croatia and how it fares compared to other EU and EMU member states to get an insight into what Croatia can expect when it joins the EMU.

The thesis' main purpose is to contribute to understanding the readiness and implications of the Croatian adoption of the euro and its decision to use a fixed rate mechanism instead of opting to continue pursuing an independent monetary policy regime. In a scenario where Croatia fulfils most of the OCA criteria more successfully than other EU member states (especially the latest joiners), then, in the long run, the benefits stemming from the euro adoption are expected to outweigh the costs.

One of the topics that the thesis will touch upon is the theory of monetary integration and whether it leads to more intra-industry trade, less inter-industry specialisation and fewer asymmetric shocks (as in the views of the European Commission (1990) and Rose & Frankel (1996, 1997)) or whether it leads to more inter-industry trade, more inter-industry specialisation and more asymmetric shocks (as in the views of Krugman (1993) and Krugman & Venables (1993)).

According to the former view, trade among member states is mostly intra-industry trade due to the presence of imperfect competition (product differentiation) and economies of scale, which means that countries within the monetary union buy and sell to each other the same categories of products (Italy sells to and buys apples from Slovenia, and vice versa). According to the latter view, trade integration leads to regional concentration of industrial activities (Italy sells apples to Slovenia, and Slovenia sells oranges to Italy).

This has large repercussions as if indeed monetary integration leads to less inter-industry specialisation, more intra-industry trade and fewer asymmetric shocks with the union, then

the euro area could become an optimum currency area ex-post even if it is not an OCA ex-ante (endogeneity) as its business cycles will become more correlated, and the intra-industry trade among individual member states will increase (these two OCA criteria are endogenous). The thesis aims to analyse whether the euro is the optimum currency for Croatia from an OCA perspective by checking whether Croatia successfully fulfils the following OCA criteria (among others):

a) Labour mobility (Mundell)
b) Openness to trade and trade integration (McKinnon)
c) Diversified economic structure (Kenen)
d) Business cycle synchronisation (Bayoumi, Eichengreen, de Grauwe, Fatás)
e) Financial, fiscal, and political integration (Ingram)
f) Price and wage flexibility (Friedman)

The thesis will analyse all the OCA criteria and try to conclude (if possible) whether Croatia could expect net benefits from joining the euro area based on these criteria. Using various indices and statistical methods to analyse these criteria, I will compare Croatia with all euro area and EU member states and check how it ranks among them.

The thesis' main hypotheses are the following:

a) *According to OCA criteria, Croatia is a suitable candidate for membership in the euro area.*
b) *The euro area entry will help Croatia in fulfilling the OCA indicators (touching upon the phenomenon of endogeneity)*

The thesis will be based on more institutional analysis and will be focused on a wide spectrum of literature and sources, ranging from textbooks to various essays on the topics. The thesis will also incorporate empirical analysis based on data from Eurostat and other data vendors, both from an empirical and a graphical perspective. In the central part of the thesis, which is an empirical analysis of whether Croatia fulfils the OCA criteria, data from Eurostat, the International Monetary Fund (hereinafter: IMF), the World Bank (hereinafter: WB), Comext, Hrvatska narodna banka (hereinafter: HNB), among others, will be used.

For the first criterion, labour mobility, I will calculate the unemployment rate across regions in Croatia and the indicators of labour mobility from data vendors such as the WB and Eurostat. For the second criterion, openness to trade, I will calculate the trade openness index, which is formulated as ((export+import)*100/GDP), as well as the structure of the Croatian exports and imports, to get an insight into whether Croatia's exports and imports are connected to the EU, or more with non-EU members. For the third criterion, Kenen's diversification criterion, I will use data from Comext to calculate the Grubel-Lloyd index, which measures the intra-industry trade of products at the HS 4-digit level. I will use data for 2020 as the data for 2021 is not yet updated. For the fourth criterion, I will use Eurostat to calculate Croatia's business cycle synchronisation with the EMU to get a clearer picture

of whether the economic cycles of Croatia resemble those of the EMU. If Croatia fares well on this criterion, it is less likely to be exposed to asymmetric shocks in the EMU. For the financial integration criteria, I will use data from European Central Bank (hereinafter: ECB) and HNB to see how euroized Croatia is compared to non-euro EU member states. For the wage and price flexibility criteria, I will use Eurostat to evaluate how wages reacted to negative shocks such as the Covid-19 pandemic. For the remaining criteria, I will discuss to what extent the criteria are fulfilled in Croatia and address what endogeneity means for Croatia for its future monetary policy course.

In the first chapter, I will outline the OCA theory and the main criteria and touch upon the benefits and costs of being part of the OCA. I will also explain the main criticism regarding the theory and introduce the phenomenon of endogeneity. In the second chapter, I will discuss the Maastricht treaty and why the OCA theory was not part of the treaty, as well as elaborate on the empirical evidence of whether the EMU is an OCA. In the third chapter, I will outline Croatia's monetary integration since its independence and discuss the importance of the euro for Croatia. In the fourth chapter, I will try to compare how Croatia fares on the OCA criteria by conducting various analyses and try to conclude why the euro is (not) a suitable currency for Croatia based on the OCA theory.

1 THE OCA THEORY

Sapir (2009, pp. 265) emphasises that OCA theory defines certain criteria that any country should fulfil to be able to participate successfully in a monetary union. Sapir (2009, pp. 266) points out: "Robert Mundell's 1961 paper in which he outlined the basics of OCA theory is short and beautiful as in less than ten pages, without a single mathematical formula or graph, it presents the basics of OCA theory." Mundell's (1961) main dilemma at the time was whether national currencies should be fixed or flexible. De Grauwe and Lavrač (1999) point out that when several countries differ in their economic structures, they are more likely to experience "asymmetric shocks". Now if these countries had flexible exchange rates, they could use the exchange rate mechanism to respond to these asymmetric shocks. Unfortunately, as these countries no longer have this instrument as a policy tool, they need ample labour mobility and flexibility to adjust to these shocks and prevent permanent unemployment. According to Eichengreen and Wyplosz (1993), in a currency union, the burden of adjustment to an external shock or other loss of competitiveness leads to either a reduction in lower wages or higher unemployment. The OCA theory specifies that the acceding country must trade-off off between the gains from a fixed exchange rate prompting international trade and the cost of losing monetary independence.

There are two distinct phases through which OCA theory went through, namely the first phase in the 1960s and the 1970s and the second phase, in the 1980s and 1990s. Brkić and Šabić (2018, pp. 2) note that in the first phase, the OCA theory was made up of theoretical papers that defined the key OCA criteria, while in the latter, the theory was more focused on empirical studies of the pros and cons of being a member of a currency union. The initial OCA theory was developed in the context of the debate on whether countries should let their currency float freely or should they use fixed exchange rates. Lavrač (2008) notes that the original OCA theory concentrated on certain structural characteristics of the economy and tried to answer whether countries should use fixed or floating rates, while the second phase of the OCA theory was more oriented toward the issue of monetary integration.

Brkić and Šabić (2018, pp. 6) explain that the main purpose of the OCA theory is to develop several criteria that would help countries decide whether their exchange rates should be permanently fixed. Brkić and Šabić (2018, pp. 6) explain that the origins of OCA theory concern the papers of Mundell (1961), McKinnon (1963), and Kenen (1969), with noticeable contributions by Friedman (1953), Ingram (1962) and Mintz (1970). The following authors all developed a set of criteria under which any monetary integration should be assessed ex-ante so that the acceding country can check whether the country (or the group of countries) is (are) suitable for using the common currency. Tavlas (1993, pp.18) emphasises that the original papers defined an OCA as a region for which it would be optimal to have its currency and a single monetary policy, with optimality being defined in terms of the attainment of both internal and external balance. Different theories of OCA concentrate on differing structural characteristics of an economy as criteria that should determine whether the

accessing country is suitable for the currency area. The main issue is whether a country can expect asymmetric shocks and whether it can respond to them with alternative mechanisms of balance-of-payments adjustment due to its structural characteristics.

1.1 OCA criteria

According to Baldwin and Wyplosz (2015), there are six OCA criteria, of which three are economic while the other three are political. The economic are labour mobility, trade openness, and product diversification. Other economic criteria suggested by other authors such as Tavlas (1993), Velis (1995), Eichengreen, McCallum and White (1992), Mongelli (2008), Corden (1972), Ishiyama (1975) and Ingram (1962), include criteria such as trade integration, business cycle synchronisation, fiscal integration, price and wage flexibility, and political integration. Baldwin and Wyplosz (2015) define the three political criteria as being commonality of destiny, homogenous preferences and fiscal transfers.

1.1.1 Labour mobility (Mundell)

According to Mundell (1961), the key determinant in OCA theory is labour mobility. In his words, an OCA is one within which individuals move without any barriers and obstacles. Mundell's key idea is that the cost of the monetary union would be diminished if production factors such as capital and labour, were fully mobile across regional borders. If labour mobility is high, a monetary union is successful in adjusting less painfully to asymmetric shocks as workers from the region that is hit by recession move to a region that is experiencing robust economic growth and is expanding.

Figure 1: Labour mobility criterion according to Mundell
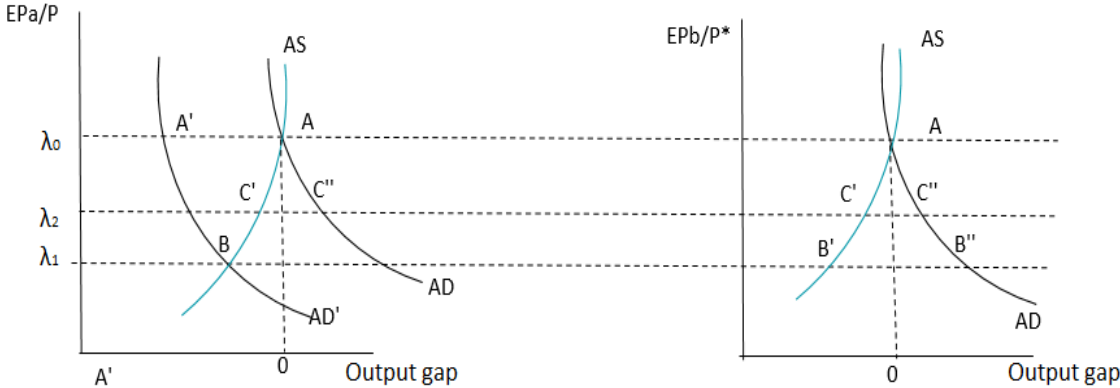
Adapted from Baldwin and Wylposz (2015).

Brkić and Šabić (2018, pp. 3) note that the greater the labour mobility, the lower the need for wage and exchange rate adjustments and the smaller the costs of losing monetary policy independence. De Grauwe (2007, pp. 205) explains that Mundell was initially very sceptical about the chances of successful monetary unification, but his subsequent works bear a much more positive tone. For example, Mundell (1973) argued that exchange rate movements do not necessarily serve as "shock absorbers" and could instead be a source of asymmetric shocks.

The reasoning behind Mundell's statement is illustrated in figure 1, where country A experiences a recession, while country B faces inflationary pressures (booming economy, robust growth). Baldwin and Wyplosz (2015, pp. 264) note that the issues of both countries can be solved by a shift of factors of production (labour and capital), which are idle in country A to country B, where they are scarce. The reallocation is shown by the supply of the supply curve from S to S'. There is no need for wages and prices to adjust as labour mobility helps to absorb the asymmetric shock automatically, without any lag. (Baldwin and Wyplosz, pp. 265).

1.1.2 Production diversification (Kenen)

According to Kenen (1969), countries that have widely diversified exports and production and have similar production structures should create a currency union. For countries to be able to reduce the probability of asymmetric shocks, they must be well-diversified and produce similar goods (and services). Brkić and Šabić (2018, pp. 3) explain that Kenen's line of thought emphasises that if economies are well diversified, it is less likely for turmoil in one sector to have a crucial impact on aggregate economic activity.

Brkić and Šabić (2018, pp. 2) point out that Kenen's criterion production diversification criterion diminishes the importance of the exchange rate mechanism as a tool for macroeconomic adjustment. Kenen (1969, pp. 12) argued that highly diversified partner countries would incur fewer costs due to abandoning exchange rate manipulations and would find the common currency optimal for both countries.

1.1.3 Openness (McKinnon)

McKinnon (1963) argues that countries that trade a lot with each other form an OCA. Brkić and Šabić (2018, pp. 2) explain that as the share of tradable goods in the consumer basket is exceedingly high in small, open economies, exchange rate manipulations are immediately transferred to domestic inflation through the prices of tradable goods, which diminishes the efficiency of the exchange rate mechanism.

Figure 2: Effectiveness of currency depreciation as a function of openness
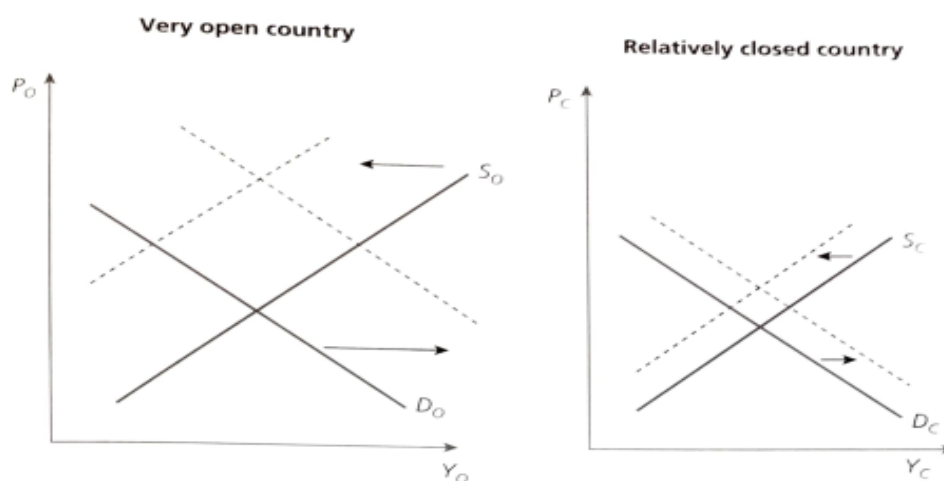
Source: De Grauwe (2007).

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As de Grauwe (2007, pp. 350) points out that the combined demand and supply effects of depreciation in two countries are such that it is impossible to say a priori in which country the depreciation is most effective in stimulating output, as presented in figure 2. De Grauwe (2007, pp. 352) points out that it is possible to conclude that depreciation will have a stronger effect on the inflation rate in a more open economy.

Figure 3: The cost of a monetary union and the openness of a country
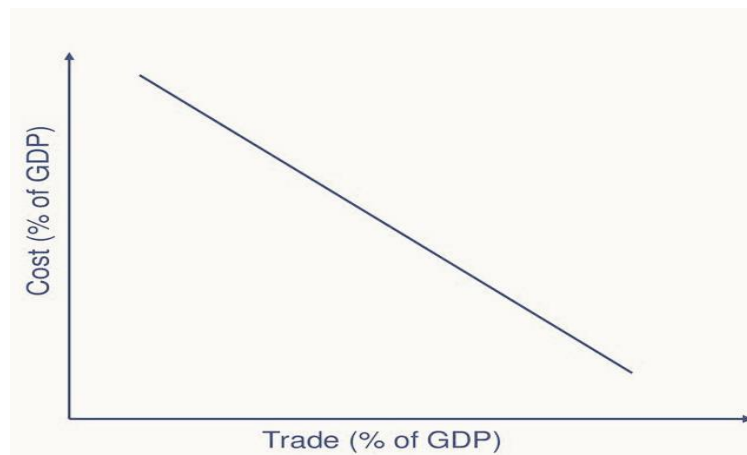
Source: De Grauwe (2007).

As it can be seen in figure 3, the loss of monetary independence is less costly for more open countries. The views of de Grauwe (2007) and the European Commission (1990) are complete opposites of the views of Krugman (1993) and Krugman and Venables (1993), which will be addressed in the third chapter of the thesis.

1.1.4 Other criteria
a) Business cycle synchronisation (BCS)

Brkić and Šabić (2018, pp. 4) note that a high degree of BCS facilitates the creation of a monetary union because it suggests that countries are exposed to comparable shocks in aggregate demand and supply and that the transmission of such shocks is symmetric, which suggests that a single central bank and a single monetary policy could be appropriate for all members. Mongelli's main argument is that some authors think the BCS criterion is composite because it requires the satisfaction of at least some other criteria first, especially McKinnon's trade integration criterion. This has important implications for the thesis's intended audience because it suggests that two of the criteria may be endogenous.

b) Financial integration

Brkić and Šabić (2018) note that in the views of Ingram (1962), the stability of a monetary union may be significantly impacted by financial integration because it may lessen the need for nominal exchange rate adjustments since capital flows between member states may help close short-term imbalances. Mundell (1961) also argued that capital mobility is a useful substitute for short-run exchange-rate changes in the short run. If financial integration is

high, even small changes in interest rates might cause equilibrium capital transfers between partner countries.

c) Price and wage flexibility

Brkić and Šabić (2018, pp. 3) explain that in the views of Friedman (1953), in a monetary union, all members should have sufficient wage and price flexibility to absorb asymmetric shocks as they are flexible, then the county hit by the shock may absorb it without facing excessive costs in the form of increased unemployment and a recession. Kawai and Nakamura (1990) explain that if there is downward wage and price rigidity, some measure of real flexibility could also be reached through exchange rate manipulations. In such a scenario, giving up monetary policy independence is a large cost to the acceding country.

d) The similarity of inflation rates

Fleming (1971) emphasises that when the difference between the inflation rates between countries in a monetary union is low and stable and is not volatile over time, the trade will remain robust, which would boost current account transactions and more trade.

e) Fiscal and political integration

Brkić and Šabić (2018, pp. 3) explain that in the views of Kenen (1969), fiscal integration makes it easier for a monetary union to function since it reduces the need for adjustment through exchange rate measures. If the monetary union has sufficient mechanisms for providing fiscal transfers to nations in a recession, then if a member state is hit with an asymmetric shock, it should be able to withstand the shock. For the EMU and the euro debt crisis, this criterion is very crucial. The theory underlying the political integration criterion is explained by Mintz (1970), who emphasises that the political will for integration must be present before a monetary union can be established. These two criteria are very intricately linked and are extremely hard to measure.

f) Homogeneous preferences and solidarity vs nationalism

Baldwin and Wyplosz (2015) outline the two other political criteria (homogeneity of preferences and solidarity vs nationalism), noting that regarding homogeneity, monetary union members must reach decide what is the best way to deal with asymmetric shocks. Baldwin and Wyplosz (2015, pp. 208) explain: "As monetary union is not a free ride and beggar-by-the-neighbour policies are not possible, costs are bound to arise when asymmetric shocks occur. The reason to accept these occasional costs is that, over time, they are more than compensated for by the benefits, which is the essence of OCA theory."

1.2 Benefits and costs of being part of a currency area
One especially important question when it comes to OCA criteria is also to analyse the costs and benefits that a country has when it becomes a part of an OCA region. As with any other arrangement when it comes to exchanging rate policy (dollarisation, fixed exchange rate, free float, pegged, managed float) and monetary policy, OCA on its own has certain benefits

and certain costs. For some countries the benefits outweigh the costs, for some, the costs outweigh the benefits. De Grauwe (2007, pp. 105) points out that for the acceding country, it is key that the net benefits are positive, noting that if they would be negative, it would make no sense for it to give away its monetary policy and join the monetary union. The benefits might not come immediately, and they can be conditional, dependent on whether the acceding country has already managed to reach a given level of nominal and real convergence with other countries in the given monetary union. Lavrač (2008, pp. 35) notes that individual structural characteristics of the economy play a crucial role for the acceding country in its choice.

The main pros of being a part of OCA can be divided into macroeconomic and microeconomic effects. Some of the benefits include the elimination of currency risk and transaction costs, additional credibility, increased trade and growth, price transparency, boosted cross-border investment, inflation discipline, less uncertainty, and a better quality of monetary policy. According to Baldwin (2006), most of the benefits are on the microeconomic side, while most of the costs are on the macroeconomic side as the joiners forgo a monetary policy that is tailored to its national stabilisation needs and no longer has monetary policy independence.

On the other hand, the costs are also extremely hard to quantify, and in some cases are one-off, sunk costs. Feldstein (2009) emphasises that the acceding country gives up the opportunity to choose a monetary policy that is optimal for its circumstances. In his view, the costs depend on whether the country can absorb asymmetric shocks on its own and whether its exchange rate tool can function as a "shock absorber" or not. They included costs from decreased macroeconomic stability, costs from negative external effects, and costs from deterioration in microeconomic efficiency, among others.

Mongelli (2002, pp. 38) notes: "The benefits and costs cannot be judged statically as they can take different profiles over time, in the early stages of a currency area vis-à-vis when the new single currency can fully display its benefits to both domestically and internationally". In his view, the main benefits include:

a) Benefits from improvements in microeconomic efficiency

These benefits result come from the increased use of money in the currency area. Due to increased efficiency, greater price transparency discourages price discrimination, decreases market segmentation, and boosts competition. Fratianni and von Hagen (1990, pp. 12) emphasise that the more concentrated trade is, the greater the savings in transaction costs are. Mongelli (2002) notes that the improved efficiency strengthens the internal market, increases trade and lowers investment risks, endorses foreign direct investments (hereinafter: FDI) and enhances resource allocation.

b) Benefits from increased macroeconomic stability (and growth)

These benefits are the result of higher price stability, access to wider and more transparent financial markets, improved external financing availability, higher FDI, reputational gain for nations with a history of high inflation, and advantages from lowered inflationary expectations. It is important to note that a single currency does not safeguard members from the negative effects of real shocks. Giavazzi and Pagano (1988) focus on a case study of Italy (which has a terrible record of inflation) and Germany (which is known as the country with the most hawkish policy in the world), and what would happen if they would be part of a monetary union. They note that since Italy no longer has an independent monetary policy, its monetary authorities (which have "wet preferences" and are policy doves) no longer exist and cannot devalue the lira. In their view, Italy has borrowed credibility from Germany, because its government has its hands tied. At the same time, besides the large potential gain for Italy, there is no welfare loss for Germany.

c) Benefits from positive external effects

These benefits are a result of reduced transaction costs brought on by the single currency's increased international circulation, income from global seigniorage, a decreased demand for foreign exchange reserves, and easier global coordination.

Mongelli (2002) outlines the following costs:

d) Costs from the deterioration in microeconomic efficiency

These expenses are primarily one-time, short-term expenses related to the transition to the new currency and include administrative, legal, and hardware expenses like re-denominating contracts and modifying vending machines. If the acceding country chooses the wrong nominal exchange rate[1], the new member may be overly competitive or not competitive at all. A national government cannot equalize the marginal cost of taxation and inflation if it joins a monetary union, according to the neo-classical optimal public finance argument against giving up monetary sovereignty.

e) Costs from decreased macroeconomic stability

Since the acceding country no longer has its monetary policy and the hands of its central bank are tied, it can not use its monetary policy tools. The issue becomes even bigger if it has higher nominal wage and price rigidities than the other members, which will deal a significant blow to its economy in case of an asymmetric shock as the exchange rate tool can no longer be used. Since member states with different market structures are exposed to asymmetric shocks, they are affected differently by external economic situations (Levitt & Lord, 2000; Bayoumi, 1994; Bayoumi & Eichengreen, 1993, 1996, 1997; Buti & Sapir, 1998; Gros, 1996).

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[1] The UK learnt this very well on 16 September 1992, when it withdrew the pound sterling from the ERM having previously entered at an overvalued exchange rate

f) Costs from negative external effects

These costs occur if one or more member countries run a sizable budget deficit and debt-to-GDP ratios, which would lead to externalities (something the EU learned during the global financial crisis (hereinafter: GFC). As the indebtedness increases, so does the fear that this debt will have to be sooner than later monetised, which can put upward pressure on the key interest rate of the monetary union. Each member state is negatively affected in such a scenario, particularly those that had stable monetary policies before.

1.3 Criticism and the relevancy of OCA theory

As with every economic theory, OCA theory has been under heavy scrutiny. Many criticise it because it is too "abstract" and argue that its conclusions and policy recommendations are too ambiguous. Baldwin (2006, pp. 42) explains that the OCA theory and the cost-benefit analysis do not apply to many of the new members of the EU (he was referring to Malta, Estonia, Cyprus, Slovenia, Latvia, and Lithuania, but we can extend the argument to Croatia given its resemblance to the aforementioned countries), noting that the macroeconomic cost of the single currency is not a cost at all.

Brkić and Šabić (2009, pp. 3) explain that Tavlas (1993) criticised the underlying recommendations of OCA criteria as decision-making is often unfeasible as several OCA criteria could lead to different interpretations. A few of the OCA criteria (for example openness) might suggest that the country should join the monetary union and fix its exchange rate, while another set of criteria (labour mobility or BCS), simultaneously suggests that the country should opt for a flexible exchange rate and keep its exchange rate policy tool. Brkić and Šabić (2009, pp. 3) add that another big problem for the OCA theory is its inconsistency and the ambiguity between the trade integration criterion and Kenen's product diversification criterion as small economies are often very export-oriented (open) but are less diversified. Under the first criterion, they are ideal candidates for membership, but under the second, they should stick to their current flexible exchange rate as asymmetric shocks will be more painful for them. Mongelli (2008) emphasises that a deficiency of the OCA theory is that it failed to anticipate the increasing importance of services in the global economy (when the foundations of OCA theory were being laid out, services played a much lesser role in the global economy than they do today). The issue is that when acceding countries are evaluated on this criterion, the emphasis is put more on analysis of the industry structure (which is usually less diversified), while the services sector is barely analysed. Brkić and Šabić (2009, pp. 5) emphasise that the OCA theory still does not have a criterion that addresses whether there are mechanisms in the monetary union to suppress macroeconomic imbalances and mitigate potential crises (this became very evident during the euro area crisis).

Tavlas (1993, pp. 8) outlines three paradoxes when it comes to OCA theory. The first one was pointed out by McKinnon (1969), who points out that Kenen's criterion implies that a large, diversified economy that is relatively closed should have a fixed exchange rate, while a small, less diversified economy that is relatively open should opt for floating rates, which is the very opposite of McKinnon's openness criterion. The second paradox concerns

Kenen's diversification criterion, which was first pointed out by Mundell (1973), who explains that the diversification principle leads to the conclusion that two relatively less-diversified economies should have floating exchange rates against the rest of the world, and by implication, among themselves. But, if these two countries form a monetary union, they create a large currency area that gives Kenen's diversification principle a better chance to be fulfilled. In the eyes of Mundell, small countries with less diversified economies should form a monetary union, so that the new combined economy becomes more diversified than its members, contrary to Kenen's view that such countries should opt for floating exchange rates. Mundell (1973) also points out another paradox, in which Kenen's diversification criterion could be turned around. Namely, highly diversified economies can easily afford to have flexible rates, while relatively undiversified economies experience higher costs when having to deal with frequent exchange-rate movements, thus it is by no means evidence that diversification could be used by countries to choose between exchange-rate arrangements.

Brkić and Šabić (2008, pp. 5) explain that the largest part of the criticism regarding OCA theory is concerned with the initial belief of how efficient monetary and exchange rate tools are in small economies, adding that in the 1960s when OCA theory was formulated, cross-border mobility of capital was fairly limited and central banks pursued a monetary policy much more efficiently. In modern times, no central bank except for the US Federal Reserve (hereinafter: Fed) can pursue an independent monetary policy on its own, not even the ECB), Brkić and Šabić (2009, pp. 5) note that in today's environment, dominated by abundant international capital flows, a small country cannot pursue an independent monetary policy on its own, regardless of its exchange rate regime.

De Grauwe (2007, pp. 204) explains that nominal exchange changes have only temporary effects on relative prices and that depreciations lead to domestic cost and price increases which tend to restore the initial equilibria. In other words, nominal exchange-rate depreciation can only lead to a temporary real depreciation, and in the long run have zero effect on the real exchange rate. De Grauwe (2007, pp. 206) explains that the volatility of exchange rates could be a significant source of asymmetric shocks for countries maintaining their currency, and that contrary to the initial OCA theory, the exchange rate policy tool cannot be used flexibly and without any cost. The initial views on the long-run effectiveness were changed by the theory of "rational expectations" in the 1970s, which emphasises that, in the long run, the monetary policy tool cannot be efficiently used to offset real shocks (Kydland & Prescott, 1977; Calvo, 1978).

European Commission (2004, pp. 26) points out that nominal exchange rate flexibility does not adjust imbalances caused by long-term real rigidities and over the short run, the exchange rate could play a stabilising role, but it could also be another shock source to the economy. In the views of Buiter (2000) and Faran and Peersman (2005), the exchange rate tool can be a source of shocks if exchange rate policy decisions are driven by factors such as geopolitical considerations and asset market developments that are not ultimately related to developments in the product markets.

Another criticism of the OCA theory is that the original works disregard currency risk, which, particularly in developing economies is an especially important risk factor. According to Bellulo, Šonje and Vrbanc (2000, pp. 25), since the primary objective of the central bank is to maintain exchange rate stability, autonomous monetary policy cannot be actively utilized to absorb shocks if currency substitution is occurring, which occurs when domestic sectors borrow in foreign currency. The issue is that emerging market economies have low credibility (something Argentina knows very well) and they are forced to borrow in foreign currency (usually US dollars).

Robson (1987) and Emerson, Gros, Italianer, Pisani-Ferri and Reichenbach (1992) explain that it is extremely hard to quantify different criteria for creating an OCA and is hard to judge one OCA criterion in correlation with other OCA criteria, noting that there is no single theory under which the pros and cons of a single monetary policy can be evaluated. Due to this, the analysis of the OCA criteria in the works of many authors is incomplete, because the range and the framework of the OCA criteria are not ambiguously assigned.

Despite the criticism, the OCA theory is as relevant today as it was in the 1990s, thanks to the "modern views on OCA theory" and particularly the phenomenon of endogeneity.

1.4 Modern views on OCA theory and endogeneity

As with all economic theories, OCA theory was not static and rigid but was dynamic and time-variant, with constant adjustment and improvement. As new authors defined new criteria, criticised the original and used more empirical instead of logical arguments, the theory became richer and more powerful, and the original OCA theory had to be revamped.

Broz (2005b) explains that the new views regarding OCA theory predominantly focus on the effectiveness of the monetary policy, its credibility, endogeneity vs specialisation, asymmetric shocks, the effectiveness of exchange rate mechanism, risk sharing, labour market institutions, BCS and political factors. De Grauwe and Lavrač (1999, pp. 53) explain that the modernists do not disregard the traditional OCA criteria as irrelevant, but find that they are incomplete and ambiguous, thus including additional elements to the theory. In the original OCA theory, a lot of emphasis was put on labour mobility, but the difference between labour institutions is an especially crucial factor as well. Broz (2005b) and De Grauwe and Lavrač (1999, pp. 102) explain that even with all the additional theories and criteria, there is still no simple measure that can precisely point out whether the acceding country should join the monetary union.

One of the most important papers to be written on the topic of OCA besides Mundell's pioneering work was Andrew Rose's paper on endogeneity. After the Bretton Woods fixed exchange rate systems collapsed in the 1970s, IMF economists aimed to prove that exchange rate volatility harms world trade. They were unsuccessful, with most economists finding that the relationship (if any) is statistically insignificant. This is where Rose stepped in with his revolutionary paper in 2000.

Rose (2000) tries to determine the effect of a common currency on trade and finds that a currency union boosts trade by 200% on top of a large and negative impact he found on exchange rate volatility. Rose spurred a debate amongst economists and statisticians, about whether this "Rose effect'' is plausible and whether it is relevant or not. Baldwin (2006) outlines the debate regarding Rose's paper, noting that Rose's econometric tactics were questionable at best, pointing out that the effect of the common currency is modest, somewhere between 5% and 15%, with 9% being the most accurate estimate. Rose used a gravity formula, which had several incorrect specifications, and most importantly, had an omitted variable bias, which significantly deteriorated his "revolutionary" findings.

Despite the criticism from some economists, Rose's finding was especially important when it comes to OCA theory. Frankel and Rose (1996) pointed out that in addition to the trade link, a monetary union also impacts other OCA criteria such as the BCS criterion. This means that two of our criteria could be endogenous, which means that Croatia (in our case) might not fulfil the OCA criteria before its euro area membership (ex-ante), but in the future, Croatia (or any other acceding country or the whole area) could become an OCA (ex-post). The persuasive argument is that due to its membership in the euro area, Croatia's trade links with the euro area would increase and its business cycle would become more correlated (if one assumes that at the moment Croatia does not fulfil these OCA criteria).

Frankel and Rose (1996) note that the advantage of eliminating different currencies adds something more, above and beyond the elimination of exchange rate variability. Their views (and the views of the European Commission (1990) are based on the argument that different demand shocks happen less often in a currency union due to trade between industrial European nations being mostly intra-industry trade. Due to economies of scale and product differentiation, the currency union leads to a structure of trade in which countries buy and sell to each other the same types of goods (for example Italy sells and buys apples to Slovenia and vice versa). De Grauwe (2007) points out that the removal of barriers due to the European Single Market Programme (hereinafter: SMP) and the currency union would lead to shocks becoming more symmetric.

On the other hand, Krugman (1993) believes that trade integration leads to regional concentration of industrial activities. His views are not revolutionary, as the basis of his "specialisation argument" was developed by Myrdal (1957), Balassa (1964) and Kaldor (1966). Namely, Krugman believes that when obstacles to trade decline, countries concentrate on production and specialise in producing the products they have a comparative advantage. As a result, different industries are concentrated in different currency union members (Germany produces solely cars, France produces solely wine, Greece produces solely olives), which means that sector-specific shocks could easily become country-specific shocks. Eichengreen, McCallum and White (1992) and Bayoumi and Eichengreen (1993, 1996, 1997) also point out that specialisation works against currencies and that diversification of the economy works in favour of it. Brkić and Šabić (2018, pp. 3) point out that Fidrmuc (2000) explains that whether endogeneity or specialisation prevails depends

mostly on whether intra-industry or inter-industry trade among countries develops more intensively. He emphasises that BCS among countries increases together with foreign trade, given that the growth in intra-industry trade is higher than the growth in inter-industry trade.

Figure 4: The views of the European Commission (left) and Paul Krugman (right) on the link between trade integration and BCS
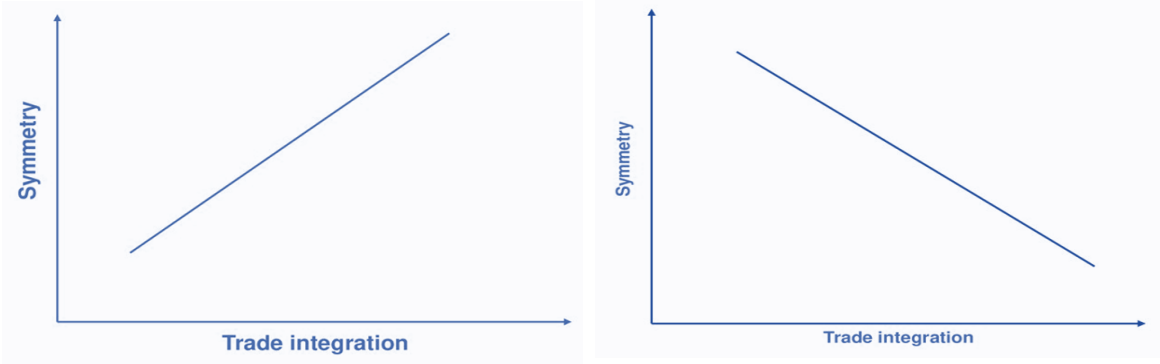
Source: De Grauwe (2007).

The opposite views regarding trade integration and BCS of the European Commission (1990) and Krugman (1993) are presented in figure 4. De Grauwe (2007, pp. 218) emphasises that it is hard to determine which view is correct, noting that a presumption exists in the favour of the Economic Commission's (1990) views. De Grauwe (2007, pp. 219) points out that the notion that integration could lead to concentration, specialisation and agglomeration cannot be disregarded, but at the same time as market integration between two or more countries proceeds, borders become less and less important as factors that decide on where production will be created. De Grauwe (2007, pp. 218) notes that economies of scale do not matter as much for services as they do for industrial activities, which is why economic integration does not lead to regional concentration of services in the same way it does with industries. In the last 30 years, services have become much, much more important than they were before and there is no doubt that the service industry will become even more important in the near future.

Frankel (1999, pp. 12) explains that due to endogeneity, some OCA criteria, such as openness and income correlation, can change over time in response to the core policies of the countries and exogenous causes, even if potential candidates for currency do not already meet the OCA criteria. The endogeneity of the OCA issue should not be limited to merely trade integration and income correlation, according to Broz (2005a). De Grauwe and Mongelli (2004) concentrate on the endogeneity of economic integration, endogeneity of financial integration, endogeneity of shock symmetry, and endogeneity of product and labour market flexibility in this sense. The endogeneity of labour market institutions is noted by Blanchard and Wolfers (2000), while Issing (1999) emphasises the endogeneity of political integration.

Regarding endogeneity in the EMU, the thesis will discuss that in the following chapter.

2 EUROPEAN MONETARY INTEGRATION

European monetary integration is probably the most important process of economic integration in the last couple of decades. After the unsuccessful developments of the ERM II system and various issues that dominated European markets at the beginning of the 1990s, the EMU was an especially important cornerstone for European monetary integration. Combining countries such as France and Germany into a monetary union with countries such as Greece, Spain and Italy was a ridiculously arduous task as many of the latter experienced decades of high inflation, weak growth, and budget imbalances. The EMU, in addition to the Single Market, aimed to bring these two diverse structures into one and ensure a prosperous future for all EMU members. Levitt and Lord (2000) point out that the euro would ideally be introduced through a "big bang" approach, but such an approach was logistically impossible. They note that the single market and Single European Act of 1986 changed the European Community's (hereinafter: EC) political system in a manner that influenced the subsequent bid for the EMU as the EC was freed from political dependence on the strict unanimity of EU member states.

2.1 The Maastricht Treaty

Connelly (1995) points out that the attainability of EMU aroused considerable scepticism as the Bundesbank was thought to be reconciled to the Treaty of the European Union, and key actors in the French and German governments have incompatible objectives, as well as rather different understandings of what had been agreed at Maastricht. In 1991, 12 heads of state and governments of the EU gathered in Maastricht, a small picturesque Dutch city, and signed the Treaty that replaced the EC with the EU. The TEU marks the end of several decades of attempts at European monetary integration as it described in great detail how the EMU would function, the creation of the ECB, and establishing entry conditions for acceding countries. These criteria, known as the Maastricht convergence criteria, were established mostly to satisfy Germany's wishes.

Table 1: History of European monetary integration

Towards Maastrich		Between Maastricht and the single currency		After Maastrich	
1970	Werner Plan	1994	European Monetary Institute (precursor of ECB)	1999	Monetary Union starts
1979	European Monetary System starts	1997	Stability and Growth Pact	2001	Greece joins
1989	Delors Committee	1998	Decision on membership	2002	Euro coins and notes introduced
1991	Maastrich Treaty signed	1998	Conversion rates set	2007	Slovenia joins
1993	Maastrich Treaty ratified	1998	Creation of ECB	2008	Cyprus and Malta join
		2014	Banking Union	2009	Slovakia joins
				2011	Estonia joins
				2014	Latvia joins
				2015	Lithuania joins

Source: Baldwin and Wylposz (2015).

The TEU followed the Werner and Delors reports in laying down a three-stage transition to the EMU, though each document differed in the purposes it assigned to each stage.

Stage one began on 1 July 1990, following the Madrid European Council and involved the completion of the single market, nominal convergence, and closer economic and monetary policy cooperation.

Stage two started on 1 January 1994 and involved the establishment of the European Monetary Institute (hereinafter: EMI), with the responsibility for the technical preparations for stage three, especially the developments of the procedures and instruments of economic policy needed for a single monetary policy.

On the 1st of January 1994, The EMI was founded in Frankfurt as member states started to submit their convergence plans to the European Commission and the EMI for assessment and comments. New rules came into force under Article 109e, including a ban on the monetization of government debt (Article 104, 104a), and a "no bailout clause", which prohibited financial support to governments or public bodies of other member states (Article 104b), while government were direct to avoid excessive deficits (Article104b) and required to making their central banks independent (Article 109e.5).

Stage three was successful in completing the EMU, the irrevocable locking of exchange rates amongst the participating EU countries, and the establishment of the ECB in 1998 and the European System of Central Banks (hereinafter: ESCB).

The third stage started on 1 January 1997. The European Commission and the EMI accessed each potential EMU member to see whether it achieved sustainable convergence according to the qualifying criteria, and the commission made a recommendation based on which the European Council would decide whether the acceding country satisfied the criteria.

2.1.1 The Maastricht criteria
The TEU (1992) outlined strict five entry conditions for all potential euro area members, of which two are monetary and three are fiscal, which are the following:

a) HICP inflation (12-month average of yearly rates), which must not exceed by more than 1.5 p.p. that of the three best-performing member states;
b) Government budget deficit, which must not exceed 3% of GDP;
c) Government debt-to-GDP ratio, which must not exceed 60% of GDP
d) Exchange rate stability, which states that acceding countries must not devalue their currency in the past two years and should participate in the ERM I/ERM II under the EMS for two consecutive years
e) Long-term interest rates (average yields for 10-year government bonds in the past year), which must not be more than 2 p.p. higher than those of the three best performing member states in terms of price stability.

The fulfilment of the Maastricht criteria was to be evaluated by late 1997, a full year before the euro would be introduced. On 1 January 1999, the exchange rates of Austria, Belgium, Finland, Germany, Ireland, Luxembourg, the Netherlands, Portugal, and Spain, were irrevocably fixed, while the United Kingdom (hereinafter: UK) and Denmark decided to keep using their currencies. The old national currencies became fractions (odd) of the euro and the scope of monetary policy was transferred to the ESCB under the aegis of the ECB, which is headquartered in Frankfurt. The euro banknotes and coins were first issued in January 2002.

Afxentiou (2000) noted that the Maastricht criteria are not based on criteria that touch upon convergence but are mostly criteria that ensure price and fiscal stability. Price stability criteria, long-run interest rates and exchange rates aim to ensure long-run price stability, while the budgetary rules are preventing the EU from inflationary pressures, which could be the result of unsustainable fiscal policies. Interestingly, in April 1997, none of the acceding countries fulfilled all of the Maastricht criteria (besides Ireland and Luxembourg, none of the other countries was able to fulfil the fiscal criteria). The TEU stressed the need for a politically independent central bank, but this did not end the debate on the role of the accountability of the ECB, nor on the level of coordination needed between monetary and fiscal policy. Temperton (1999) explained that on a fundamental level, the euro's introduction is a political decision to ensure peace and stability in western Europe.

2.1.2 Why OCA theory was not part of Maastricht
One may wonder why the Maastricht convergence criteria were based on nominal variables and not on real variables (such as GDP per capita, and development), and many believe that the main reason was that if more "strict criteria were used," then many the potential joiners would not have been able to successfully fulfil the Maastricht criteria.

Sapir (2009, pp. 273) argues that the OCA and the Maastricht criteria are essentially unrelated, with the latter placing more emphasis on the importance of economic integration and real convergence among candidate countries than the former does on nominal convergence and asymmetric shocks resulting from structural differences. The development of the EMU was motivated by political rather than economic grounds, and its ancestors dreaded the political repercussions of a partition of the EU into a core and peripheral that might have followed from the basis of the OCA criteria. Sapir (2009, pp. 274) explained that the elimination of shocks caused by national central banks inside the monetary union was thought to make macroeconomic shocks less frequent, and it was hoped that shocks would become more symmetric due to endogeneity.

The OCA criteria may have been overlooked because automatic stabilisers were thought to be sufficient at absorbing asymmetric shocks, even though the EMU lacks a common fiscal instrument. This is especially true after the introduction of the Stability and Growth Pact (hereinafter: SGP), which was designed to give countries more leeway during difficult economic times. The Maastricht criteria are therefore ultimately intended to ensure that countries joining the euro can live in an environment of low inflation, similar to what

Germany and the countries in the DM-area enjoyed before monetary unification, according to Sapir (2009, p. 268). Only the DM-area nations (Germany, the Benelux, France, and Austria) would have been eligible for EMU membership under the OCA criteria, and the EU would have been divided into a "core" and a "periphery," with the latter consisting of nations like Italy, Spain, Greece, Portugal, Ireland, and Finland. As noted by Sapir (2009, pp. 270). Vinals (1996, p. 1104) emphasized that even with the Maastricht criteria, which might have been construed with an "OCA theory twist," the possibility of such a division existing as a narrow EMU, which only includes DM-area countries, would negatively impact those nations who did not join the EMU and cause the financial markets to devalue those nations' currencies. Unfortunately, as political factors were stronger than economic factors, the complete disregarding of the OCA criteria did not prevent the emergence of fundamental differences among EU member states during the financial crisis of 2008.

2.2 Empirical evidence on the optimality of the EMU as an OCA

Ever since the creation of the EMU, there has been a heated debate on whether the EMU as a whole qualifies as an OCA and fulfils the OCA criteria. While there have been some arguments in favour, most economists tend to agree that the EMU is not an OCA as it satisfies some but not all the OCA criteria. If one refers to endogeneity[2], we cannot ambiguously rule whether the EMU is, or it is not an OCA at the moment as it could become an OCA in the future. For example, de Grauwe (2007) puts the EU below the OCA line, but the EMU just above the OCA line.

Figure 5: Symmetry and labour market flexibility in monetary unions
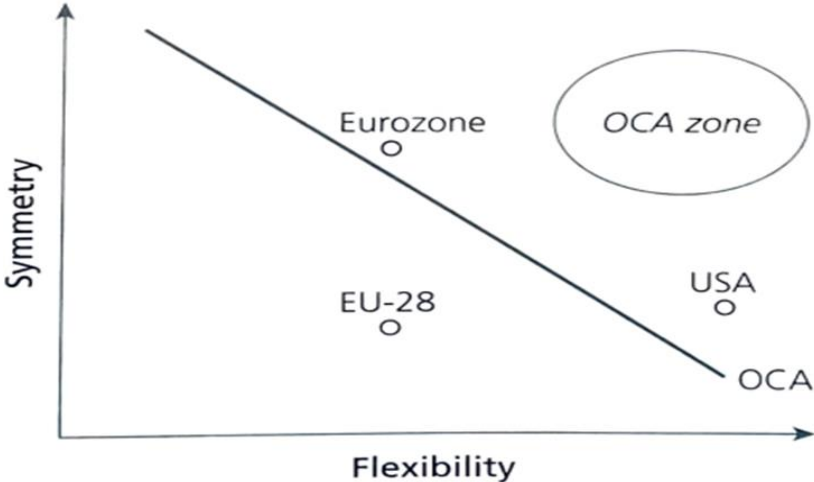
Source: De Grauwe (2007).

As can be noticed in figure 5, de Grauwe (2007) argues that there is a broad concord that the EU is not an OCA (similar views are shared by Eichengreen, (1991); von Hagen & Neumann, 1994; Bayoumi & Eichengreen, 1993, 1996, 1997; Bayoumi & Masson (1994), Argy & de Grauwe, 1990; de Grauwe & Heens, 1993; Beine, Candelon & Sekkat, 2003).

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[2] This is highly unlikely as the fiscal criterion will be difficult to be fulfilled

Several studies analysing the optimality of the monetary union involving all EU member states showed that the EU is allocated below the OCA line.

At the same time, there is a strong unison that there is a subset of EU member states that could create an OCA, the most usual suspects being Germany, the Benelux countries, Austria, and France. Erkel-Rousse and Melitz (1995) found that in most EU countries monetary policies cannot affect real (as opposed to nominal) variables such as GDP and unemployment, noting that the loss of the monetary policy tool has not been very costly for peripheral countries. According to Gros (1996), asymmetric shocks in the EU largely take place at the sectoral level rather than the national level and cannot be mitigated by changes in exchange rates. De Grauwe (2007) points out that the US is above the OCA line and that the degree of symmetry between regions in the US is similar to that in the EU, but notes that the difference in the degree of flexibility of labour markets is the most significant as the US labour force is significantly more adaptable than that of the EU. Bruno and Sachs (1982) and Grubb, Jackman, and Layard (1983) both note that real wages in Europe react to unemployment less strongly than they do in the US. De Grauwe (2007) adds that there is ample evidence that labour mobility is much higher within the US than it is between EU member states (the reason the US is located above the OCA line in figure 5).

Bordo and Jonung (1999, pp. 9) explain that the EMU is not an OCA due to heterogenous economic structures of member states, the absence of a lender of last resort (hereinafter: LOLR)[3], low labour mobility and inflexible product market, SGP lacking credible sanction and being too restrictive in face of asymmetric shocks[4]

The main debate is on which criteria the EU fulfils and which it does not.

2.2.1 Labour mobility
Baldwin and Wyplosz (2015, pp. 260) point out that labour mobility is influenced by non-economic incentives such as cultural differences in the immigrating country, family and friendship links that can be weakened and nationalism. For these reasons, labour mobility is always limited. In the EU, labour mobility is much lower than it is in the US. The EU is far from fulfilling Mundell's labour mobility criterion, meaning that in case of asymmetric shocks, they are likely to lead to higher unemployment in countries that lack competitiveness and a possible recession.

Stiglitz (2016) explains that three ingredients are needed to make a monetary union work, labour mobility, deregulated labour markets and fiscal transfers, noting that, in the EMU, none of these exists as labour mobility in the EU is 27 times less than in the US. Eichengreen, McCallum and White (1992) and Brkić and Šabić (2018) emphasise that US workers are two to three times more mobile than EU workers, blaming both the strong presence of labour

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[3] This point is questionable as the ECB has functioned as the LOLR during the euro area crisis and the Covid-19 pandemic

[4] In January 2022, Italian Prime Minister Mario Draghi and French President Emanuel Macron also touched upon the rigidity of the SGP and asked for larger flexibility

mobility and the lack of motivation. Stiglitz (2016) adds that when an asymmetric shock occurs (in his example South Dakota), citizens of South Dakota move to other cities in the US because few Americans in other states worry if South Dakota becomes depopulated, something that Greeks (or Croats) worry much more about. In the US, it makes no difference whether jobs move to the people or people move to the jobs, something that cannot be said for the EU. Heinz (2013) emphasises that the euro area is not an OCA as its labour mobility is low, prices and wages are rigid, and its financial markets are not used for risk insurance. Furceri, Loungani and Pizzuto (2020) explain that labour mobility in the EU is significantly lower than in the US, noting that euro area economies adjust to adverse labour market shocks through an increase in the unemployment rates or decrease in the participation rates, pointing out that over time, the role of migration as a shock absorber has increased both in the euro area and the US.

2.2.2 Production diversification and similarity of production structure

Baldwin and Wyplosz (2015) claim that the majority of EMU member states meet this criterion because the trade dissimilarity index, a measure of how differently each country's trade structures compare to those of its trading partners, is relatively low, particularly in Slovenia, Italy, Austria, and Slovakia. The EMU successfully satisfies this criterion since many EMU (and EU) member states tend to avoid specialization and because the majority of trade is focused on intra-industry trade.

2.2.3 Openness to trade and trade integration

Trade openness, which is measured by the sum of exports and imports divided by GDP, reduces the usefulness of the independent exchange rate.

Figure 6: Openness to trade (measured as (export+import)*100/GDP) among EU member states, data for 2020

Adapted from Eurostat (2021a).

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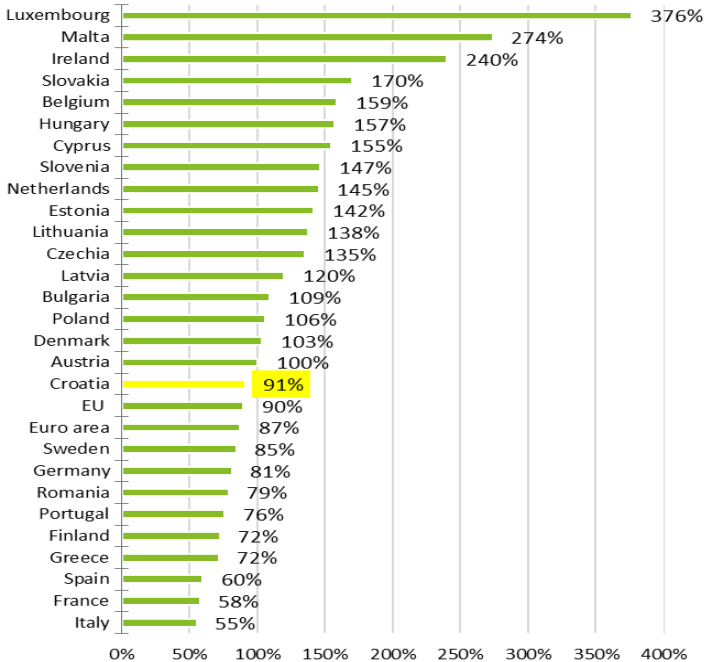
As shown in figure 6, most EU and EMU member states are extremely open. Most EU member states (especially Luxembourg, Malta, and Ireland) bow very well on this criterion, as does the EU as its openness index is above 90%. Croatia's index is above the EU average, which will be important in the next chapter. As most EU member states have readings on this index above 100%, they satisfy McKinnon's criterion.

Brkić and Šabić (2018, pp. 6) note that the euro area performs exceptionally well on this criterion, adding that the volume of international trade among the original EMU member states is extremely high and that, at the time the euro area was created, trade with the rest of the monetary union accounted for more than half of the total trade in goods for most of its original member states.

2.2.4 Business Cycle Synchronisation

There are assorted studies done regarding this criterion, including Argy and de Grauwe (1990), Bayoumi and Eichengreen (1993, 1996, 1997), de Grauwe and Heens (1993), von Hagen and Neumann (1994), Beine, Candelon and Sekkat (2003) and Fatás (1997). They focus on how business cycles are synchronised among EU member states and how asymmetric shocks would affect different member states. For example, Argy and de Grauwe (1990) note that the EU satisfies this criterion under certain nuances and assumptions, while de Grauwe and Heens (1993) and Bayoumi and Eichengreen (1993) point out that although the EU, as a whole, does not satisfy the BCS criterion, there is a subset of EU countries (Germany, the Benelux countries and Denmark) that satisfy this criterion.

Beine, Candelon and Sekkat (2003), von Hagen and Neumann (1994), Bayoumi and Eichengreen (1997) and Fatás (1997) point out that the EU only partly satisfies this criterion, as there are significant differences between the "core" and the "peripheral" countries. All these studies note that while there are some differences in the correlations between the economic growth between EU countries, correlations have increased over time as national borders have become less important.

2.2.5 Fiscal criterion (Fiscal transfers)

Probably the criterion that is the most vital for the EU is the fiscal criterion. Namely, before the GFC, there was no transfer system in the EU, the EU budget amounted to a mere 1% of its GDP. Baldwin and Wyplosz (2015) emphasise that the EU is not an OCA, by far, if judged by this criterion. Eichengreen (1991) notes that the EU does not fulfil this criterion, as its labour force mobility is limited, which was also confirmed by Furceri, Loungani and Pizzuto (2020). Fatás, Torben and Philippe (1998) explain that in well-run economies, fiscal and monetary policies are harmonised, something that is missing in the EU. In the EU, the strictly independent ECB runs monetary policy, but there is no single institution to run fiscal policy because EU member states are not prepared (yet) to give up their control of tax, spending and borrowing decisions. It is hardly possible that the tide will change and leaders like Victor Orbán Mateusz Morawiecki would ever agree to such policy changes.

Monetary unions do not need marginal fiscal flexibility, they require ample flexibility as in the US, around 25% of its GDP is available to redistribute resources automatically via the transfer of tax revenues from states experiencing robust growth to unemployment benefits in poorer states. In the EU, national welfare programs (such as social security) are funded by national governments, so if a member state has a crisis, its government will have to cover its increasing welfare payments, at a time when government revenues are failing and are hampered by the restrictive SGP rules. In the EU, there is simply little discretionary money that can be used in a countercyclical manner. Levitt and Lord (2000) argue that the consequence of lower labour mobility and the absence of a sizable EU budget means that asymmetric economic shocks pose greater problems in the EU than in the US.

Brkić and Šabić (2018, pp. 8) point out that the European Stability Mechanism was not designed as a permanent fiscal transfer system and was only used to provide support in cases of deep economic and financial crises. As of now, the EU is far from fulfilling this criterion, which has rampant repercussions for Croatia in case it experiences an asymmetric shock while other EU member states (for example Germany) experience robust growth.

2.2.6 Homogeneous preferences and solidarity vs nationalism

According to Baldwin and Wyplosz (2015), this criterion is hard to measure, noting that there remains some heterogeneity among national preferences. Many EU member states do not agree on the use of monetary policy or inflation targeting by the ECB. Although differences exist, EU citizens still trust the EU and believe that the EU is the right way forward for their country.

Figure 7: How much trust do EU citizens have in the EU by member state (left), data for 2020, and on average in the EU, their parliament, and their government (right)

Country	0-100	Ranking
Portugal	73	1
Ireland	71	2
Lithuania	69	3
Estonia	63	4
Malta	62	5
Denmark	61	6
Hungary	56	7
Romania	56	8
Latvia	55	9
Slovenia	55	10
Poland	55	11
Bulgaria	55	12
Spain	54	13
Finland	54	14
Belgium	53	15
Sweden	52	16
Croatia	51	17
Netherland	49	18
Czechia	49	19
Italy	49	20
EU	49	
Luxembou	48	21
Germany	47	22
Austria	45	23
Cyprus	45	24
Slovakia	43	25
France	36	26
Greece	36	27
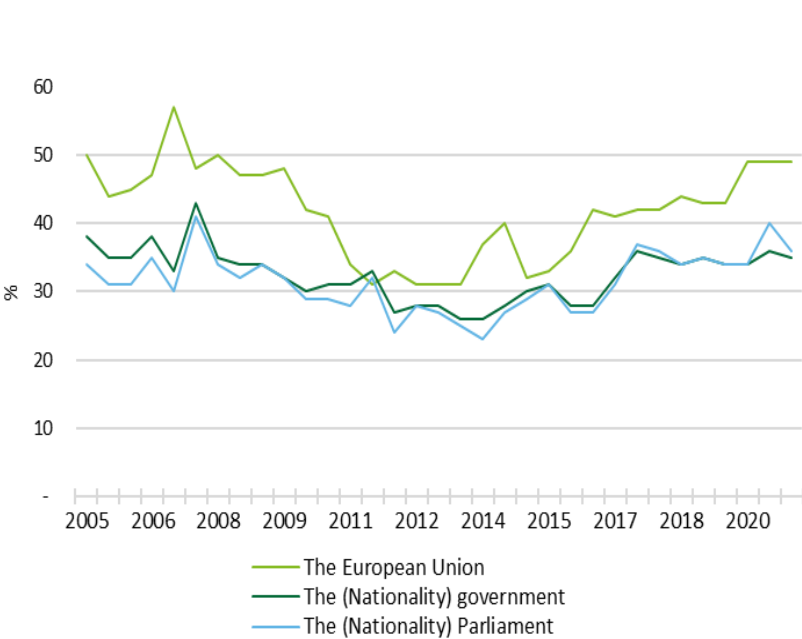
Adapted from European Commission and European Parliament (2021).

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As shown in figure 7, in 2020, the Portuguese had the most faith in the EU, followed by the Irish and Lithuanians. Croatia is ranked 17th, with just above 50% of surveyors saying that they trust the EU. In the right part of the graph, it is noticeable that trust in the EU (but also in the national governments and parliaments) fell after the 2008 crisis, only to rebound in recent years. It can be concluded that EU citizens have faith in the EU more than in their national governments and parliaments. The EU fulfils this criterion partially and this criterion is very dependent on factors that are not always based on economic logic, making it almost impossible for it to be completely fulfilled.

2.2.7 Price and wage flexibility

The Organisation for Economic Co-operation and Development (hereinafter: OECD (2000)) and the European Commission (1999 explain that price flexibility is exceptionally low across the EMU. According to Mongelli (2002, pp. 15), despite substantial signs of progress in recent years, real wages are still relatively sticky throughout most EU member states, albeit with notable disparities. This low wage flexibility is also a major factor in why prices are also rigid. According to the OECD (2000), there is a strong correlation between the product and wage markets since nations with stricter laws governing the product market also tend to have stricter laws governing employment protection.

The EU (and the EMU) do not fulfil this criterion.

2.2.8 Financial integration

Although this criterion was largely met by initial EMU member states[5], it played a key role in fuelling the GFC in the EU. The establishment of the EMU led to converging yields between EMU countries. It seemed for a brief period that Greece's debt has the same risk as does Germany, something that seems too good to be true. Unfortunately, what these yields did not show are the dynamics of the current account balance between "core" and "peripheral" EU member states.

Brkić and Šabić (2018, pp. 7) explain that macroeconomic imbalances which accumulated in peripheral countries as a result of excessive capital flow made these nations more susceptible to negative demand shocks since the foreign cash that these member states received after the creation of the EMU was not invested in productive activity. Brkić and Šabić (2018, pp. 8) note that foreign money that was then poured into peripheral countries was largely related to foreign borrowing by banks, who used it to provide consumer loans to households and investment loans for residential buildings. Although the EMU has brought a great degree of financial integration and favourable lending conditions, the crisis pointed out that some of the conditions in the market were good to be true.

As the Covid-19 pandemic also adversely affected the EU and the euro area, this time the ECB has been able to react more promptly and prevent similar disasters. One can conclude

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[5] The initial fulfilment of the Maastricht criteria (and hypothetical fulfilment of some of the OCA criteria) by original EMU member states could be attributed more to market perception of the EMU than the sound convergence process (especially real) in some countries

that the EMU now fulfils the financial integration criterion much more than it did during the debt crisis (Although before the debt crisis it seemed that it was fulfilled without any issues (Brkić and Šabić, 2018, pp. 30))

2.2.9 Political integration

Similarly, to the previous criterion, this criterion is very problematic, and the debt crisis highlighted that the EU, at the time, was far from fulfilling this criterion. Brkić and Šabić, 2018, pp. 7) note that the failure of EU member states to reach an acceptable level of political integration may have contributed to the unrestrained escalation of imbalances in peripheral nations, emphasising that another problem is that the SGP regulations are not followed as strictly as they ought to be (France and Germany are very good at bending the rules), and there is no supervisory mechanism at the level of the euro area to identify other macroeconomic vulnerabilities like the balance of payments imbalances or excessive loan growth and to encourage national governments to take action to address such issues.

In 2022, much more prudence is required, and such mechanisms exist. For example, in early February 2022, the European Systemic Risk Board, which was established at the end of 2010, warned Croatia that the unsustainable growth of its real estate prices could jeopardise its financial sector. Also, banks are required to have more capital than before and even more importantly, countries such as Hungary and Poland, which fail to respect the rule of law, are not paid out funds from the EUR 750 billion EU recovery fund. While political integration is not optimal, the EU is moving in the right direction. Vrnakova and Bartuškova (2012) add that the strongest point of European monetary integration is the political will of member states, adding that from the very beginning the political will was a reason and core characteristic of the single currency.

Table 2: Overview of studies on whether the EU is an OCA

Study	Year	Criterion	Does the EU/EMU fulfill this criterion	If not, is there improvement? (author's views)
De Grauwe, Vahevarbeke	1990	BCS	Yes (under certain assumptions)	
Bayoumi, Eichengreen	1997	BCS	Mostly	Yes
Neumann, von Hagen	1994	BCS	Mostly	Yes
Bayoumi, Eichengreen	1992	BCS	Partly (only certain EU countries)	Yes
Beine, Candelon, Sekkat	2003	BCS	Mostly	Yes
Fatas	1997	BCS	Mostly	Yes
De Grauwe and Heens	1993	BCS	Partly (only certain EU countries)	Yes
Brkić and Šabić	2016	Financial integration	Yes	
Baldwin & Wyplosz	2017	Fiscal Transfers	No	Yes
Heinz	2017	Fiscal Transfers	No	Yes
Vrnakova, Bartuskova	2013	Fiscal Transfers	No	Yes
Brkić and Šabić	2016	Fiscal Transfers	No	Yes
Baldwin & Wyplosz	2018	Homogeneity of preferences	Partly	Yes
Baldwin & Wyplosz	2015	Labour Mobility	No	No
Heinz	2013	Labour Mobility	No	No
Furceri, Loungani, Pizzuto	2020	Labour mobility	Partly	No
Eichengreen	1991	Labour Mobiliy	No	No
Vrnakova, Bartuskova	2013	Political integration	Partly	Yes
Baldwin & Wyplosz	2016	Production Diversification	Yes	
Brkić and Šabić	2016	Trade integration	Yes	
Baldwin & Wyplosz	2015	Trade openness	Yes	

Source: Own work.

An overview of all studies on whether the EMU is an OCA can be seen in table 2. Most of the studies focused on the BCS criterion and found that the EMU satisfies this criterion to a certain extent, while most of them found that there is a subset of core European countries that fully satisfy the BCS criterion.

2.3 Endogeneity in the EMU

As we may share the opinion of the majority of experts that the EU and the EMU are not (yet) OCA, the question is whether they can become an OCA at some point in the future.

Namely, referring to the phenomenon of endogeneity is it possible that because two of the OCA criteria are endogenous (one influencing the other, et ceteris paribus) and the lower obstacles to trade have increased trade among EU members (the "Rose effect") and at the same time making their business cycles more correlated, thus making them less vulnerable to asymmetric shocks. This endogeneity theory, proposed by Frankel and Rose (1997) as opposed to the specialisation paradigm, proposed by Krugman (1993) and Krugman and Venables (1993), is one that is of vital importance for the EMU and Croatia as the acceding country.

Frankel and Rose (1997, pp. 8) explain that countries that join the EMU, no matter what their motivation may be, may satisfy OCA properties ex-post even if they fail to satisfy them ex-ante as a country's suitability for an entry into a currency union may have to be reconsidered if satisfaction of OCA criteria is endogenous. The theory was evaluated empirically by many authors, trying to find out whether endogeneity or specialisation in the EMU prevails.

Figure 8: A country joins the EMU, and the "Endogeneity" of OCA dominates"
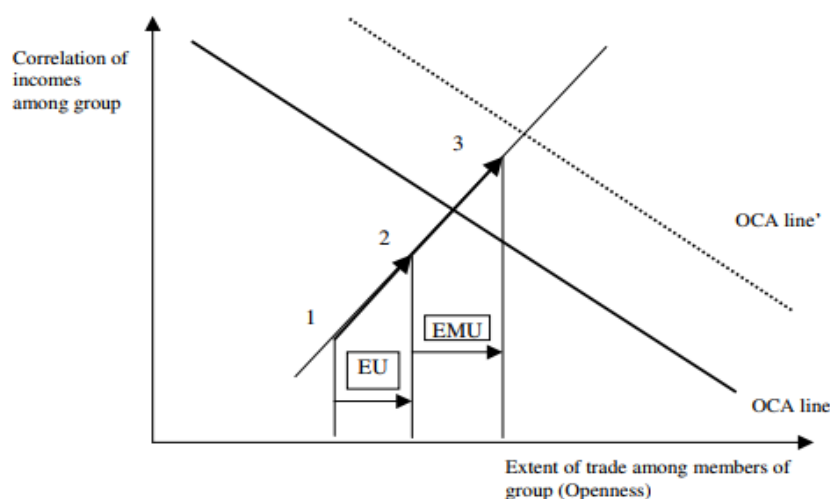
Source: Mongelli (2002).

As shown in figure 8, if endogeneity prevails, especially in the case of high openness and high BCS, the EMU (or any other currency area with a similar structure) is preferred for the acceding country (ex-post). The empirical studies regarding endogeneity focus on two

channels, the first being whether the creation of monetary unions spurs trade, while the second focused on whether the increased trade increases BCS.

2.3.1 Studies on the euro's effect on trade

Studies on the first channel were made by Rose (2000), Rose and van Wincoop (2001) and Rose (2002), by applying a model covering over 200 countries to analyse the effects of a common currency on trade flows between members. They found this "Rose effect" to be around 200%, meaning that joining a monetary union doubles the size of trade flows[6]. While some economists followed in the footsteps of Rose, many of them took the stance that his calculations are incorrect and tried to prove that this "Rose effect" is too large to be plausible.

Numerous studies such as Persson (2001), Nitsch (2001), Baldwin (2006), Bun and Klaasen (2002), Flam and Nordstrom (2003), Berger and Nitsch (2006) find that the "Rose effect" is inflated and that the trade effect in the EMU is likely to be much lower, probably between 10% and 15%. Baldwin (2006) makes an important conclusion that even these lower numbers for the "Rose effect" might not be plausible as most of these studies have failed to formulate how monetary union affects trade, and without concrete theoretical background, aggregate effects of the correlation between these two variables have extremely low explanatory power.

Rose (2009) incorporates several studies on whether the EMU led to higher trade and uses a meta-analysis to try to estimate whether this has been the case or not. He collected 26 studies from 2002 to 2008 and tabulated a meta-estimate of the effect of the euro, using both the fixed effect and random effect technique.

The results of the studies are shown in the appendix, with gamma estimates (whether the effect of the currency union is statistically different from zero) ranging from -0.02 (Baldwin & Taglioni, 2006) to +1.8285 (Yamarik & Ghost, 2005). It is important to mention that all of the studies are using data relevant to the EMU. Most studies are based on Rose (1999) and his gravity equation.

Table 3: Regression coefficients based on a meta-analysis of the impact of currency union on trade

Estimation technique	Pooled estimate of γ	Lower bound of 95%	Upper bound of 95%
Fixed	0.08	0.07	0.09
Random	0.21	0.15	0.27

Source: ECB (2009).

As can be noticed in table 3, Rose (2009. pp. 260) emphasises that in the case of heterogeneity, the fixed effects and the random effects estimators will significantly differ. Both estimators in the meta-analysis are statistically significant (at an extremely high

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[6] Baldwin (2006) explains the problems behind these statistical calculations, showing that the multiple regression has an omitted variable bias, lowering this effect to between 5% and 15%

confidence interval), with the fixed effects estimator showing that a common currency raises trade by about 8%, while the random effects estimator shows that it increases it by 23%.

2.3.2 Studies on the increased trade's effect on BCS

Rose (2009) does not stop here but also analyses the other channel, which is how this increased trade integration affects BCS. The majority of studies on this topic are based on Frankel and Rose (1996, 1997), which analysed the connection between increased trade and BCS. They found that trade integration is strongly and consistently positively correlated with higher BCS, which is also confirmed by studies such as Rose and Engel (2001) and Rose (2002). Rose (2009, pp. 265) explains that Frankel and Rose (1997) is a particularly important paper, as it is the first to formulate that β is ambiguously signed as it depends on what trade is spurred by integration, and what sorts of shocks hit the economy. If β is positive, then monetary unions may endogenously become OCA. A considerable rise in BCS results from a currency's ability to indirectly stimulate trade, which makes the currency union feasible by lowering the need for national monetary interventions to counteract asymmetric shocks. Rose (2009, pp. 266) explains that The BCS is (usually)[7] measured as a correlation coefficient between detrended levels of activities between two or more countries over some reasonable period. As in the previous analysis, a meta-analysis of the 20 studies is used, in the period between 2001 and 2007), with β ranging from 0.013 (Calder, 2007) to 0.134 (Baxter, 2005).

Table 4: Regression coefficients based on a meta-analysis of the impact of trade on BCS

Estimation technique	Pooled estimate of γ	Lower bound of 95%	Upper bound of 95%
Fixed	0.02	0.016	0.023
Random	0.043	0.031	0.054

Source: ECB (2009).

As noticeable in table 4, Rose (2009) again uses both the fixed effects and random effects and notes that the hypothesis that β is statistically insignificantly different from zero is rejected at an extremely high confidence interval. Similarly, as in the case of trade, there is considerable heterogeneity between the two estimators. While the fixed effect estimator yields a pool estimated β of 0.02, the random effects estimator yields an estimate of 0.043. Rose (2009) notes that he tends to be orthodox and focuses on the lower, fixed effects estimator of β of 0.02, which is considerably lower than the β in Frankel and Rose (1997).

2.3.3 Quo Vadis, endogeneity

Rose (2009, pp. 259) notes that if the EMU has boosted trade increase of 8% and each 1% increase in trade has increased BCS by 0.02, then the EMU leads to a rise in the correlation

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[7] Rose (2009, pp. 260) points out that different measures of real activity are available such as real GDP, unemployment rate, and industrial production, as are detrending techniques, which do not have an appreciable difference on the results in practice

coefficient of detrended outputs of 0.16. Corsetti and Pesenti (2002) successfully prove that the EMU can become an OCA ex-post, as the OCA is the result of the duties of national governments and reactions of the economy on prices, which attribute to making an optimal fixed exchange rate, without intra-industry specialisation playing a key role, while Babetski (2004) explains that lower exchange rate volatility positively effects on convergence, noting that endogeneity prevails in the EMU.

Eichengreen, McCallum and White (1992) note that diversification has a stronger and more powerful impact on asymmetric shocks, especially in developing countries, noting that the effect of trade intensity on asymmetric shocks is dependent on the types of shocks. According to Brkić and Šabić (2018, pp. 3), while De Grauwe and Mongelli (2004) prove the endogeneity of financial integration, Darvas and Szapáry (2008), Furceri and Karras (2008) and Gogas (2013) provide evidence that the introduction of the euro has enhanced BCS in the euro area.

According to Tavlas (1993, pp. 17), currency areas among economies that trade widely with one another would be more closed than any of its constituent portions, acting as a larger buffer against external shocks even in the absence of endogenous-trade effects. Although the causation of the endogeneity literature's conclusions is unclear, they are extremely substantial and resilient to many sensitivity analyses. The findings of the endogeneity literature are quite significant and robust to various sensitivity analyses, yet causality is ambiguous.

Frankel and Rose (1997), Alesina and Rodrik (1994), Helpman (1988), and Bradford and Chakwin (1993) point out the simultaneity between growth and trade, noting that causality may run from investment to growth and then to exports, rather than the other way around as the dilemma is whether countries are in a currency union because they trade a lot or start trading more solely because they create a currency union. Mongelli (2008) also points out that there is a possibility that there are other sources of endogeneity.

De Grauwe and Mongelli (2004) examine three other sources of endogeneity of OCA and review some similar concepts. They analysed the endogeneity of financial integration and insurance schemes, the endogeneity of symmetry of shocks and output synchronisation and the endogeneity of flexibility in product and labour markets. A common denominator among these three possible sources of endogeneity is the removal of barriers that leads to the narrowing of distances and a change of agents' incentive structures.

Baldwin & Wyplosz (2015, pp. 382) point out that if trade integration leads to more specialisation as each country becomes more specialised and focuses on its competitive advantage, then the Kenen diversification criteria may become less fulfilled in the future than now. On the other hand, if trade integration leads to less specialisation, then diversification increases, with every country producing a complete range of goods. In their opinion, diversification rises with trade integration, thus endogeneity prevails over specialisation, bringing the EMU closer to becoming an OCA.

3 CROATIAN MONETARY SYSTEM

After Croatia became independent on 25 June 1991, it underwent drastic changes. The first couple of years after its independence were marred by the war with Serbia and hyperinflation. After this tough period, Croatia managed to successfully implement structural reforms and steered its way towards EU membership. Its efforts were rewarded on 1 January 2013 when it became the 28th EU member state. As it did not negotiate an opt-out clause as did the UK and Denmark, it is officially obliged to join the EMU once it officially fulfils the Maastricht criteria[8]. Croatia entered the ERM II mechanism on the 10th of July 2020 and is expected to enter the euro area on 1 January 2023.

3.1 Pre-EU Croatian monetary developments

Before declaring independence in 1991, Croatia was part of Yugoslavia, together with Slovenia, Macedonia, Serbia and Bosnia and Herzegovina and Montenegro). After the first independent elections in 1990, the former Yugoslav army attacked Croatia, leading to a war that would lead to big issues in the Balkans (Bosnia was also attacked by the former Yugoslav army). In early 1992, the United Nations (hereinafter: UN) recognised Croatia as an independent state. The war ended in 1995 with the help of both military and diplomatic efforts with the signing of the Dayton agreement. In mid-July 1997, the UN forces stationed in Croatia began to withdraw from the country and the UN mandate for peacekeeping forces in the region was phased out in January 1998. During the war, Croatia experienced massive economic instability, which had its roots in former Yugoslavia in the 1980s after the death of its former leader, Josip Broz Tito. According to Broz (2010, pp. 12), this period was marred by hyperinflation as before the introduction of the so-called stabilisation programme, MoM inflation reached 30% in 1993, as well as a severe slump in industrial production and GDP as well as large supply-side shocks. Crkvenac (1997) notes that Croatia's industrial production in 1993 was 42.5% lower than in 1990 in real terms.

Broz (2010, pp. 12) explained that in October 1993, the then government announced the so-called "Stabilisation Programme", which had three distinct phases, of which the first included curbing inflation, the second included structural changes in the Croatian economy and the third fast and robust economic development. Broz (2005a, pp. 8) points out that the programme was well communicated with the Croatian public and the public had faith in the government's determination to reduce inflation. The programme was able to curb price growth, with both the GDP and industrial production beginning to rise. As the programme was successful, the other two phases of the destabilisation programme were neglected, so there was no support for economic development. According to Broz (2005b, pp. 25), due to this decision, combined with the banking and financial crisis in 1997, Croatia entered a recession in 1998 Q4 that lasted until 1999 Q3.

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[8] On the 1st of June 2022, the European Commission announced that Croatia is ready to adopt the euro on 1.1.2023 as it successfully fulfils all of the Maastricht criteria

Croatia's financial system was characterised by the dominance of the banking system, as capital markets are much less developed. It has a two-tier banking system, in which HNB acts only as a central bank and is not engaged in commercial banking. The country's main stock market, the Zagreb Stock Exchange, which was first established in 1918 was revived by 25 banks and insurance companies in July 1991. There are also two smaller independent stock exchanges in Varaždin and Osijek.

HNB became the central bank on 23 December 1991, when the Croatian dinar was introduced as the official currency. The Croatian kuna replaced the dinar on the 30th of May 1994. The status of HNB is defined in Article 53 of the Croatian constitution and in HNB Law (35/95), which both declare the central bank as an autonomous institution with a high degree of independent responsibility. HNB's governor is elected by the Croatian Parliament for six years, and the bank is subject to supervision by the parliament to which it submits annual reports. HNB's current governor is Boris Vujčić, who was elected in 2012.

Croatia's monetary policy is based on a floating exchange rate regime, however, in effect, HNB operates a "managed float" by intervening to limit fluctuations. The Croatian kuna as a currency has full convertibility as Croatia adopted Article VII of the IMF agreement in June 1995, and there are no restrictions on the import or export of foreign income by non-residents, while international investors are not required to report transactions to the HNB. Foreigners can freely convert and repatriate capital and profits under Article 49 of the Croatian Constitution and Article 41 of the Foreign Exchange Law.

In Croatia, domestic or foreign legal entities or individuals can establish banks. The minimum equity capital requirement is HRK 3.6 million for a savings bank, HRK 9 million for a branch, HRK 18 million for a commercial bank and HRK 54 million for a bank dealing in foreign exchange (HNB, 2018).

Table 5: Selected indicators for Croatia between 1993 and 1997

Year	Reserve money	Money M1	Money M1a	Broadest money M4	HRK/EUR exchange rate	Nominal wages in HRK
1993	2,249	3,134	3,759	10,061	4.19	535
1994	4,073	6,198	6,825	16,184	7.09	1,201
1995	5,653	7,732	7,972	21,005	6.76	1,757
1996	7,374	9,621	9,796	30,885	6.81	1,967
1997	9,168	12,263	12,408	44,605	6.96	2,255

Source: HNB (2022a).

As shown in table 5, in the first couple of years after independence, Croatia's monetary aggregates grew significantly, as did nominal wages (mind that HNB's official inflation figures are from 1998 onwards), which rose from HRK 535.4 in 1993 to HRK 2,254.8 in 1997.

Figure 9: HRK/EUR exchange rate between 1994 and 2021
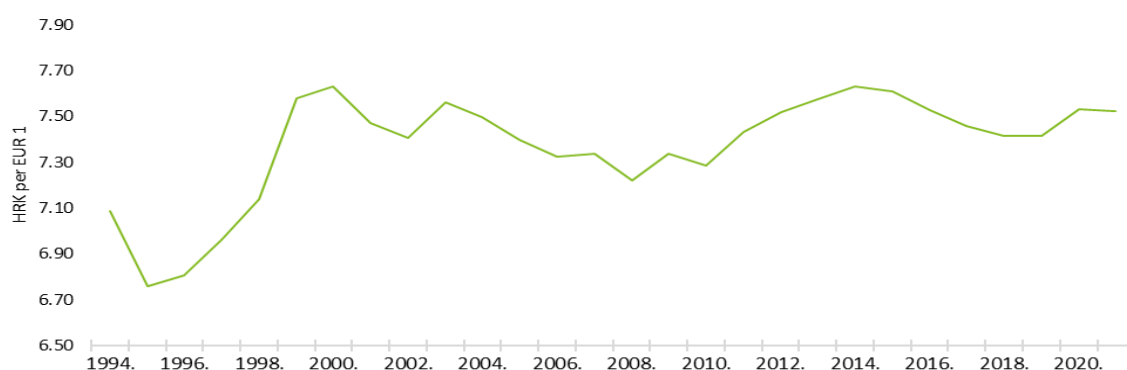
Adapted from HNB (2022a).

As can be seen in figure 9, in 1995, the HRK appreciated vis-à-vis EUR, but depreciated in 1996 and 1997, as the HRK/EUR exchange rate went from 6.76 in 1995 to 6.96 in 1997. The HRK continued to depreciate until 2000, after which it remained fairly stable. After the inflationary period and the economic recession after independence, the Croatian economy stabilised, and all its efforts were set on its accession to the EU.

In 2003, Croatia applied for EU membership and negotiated with the EU until December 2011. On the 9th of December 2011, Croatia signed the EU accession treaty, becoming the 28th EU member country on the 1st of July 2013.

The period before its EU accession (2000-2013) was first marred by a period of economic stability and then a period of an economic downturn. In the pre-crisis period, the Croatian economy experienced robust growth, but the economic crisis severely affected the economy (although maybe not being an EU member turned out to be a blessing in disguise for Croatia as it did not have to adopt the EU's austerity policies).

Table 6: Economic indicators for Croatia in the period 2000-2008

Economic Indicators	2000	2001	2002	2003	2004	2005	2006	2007	2008
Population (million)	4.43	4.31	4.31	4.31	4.31	4.31	4.31	4.31	4.31
GDP (million EUR, current prices)	23,682	25,986	28,773	31,011	33,779	36,805	40,546	44,272	48,338
GDP per capita (in EUR)	5,351	6,035	6,683	7,202	7,836	8,534	9,400	10,267	11,216
GDP - YoY rate of growth	2.90	3.00	5.70	5.50	4.10	4.30	4.90	4.90	1.90
Average CPI year-on-year inflation rate	4.60	3.80	1.70	1.80	2.10	3.30	3.20	2.90	6.10
Current account balance (as of % GDP)	(1.40)	(2.20)	(6.30)	(9.00)	(5.90)	(7.20)	(7.70)	(7.80)	(10.40)
Exports of goods and services (as of % GDP)	35.10	37.30	36.00	35.60	36.70	36.50	37.70	37.60	36.20
Imports of goods and services (as of % GDP)	39.50	42.30	45.30	45.90	45.10	45.20	46.10	46.00	46.30
External debt (as of % GDP)	57.20	58.50	59.20	70.90	74.60	77.20	80.20	83.10	91.00
General government debt (as % of GDP)	35.40	36.60	36.50	37.90	40.00	40.90	38.50	37.20	39.10
Unemployment rate (in %)	16.10	15.80	14.80	14.30	13.80	12.70	11.20	9.90	8.50

Source: HNB (2022a).

As can be seen in table 6, Croatia's population slightly decreased, falling from 4.426 million to 4.310 between 2000 and 2008. Its GDP grew significantly in this period, with the GDP growth peaking at 5.7% in 2002 before slowing down to 1.9% in 2008, when Croatia became

to be affected by the global financial crisis (hereinafter: GFC). Its inflation rate declined to 1.7% in 2002 but rose to 6.1% in 2008. Its current account balance was negative throughout the period, while its external debt as a % of GDP skyrocketed from 57.2% of GDP to 91% between 2000 and 2008. The structural reforms positively affected the labour market, as the unemployment rate, which was soaring at 16.1% in 2000, fell to 8.5% in 2008.

The GFC had severe repercussions on both the EU and Croatian economies. As the EU and the euro area were facing a slump, Croatia was experiencing the same effects, albeit with a slight lag. Tajnikar, Došenović-Bonća and Rubinić (2021) explain that the Croatian contraction period of 2009 had its roots in early 2007; however, the turnaround into the all-time low economic growth was delayed in comparison to trends reported by the rest of the euro area. The key underlying driver was investment growth, which peaked in 2008. The soaring investments were connected to both public and private sector borrowing, with household consumption playing a crucial role in preserving economic growth in 2008. Due to the exogenous nature of the crisis, Croatia's fall in exports in 2009 was a result of the contraction of the euro area's demand and was additionally impacted by the record low exchange rate against the euro. (Tajnikar, Došenović-Bonća and Rubinić, 2021, pp. 158).

Tajnikar, Došenović-Bonća and Rubinić (2021, pp. 162) emphasise that from 2009, the upward trajectory of Croatia's growth was conditioned by two external factors, the economic conditions of its main trading partners and the process of forced deleveraging which particularly affected the private sector. The rapid recovery of Croatia's exports in 2010 and 2011 was due to the revival of the EU economy and the participation of HNB's active policy, which devalued the kuna against the euro with its policies. Until 2015, Croatia's public debt and publicly guaranteed debt continued to grow, while private sector debt continuously fell, due to the absence of multiplicator effects.

In a case study between Croatia and Slovenia, Tajnikar, Došenović-Bonća and Rubinić (2021) suggest that Croatia exhibited vast similarities to that of the euro area during the GFC, noting that the ability to implement exchange rate policies (in Croatia) as opposed to not having an independent monetary policy (in Slovenia) led to different outcomes for the two countries. Tajnikar, Došenović-Bonća and Rubinić (2021) add that HNB's exchange rate policy since the depreciation of the kuna stimulated export growth. spurred economic growth and initiated the recovery from the GFC, with such policies allowing for a gradual balancing of trade (it took until 2015 for Croatia to record a positive trade balance). In this period, the appreciation of the kuna stimulated the emergence of a new type of imbalance in the Croatian economy, although Croatia's relationship with the rest of the world remained fairly balanced, which indicates that exchange rate policies can also become a facilitator of greater economic instability and are not always shock absorbers.

Table 7: Economic indicators for Croatia after the GFC

Economic Indicators	2009	2010	2011	2012	2013
Population (million)	4.305	4.295	4.281	4.268	4.256
GDP per capita (in EUR)	10,549	10,615	10,608	10,430	10,423
GDP - year-on-year rate of growth (in %, constant prices)	-7.3	-1.3	-0.1	-2.3	-0.4
Average CPI year-on-year inflation rate	2.4	1.1	2.3	3.4	2.2
Current account balance (as of % GDP)	-6.5	-2.1	-1.7	-1.8	-1.0
Exports of goods and services (as of % GDP)	32.4	35.9	38.4	39.1	39.9
Imports of goods and services (as of % GDP)	38.0	37.5	40.1	40.7	41.9
External debt (million EUR, end of year)	48,271	49,515	49,198	47,624	48,622
External debt (as of % GDP)	106.3	108.6	108.3	107.0	109.6
General government debt (as % of GDP)	48.4	57.3	63.7	69.4	80.3
Unemployment rate (in %)	9.2	11.6	13.7	15.9	17.3

Source: HNB (2022a).

As noticeable in table 7, in the period after GFC, GDP and GDP per capita growth slumped, with Croatia's GDP falling from 45,416 million in 2009 to 44,359 in 2013. The GDP growth rate was negative throughout the whole period, peaking at -7.3% in 2009. In this period, Croatia's public finances deteriorated, with government debt skyrocketing from 48.4% in 2009 to 80.3% in 2013. Even more adversely impacted was Croatia's labour market as its unemployment rate rose from 9.2% in 2009 to 17.3% in 2013.

3.2 Pre-ERM II period of the EU membership

As previously mentioned, Croatia entered the EU on the 1st of January 2013 without the EMU 3rd phase opt-out clause. It entered the ERM II mechanism on the 10th of July 2020 and together with Bulgaria is still a part of it as it is expected to introduce the euro from the beginning of 2023, given that it successfully fulfils the Maastricht criteria and is given the green light by the EU. Its' accession to the EU brought with its entry into the customs union and internal market integration, both of which positively affected its economy. Bukovšak, Ćudina and Pavić (2017) emphasise that the elimination of barriers to trade with other EU member states facilitated and accelerated Croatian exports and imports and foreign trade in general. The period was marred without any significant imbalances and was characterised by additional structural reforms in Croatia. Croatia's political and economic systems became more integrated with the EU, and tourism was the industry that felt the most benefits from Croatia's EU accession.

Table 8: Economic indicators for Croatia after its EU entry

Economic Indicators	2014	2015	2016	2017	2018	2019	2020
Population (million)	4.238	4.204	4.174	4.125	4.088	4.065	4.047
GDP (million EUR, current prices)	43,944	45,211	47,271	49,913	52,718	55,604	50,225
GDP per capita (in EUR)	10,369	10,754	11,324	12,100	12,896	13,678	12,410
GDP - YoY rate of growth (in %, constant prices)	-0.3	2.5	3.5	3.4	2.9	3.5	-8.1
Average CPI year-on-year inflation rate	-0.2	-0.5	-1.1	1.1	1.5	0.8	0.1
Current account balance (as of % GDP)	0.3	3.4	2.3	3.5	1.9	3	-0.1
Exports of goods and services (as of % GDP)	42.8	45.8	47.1	49.3	49.5	50.8	42.1
Imports of goods and services (as of % GDP)	43.2	45.5	45.9	48.6	50.3	51.1	48.8
External debt (as of % GDP)	112.6	106.9	94.5	87.2	80.8	72.4	79.8
General government debt (as % of GDP)	83.9	83.3	79.8	76.7	73.3	71.1	87.3
Unemployment rate (in %)	17.3	16.2	13.1	11.2	8.4	6.6	7.5

Source: HNB (2022a).

In this period, as can be seen in table 8, Croatia's GDP and GDP-per-capita experienced robust growth, with GDP growth peaking at 3.5% in 2016 and 2019. In 2020, Croatia was very adversely affected by the Covid-19 pandemic, experiencing the worst GDP slump throughout the EU[9]. As previously mentioned, Croatia's current account balance turned positive for the first time since it became independent, and since then its current account balance has been very balanced. The HRK exchange rate was fairly stable, first experiencing a slight depreciation from 2013 to 2015 and then a slight appreciation after 2015.

During this period, Croatia experienced a period of exceptionally low inflation (even deflation between 2014 and 2016). While its GDP per capita rose from 10,369 in 2014 to 13,678 in 2019, it slumped to 12,410 in 2020. Also, its external debt as % of GDP was significantly reduced, from 112.6% in 2014 to 72.4% in 2019 and its debt-to-GDP ratio dropped to 71.1%. Croatia is steadily on the course toward euro adoption, and its accession to the ERM II mechanism was an especially important cornerstone for the country.

The successful accession to the ERM II mechanism was seen as an important goal, and the current government of Croatian Prime Minister Andrej Plenković is widely lauded for its efforts in achieving this goal.

3.3 The ERM II participation period and fulfilment of Maastricht criteria
Croatia has been in the ERM II mechanism since July 2020 and must be in this mechanism for at least two years (one of the Maastricht criteria) to be able to introduce the euro. On the 1st of June 2022, the European Commission published its Convergence Report, in which it noted that all four nominal convergence criteria and its legislation is fully compatible with the requirements of the Maastricht Treaty and the Statute of the ESCB/ECB.

European Commission (2022) pointed out that out of all the EU member states that are legally committed to adopting the euro (Sweden, Romania, Bulgaria, Czech Republic, Hungary, Croatia, and Poland), Croatia and Sweden are the only two that meet the price stability criterion. European Commission (2022) emphasised that by considering all factors, Croatia successfully fulfils the Maastricht criteria.

3.3.1 Price stability criterion
The price stability criterion is the most problematic criterion to meet, especially when the world is experiencing inflation not seen since the beginning of the 1980s. For example, Lithuania was rejected due to a 0.1 percentage points miss of the inflation criterion plus the outlook for higher inflation. According to the European Commission (2022), the average Croatian inflation rate between April 2021 and April 2022 was 4.7%, which is 0.2 percentage

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[9] Although 2020 was disastrous for the Croatian economy, its recovery in 2021 has been nothing short of amazing. Before the end of November, it was already back to pre-pandemic levels, unlike more economically developed countries such as Germany, Austria, and the Netherlands, as its GDP grew by 15.8% YoY and 13.8% YoY in Q3 and Q4

points below the reference value[10] and is also forecast to stay below it in the upcoming months. Croatia's inflation, which averaged 0% in 2020, rose to 2.7% in 2021, spiking at the beginning of 2022, reaching a decade-high of 12.1% YoY in July 2022. The European Commission (2022) also noted that Croatia's inflation cycles are already highly synchronised with those of the euro area.

Figure 10: Croatian and euro area HICP inflation (Year-on-Year)
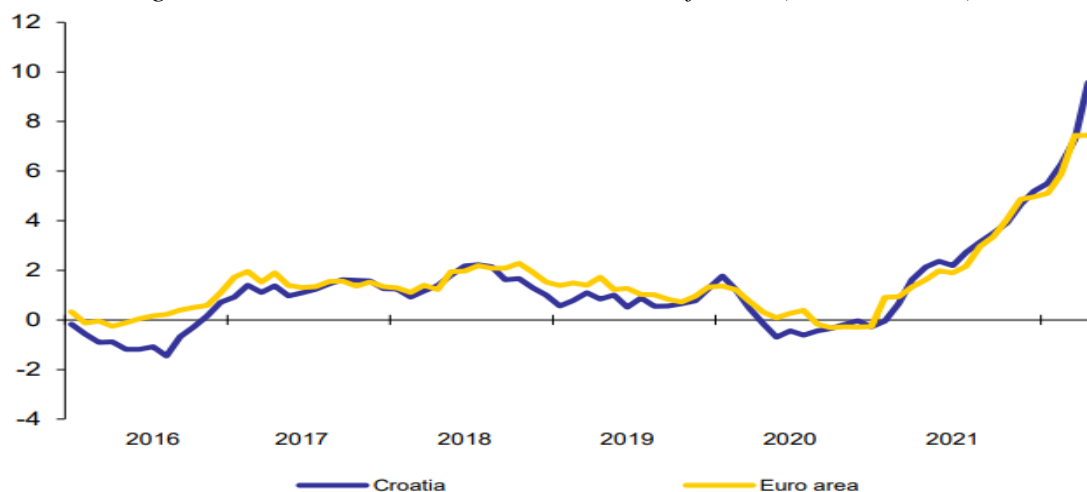
Source: European Commission (2022).

As can be noticed in figure 10, Croatia's HICP annual inflation very closely resembles the euro area's annual inflation in the past few years, with inflation reaching decade-highs in 2022 both in Croatia as well as the euro area due to several factors such as the Covid-19 pandemic, accommodative monetary policy, supply-chain bottlenecks, and Russia's invasion of Ukraine.

Figure 11: Croatian inflation vs reference inflation (2016-2022)
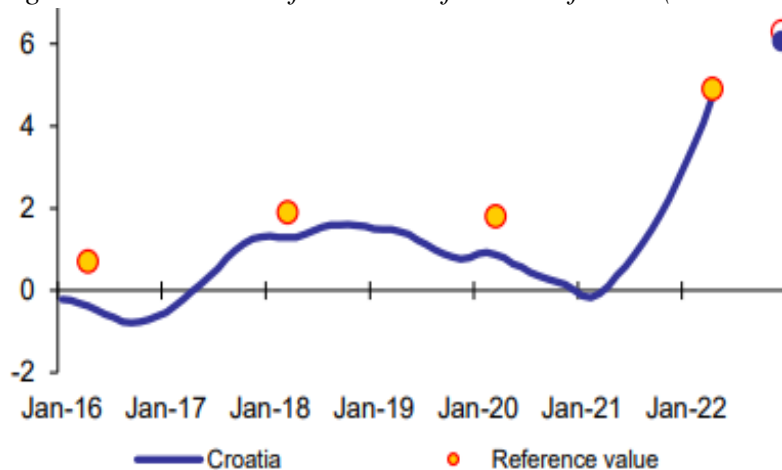
Source: European Commission (2022).

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[10] The reference rate is calculated as the average of the three EU member states with the lowest inflation rate +1.5 p.p.

As noticeable in figure 11, In the few years before the pandemic, Croatia's inflation has always been easily below the reference rate. Considering the recent developments, Croatia's inflation is just below the reference rate in the first part of 2022. As can be seen, by the blue and red dots on the right of the figure, Croatia's average yearly inflation is forecast to stay below the reference value. Croatia's inflation is forecast to increase to 6.1% in 2022 before subsiding to 2.8% in 2023.

3.3.2 Public finances criterion

According to the European Commission (2022), Croatia fulfils both the debt-to-GDP and government deficit criteria.

Figure 12: Croatia's government balance (right axis, inverted) and gross debt-to-GDP ratio (left axis)
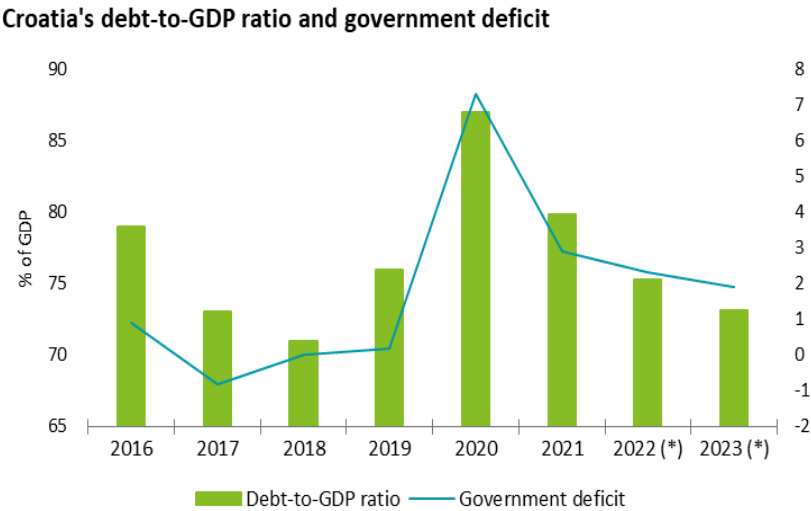
Adapted from European Commission (2022).

As can be seen in figure 12, Croatia's government deficit, which skyrocketed to 7.3% of its GDP in 2020 due to the Covid-19 pandemic, decreased to 2.3% and is expected to improve to 2.3% in 2022, before further decreasing to 1.8% in 2023. On the other hand, Croatia's debt-to-GDP ratio, which was stable between 2016 and 2019 in the interval between 70% and 80%, rose to 87% in 2020, before dropping to 79.8% in 2021. According to the European Commission's forecasts, it is projected to drop to 75.3% in 2022 and to 73.1% in 2023. European Commission (2022) also explained that Croatia's debt sustainability risks do not look dangerous in the medium term as the government debt is forecast to stay below its 2021 level in 2032, adding that the Croatian fiscal framework has become much more robust.

3.3.3 Convergence of long-term interest rates criterion

According to the European Commission (2022), Croatia also satisfies the long-term interest rate criterion as its long-term interest rate is below the reference value.

Figure 13: Croatia's performance on the long-term interest rate criterion
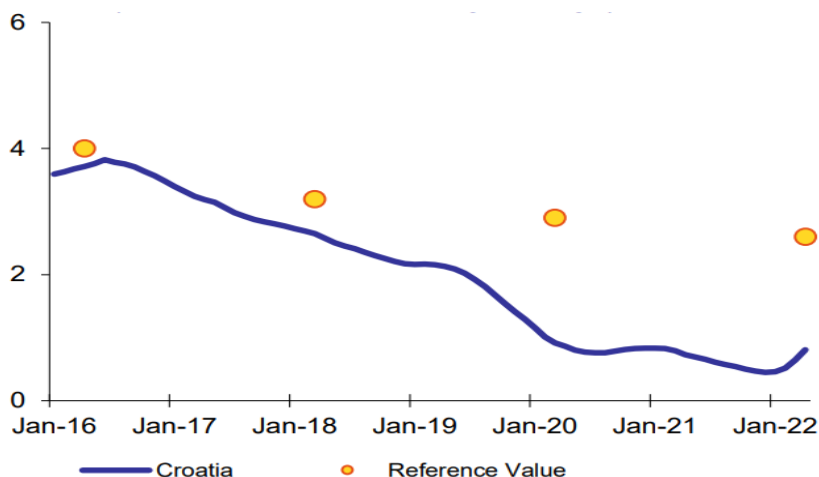
Source: European Commission (2022).

As shown in figure 13, the European Commission (2022) pointed out that the average Croatian long-term interest rate in April 2022 was 0.8% as of April 2022, significantly below the 2.6% reference value, noting that Croatia's interest rate, which did rise to 1.2% in April 2020 due to the Covid-19 pandemic, fell to 0.3% by the end of 2021. In the first part of 2022, Croatia's interest rate again increased slightly due to Russia's invasion of Ukraine.

3.3.4 Exchange rate stability

Croatia also successfully fulfils this criterion, as it has been part of the ERM II mechanism since the 10th of July 2020 under an HRK/EUR exchange rate of 7.5450 ± 15%. European Commission (2022, pp. 50) explained that in the two years that Croatia was a member of the ERM II mechanism, the HRK/EUR exchange rate experienced seasonal modest appreciation but remained remarkably close to the ERM II central rate and without any depreciations in this period. As per the European Commission's last convergence report, Croatia fulfils all the Maastricht criteria and is ready to introduce the euro at the beginning of 2023.

3.4 The importance of the euro for Croatia

On one hand, HNB, on its own, can conduct its monetary policy, but this policy is in no way "independent" and is massively affected by the policies of the ECB, but also the Fed. Despite the exchange rate tool that it can use, this tool can only affect nominal and real shocks. In the long run, when there is a supply-side shock such as the Covid-19 pandemic, the hands of many central banks are tied as a depreciation of the currencies can have ambiguous effects on the economy.

If HNB were to conduct such policies that would see the kuna depreciate to HRK 8 or HRK 9 per EUR 1, it is not certain how this would affect Croatia's economy. A depreciation of the kuna at a time when effective demand (especially in its main trading partner, which is the EU), can lead to higher export, but also large exchange rate volatility is never good for the central bank.

One more thing is that HNB, as an institution, despite doing a good job, its mandate has not gone without large scandals. Just in February 2022, HNB organised a tender in which Croatian citizens had the chance to submit their designs for the design of the national side of euro coins[11]. The winning design for the EUR 1 coin was from Stjepan Pranković. Mr Pranković was widely lauded for his design, congratulated by the Croatian government, and even received an award.

Everything went well until it was found out that his design of a marten (English for kuna), was a picture of a Scottish marten stolen from the internet without permission. In a matter of days, the tender was cancelled, and the results were annulled (Klepo, 2022). HNB also was embroiled in a recent scandal, as a report by the Index portal found that many former and current HNB officials, including current HNB Governor Vujčić and HNB Vice-Governor Sandra Švaljek, had traded in bank securities of banks that HNB supervised, something that is forbidden by ECB legislation (Ćimić, 2022).

On the other hand, Croatians have already accepted the importance of the euro, which despite not being the official currency, is widely used for transactions such as paying rent, buying an apartment or a house or more importantly, when taking out a loan. The majority of Croats have a loan that is expressed in euros or has a euro currency clause[12]. One more thing is that Croatia's debt is predominantly in euros and thus Croatia is very exposed to exchange rate risk (HNB, 2018).

Even at the end of 2016, six years before Croatia is expected to join the EMU, almost 73.8% of all debt was foreign currency debt, of which 90% was in euros. HNB (2018) warned that if the Croatian kuna would depreciate by 10% vis-à-vis EUR, its currency debt would rise to HRK 50 billion, resulting in a worse credit score and higher interest rates.

In its country report for Croatia for 2021, IMF (2021) warned that external financing in Croatia remains high, albeit lower than in previous years, noting that non-residents' holding of public debt accounts for 36% of total public debt, while foreign currency-denominated debt amounts to 40% of the total public debt, remarkably close to the upper early warning benchmarks.

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[11] To add insult to injury, the winning design for the ten cents, twenty cents and 50 cents was a picture of scientist Nikola Tesla, which Serbia did not appreciate as Tesla originates from Serbia and not from Croatia

[12] Similarly, many Slovenian and Croatian brainiacs thought that having a loan in Swiss francs, a currency they have no control over is a genius idea, which came back to haunt them when the franc appreciated powerfully against all major currencies in 2015

Figure 14: Share of currency loans in total loans (left) and share of foreign currency deposits in total deposits (right)
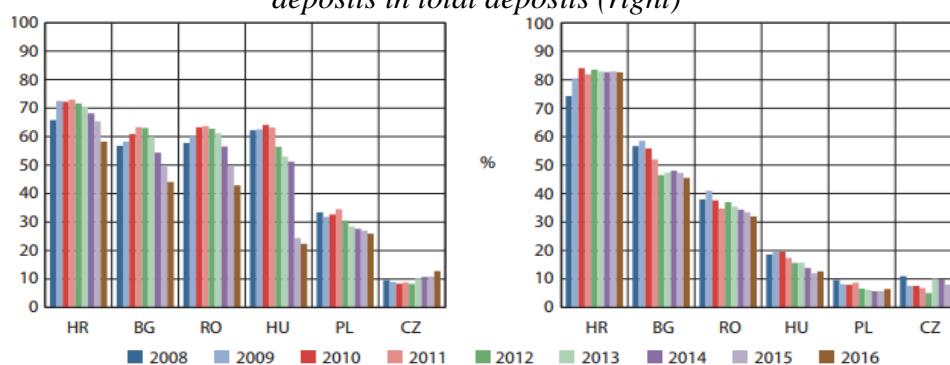
Source: HNB (2018).

As it can be seen in figure 14, not only is Croatia already exposed to the euro, but Croats also embrace the euro as Croatia has the highest share of foreign currency in domestic placement, i.e., the largest credit eurosation of all non-euro area member states. HNB (2018, pp. 24) note that in December 2016, due to the funding structure of Croatian banks, 68% of placements to the government and 58% of placements to other domestic sectors in 2016 were tied to a foreign currency, primarily the euro. The significant propensity to save in foreign currencies emerged as a way for people to protect their money during previous periods of high inflation and macroeconomic instability, according to HNB (2018, pp. 25).

Because the habit of saving in foreign currencies was developed during the hyperinflationary times in former Yugoslavia, it is hard to reverse, something like how Germans still have effects from the 1920s hyperinflation. Ever since Croatia became independent, deposit euroisation remain between 70% and 90% despite low inflation, stable HRK/EUR exchange rate and persistently higher rates on deposits in kunas in comparison to deposits in foreign currency. As elimination of exchange rate risk (as well as transaction costs) is one of the most important benefits of the euro, and since Croatia already has the euro in its everyday use, despite not being the official currency, the changeover to the euro will be done smoothly given Croatia's current level of euroisation. To protect against higher inflation (although Croatian prices are already at European levels), five months before the introduction of the euro in Croatia and one year after its introduction on the 1st of January 2022, all prices will be expressed in both kunas and euros. Whoever uses the introduction of the euro for unjustified price increases or rounds-up prices, will be put on a "blacklist". Also, all the accounts that Croatians have in banks in kunas will be automatically transferred into euros, while Croatians can exchange their kuna coins until 2026 and kuna banknotes for an indefinite period at HNB. (HNB, 2018, pp. 45)

4 DOES CROATIA FULFIL THE OCA CRITERIA

In the first and the second chapter, the thesis outlined the theory behind the OCA criteria, while this chapter will be dedicated to checking whether Croatia fulfils them and how it fares against other EU member states at the moment, or other euro area members when they were introducing the euro.

As previously pointed out, using OCA criteria in decision-making is often impossible as different performances on different OCA criteria might lead to different conclusions. Brkić and Šabić (2018, pp. 3) emphasise that a few of the OCA criteria might suggest that the country should join the monetary union and irrevocably fix its exchange rate, while another set of criteria could simultaneously suggest otherwise.

Despite its inefficiencies and criticism, the OCA theory is still one of the most used, relevant, and important theories for a member state when choosing whether it should join a currency area. The caveat here is that, even if Croatia, at the moment, does not fulfil some of the OCA criteria, there is no guarantee that it will not follow them at some point in the future (ex-post).

The thesis previously explained the endogeneity paradigm, which states that two of the criteria, BCS and trade integration, are endogenous and that Rose (2009), among others, was able to statistically prove that there is evidence of endogeneity in the EMU, which can be greatly beneficial for Croatia in the future.

4.1 Labour Mobility

Brkić and Šabić (2018, pp. 13) point out that labour mobility across Croatian regions is quite low, which can be deducted from the differences in unemployment rates across Croatian counties[13]. It has to be also pointed out that labour mobility was also affected by the effects of the GFC and Croatia's entry into the EU in 2013. According to the Croatian Bureau of Statistics (hereinafter: CBS), more than 30,000 Croats emigrated to the EU in 2014 and 2015.

Brkić and Šabić (2018, pp. 13) note that Croatia will only fully meet the labour mobility criterion if it turns out that the outflow of workers was a temporary phenomenon brought on by cyclical factors such as the GFC, adding that it is almost impossible to determine whether the departure of Croats will be permanent[14] or whether they would return.

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[13] HNB (2018, pp. 18) emphasise that, at the end of 2015, the unemployment rates across Croatian counties varied significantly, from 9.6% in the Zagreb to 35.8% in Virovitica-Podravina County, which means that Croatia's labour force is far from mobile.

[14] In January 2022, Croatian Prime Minister Plenković announced that the government would give grants and additional subsidies to Croatian workers that work to return to work in Croatia.

Figure 15: Unemployment rate (% of the total population) across Croatian counties in 2017
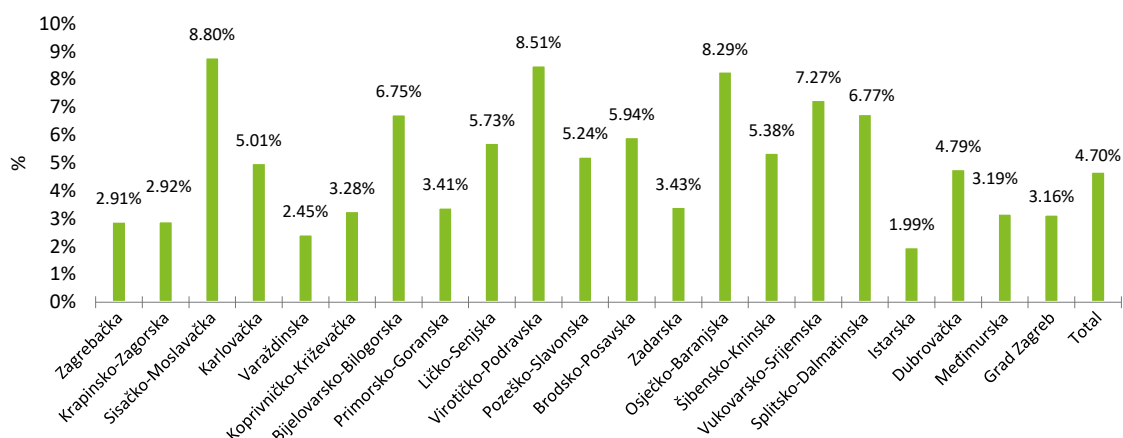
Adapted from Croatian Employment Service (2022), CBS (2022).

As visible in figure 15, labour mobility is not remarkably high across Croatian counties, as the percentage of unemployed individuals in the total population range from 1.99% in Istarska County to 8.8% in Šišačko-Moslavčka County. To get a better picture, it is better to compare Croatia to other EU member states and see how Croatia fares on this criterion. According to the WB's data regarding data mobility, Croatia fares quite badly on this criterion.

Table 9: The WB's labour mobility index (based on the survey question:" In your country, to what extent do people move to other parts of the country for professional reasons", 1 = not at all, 7 = to a great extent), data for 2017-19

Country	2017	2018	2019	rank 2019
US	5.55	5.70	5.50	1
Bulgaria	4.45	4.68	5.23	2
Germany	5.03	5.16	5.16	3
Estonia	4.92	5.17	5.02	4
Italy	4.74	4.93	4.99	5
Luxembourg	4.37	4.57	4.85	6
Ireland	5.05	4.93	4.73	7
Latvia	4.89	4.61	4.54	8
Netherlands	4.54	4.56	4.46	9
Spain	3.82	4.23	4.37	10
Cyprus	4.17	4.31	4.35	11
Sweden	4.51	4.82	4.35	11
France	3.88	3.91	4.23	13
Denmark	3.85	3.91	4.21	14
Slovak Republic	3.78	3.84	4.15	15
Norway	3.99	4.15	4.15	15
Finland	3.80	3.89	4.03	17
Belgium	3.49	4.00	4.00	18
Greece	3.68	3.82	3.92	19
Portugal	3.94	3.89	3.76	20
Malta	3.69	3.75	n/a	21
Austria	3.56	3.69	3.71	22
Romania	3.19	3.07	3.56	23
Croatia	3.24	3.20	3.41	24
Poland	3.48	3.38	3.37	25
Slovenia	3.23	3.20	3.27	26
Hungary	2.62	3.07	3.11	27
Czech Republic	2.97	2.93	3.06	28

Source: WB (2019).

This indicator is scaled from 1 to 7, based on a study on how frequent people would relocate to other areas of the country for work. The data source for the indicator is the WB's World Economic Forum Global Competitiveness Index. The survey is structured in the following manner. Namely, random surveyors are asked the question: "In your country, to what extent do people move to other parts of the country for professional reasons"? To this question, they answered between 1 and 7 (1 = not at all, 7 = to a great extent)

As expected, the US leads the way, with interestingly Bulgaria coming in second. Croatia fares quite badly, as it is nearly at the bottom of the list, improving one position in 2019, surpassing Poland. This indicator might not be as explanatory, as some countries such as Slovenia and Austria have low readings, which might indicate that their labour market is not in the best shape, which is contrary to reality. The US[15] is included just for comparative purposes.

Broz (2005a, pp. 15) notes that Croatia's labour force, like throughout most of the EU, is very immobile, with the only mobility present in migrations towards the capital city, Zagreb. Interestingly, the ministries of agriculture and tourism are stationed in Zagreb, despite most of the tourism revenues steaming from the coast and most of the agricultural sector being stationed in Slavonia, the eastern part of Croatia.

Even though the Croatian government is trying to stimulate workers and firms to allocate to more depopulated areas, some Croatian regions (such as Lika) are still very sparsely populated. Broz (2005a, pp. 16) also emphasises the scenario in which asymmetric shocks can affect various Croatian regions differently and that the country's limited labour mobility will not be able to mitigate the negative effects.

Figure 16: EU mobile citizens of working age (20-64) by country of citizenship, % of their home-country resident population, data for 2010 and 2020
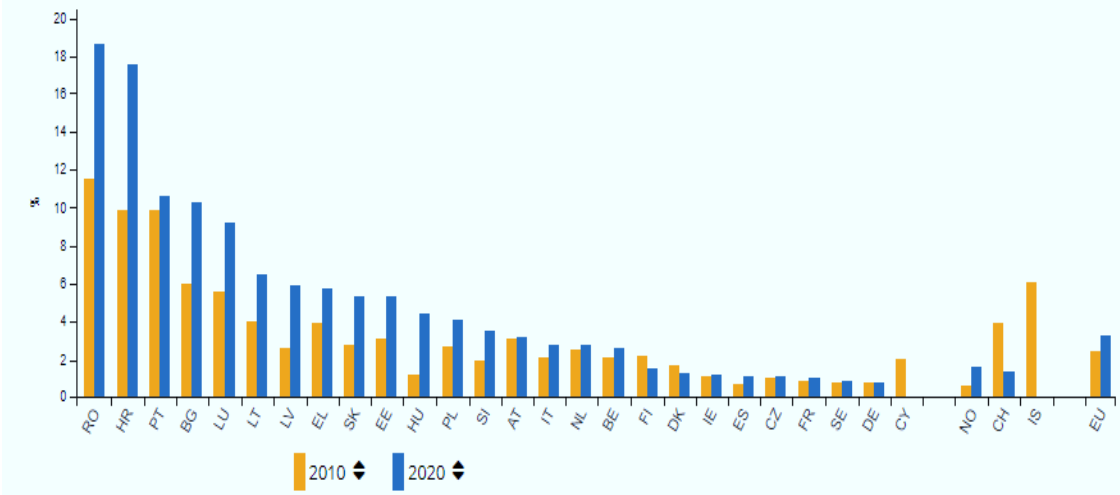
Source: Eurostat (2021b)

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[15] Data for the US is used only for descriptive purposes, to get a sense of the difference between labour mobility in the US and throughout the EU.

As can be seen in figure 16, Croatia ranks second in the EU by the percentage of its working residents living in other EU member states, just behind Romania. The percentage has increased by nearly 9 percentage points just between 2010 and 2020. This means that a substantial proportion of its labour force has left the country and is unlikely to come back. Due to the "brain drain," adverse shocks will have very adverse effects on the Croatian economy.

Figure 17: Share of people born in other EU member states in the total population, data for 2021
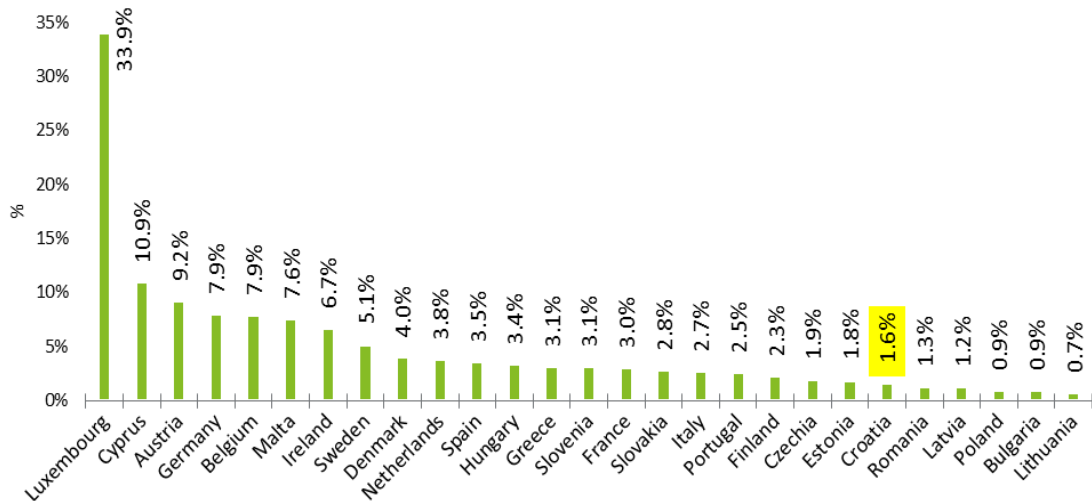
Adapted from Eurostat (2021b).

Not only do a lot of Croats emigrate to other EU member states, but not a lot of individuals from other EU member states also move to Croatia. As visible in figure 17, in 2021, only 1.59% of the total population in Croatia (64,330 out of 4,036,335) were individuals born in other EU member states. Croatia is ranked 22nd, with Luxembourg being in the first place (33.94% of the total population), but is in front of countries such as Romania, Latvia, Poland, Bulgaria, and Lithuania.

To conclude, Croatia partially fulfils the labour mobility criterion, as the labour mobility of its workforce, as is the labour mobility in the EU, is limited.

4.2 Openness to trade and trade integration

As pointed out earlier, countries that are open and small have higher benefits from being part of a monetary union than countries that are big and relatively closed. Croatia is the smallest country in the EU that is still using its national currency. Other counties with a similar population, such as Slovakia, Ireland, Lithuania, Slovenia, Estonia, and Latvia have already introduced the euro as their official currency.

Table 10: Openness to trade (measured as (export+import)*100/GDP) among EU member states, data for 2020

Country	Trade openess (in %)	rank
Luxembourg	376%	1
Malta	274%	2
Ireland	240%	3
Slovakia	170%	4
Belgium	159%	5
Hungary	157%	6
Cyprus	155%	7
Slovenia	147%	8
Netherlands	145%	9
Estonia	142%	10
Lithuania	138%	11
Czechia	135%	12
Latvia	120%	13
Bulgaria	109%	14
Poland	106%	15
Denmark	103%	16
Austria	100%	17
Croatia	91%	18
EU	90%	19
Euro area	87%	20
Sweden	85%	21
Germany	81%	22
Romania	79%	23
Portugal	76%	24
Finland	72%	25
Greece	72%	26
Spain	60%	27
France	58%	28
Italy	55%	29

Adapted from: Eurostat (2021a).

As visible in table 10, Croatia fares above average when it comes to how open it is, as the ratio of its exports and imports to its GDP is 91%, above the EU average of 90%. Although it is not as open as Luxembourg, Malta, Ireland, and Slovakia, which fulfil this criterion to a very satisfactory level, Croatia still fares quite good regarding this OCA criterion.

It is important to also analyse whether the high proportion of the exports and imports are with the EU or Croatia exports and imports mostly, for example, from China or Mozambique. If Croatia predominantly trades with non-EU countries, then a high degree of openness could be interpreted wrongly. For this question, the thesis is whether Croatia imports and imports mainly toward the EU (inter-EU) and what percentage of its total exports and imports are made up by intra-EU exports and imports to see whether Croatia's trade integration with the EU is at a satisfactory level. The higher the figure, the better for Croatia, as it means that it is even better in fulfilling McKinnon's openness criterion and that the euro area is indeed an OCA for Croatia.

Country	2018	2019	2020	Ranking	Country	2018	2019	2020	Ranking
Luxembourg	86.6	83.5	89.0	1	Luxembourg	81.0	79.9	80.4	1
Slovakia	78.5	78.9	80.3	2	Czechia	79.7	79.4	79.7	2
Croatia	76.4	78.7	77.1	3	Slovakia	81.0	80.0	79.0	3
Austria	75.8	76.2	76.9	4	Hungary	78.0	78.5	78.4	4
Latvia	72.1	74.9	76.1	5	Romania	72.8	73.2	74.1	5
Estonia	74.0	75.8	75.2	6	Poland	74.3	74.0	74.0	6
Portugal	73.4	73.8	74.7	7	Portugal	69.8	70.7	71.4	7
Romania	72.6	72.7	73.6	8	Austria	68.6	67.9	68.7	8
Czechia	74.3	74.0	72.9	9	Croatia	66.3	66.2	67.3	9
Finland	67.6	68.9	71.6	10	Slovenia	74.6	72.0	67.3	10
Lithuania	66.1	66.4	70.7	11	Estonia	65.8	68.6	66.2	11
Hungary	72.8	71.9	70.6	12	Netherlands	66.0	65.3	65.8	12
Denmark	66.3	66.6	68.8	13	Bulgaria	65.2	64.2	65.5	13
Sweden	65.0	65.5	67.8	14	Belgium	65.1	65.1	64.6	14
Poland	67.4	66.5	67.7	15	Latvia	61.4	62.1	61.8	15
France	64.5	63.7	66.1	16	Spain	59.5	59.8	61.3	16
Germany	62.7	63.1	63.1	17	EU	59.4	59.0	59.6	
EU	60.7	60.8	61.9		Greece	49.2	52.4	57.5	17
Belgium	60.0	59.9	61.2	18	Lithuania	55.0	55.0	56.0	18
Bulgaria	62.1	61.2	61.0	19	Finland	54.5	54.7	54.2	19
Slovenia	66.0	62.2	58.7	20	France	52.3	51.4	53.6	20
Italy	56.2	57.0	58.3	21	Germany	52.7	52.5	52.6	21
Cyprus	51.0	59.2	57.8	22	Sweden	53.8	52.5	52.2	22
Malta	63.1	53.9	57.3	23	Denmark	54.3	52.6	51.7	23
Greece	50.1	51.3	57.1	24	Italy	51.4	51.1	51.5	24
Spain	54.7	54.6	56.7	25	Malta	53.2	55.3	49.8	25
Netherlands	40.2	40.3	41.7	26	Ireland	38.8	37.0	40.5	26
Ireland	38.0	38.1	37.9	27	Cyprus	25.5	40.6	33.9	27

Adapted from: Eurostat (2021c).

From table 11, it can be deduced that 77.1% of all of Croatia's imports in 2020 were intra-EU, ranking it in 3rd place, behind Luxembourg and Slovakia, and 67.3% of all its exports were intra-EU, ranking it in 9th, just above Slovenia.

Since Croatia is small and open and exports and imports a lot, especially to and from the EU, we may conclude that Croatia fulfils McKinnon's openness criterion and the trade integration criterion.

4.3 Production diversification

Asymmetric shocks are less likely among nations with similar production patterns and diversified trade, according to Kenen's production diversification criterion. Economic shocks that happen in one industry of a well-diversified economy only have a limited impact on other industries and the economy as a whole. That is why a member state must have a similar economic structure as a monetary union because this implies a lower likelihood of asymmetric shocks.

The largest issue for Croatia is that it has the highest ratio of tourism revenue to its GDP, which points out that the diversification of the Croatian economy is limited, and that the tourism sector is highly prone to large external shocks.

According to HNB (2018, pp. 12), the manufacturing of non-metallic mineral products, wood products, and clothing predominate in Croatia in contrast to the other euro area member states, where high-tech products such as cars, machinery, and equipment make up a significant portion of total manufacturing.

Although Croatia's trade share in its GDP is lower than that of the euro area, after Croatia entered the EU in 2013, certain encouraging patterns have emerged due to a growth in intra-sectoral trade with the euro area. According to HNB (2018, pp. 28), these beneficial changes have increased BCS and shock symmetry between Croatia and the euro area since, if sector-specific shocks manifest, they spread across all member states where this sector is substantially represented.

Brkić and Šabić (2018, pp. 12) rightly pointed out that this criterion is the most problematic OCA criterion for Croatia, with the inefficient diversification of the Croatian economy best seen in its dependence on the tourism sector.

Figure 18: Foreign exchange revenues (% of GDP) from tourism for 2015
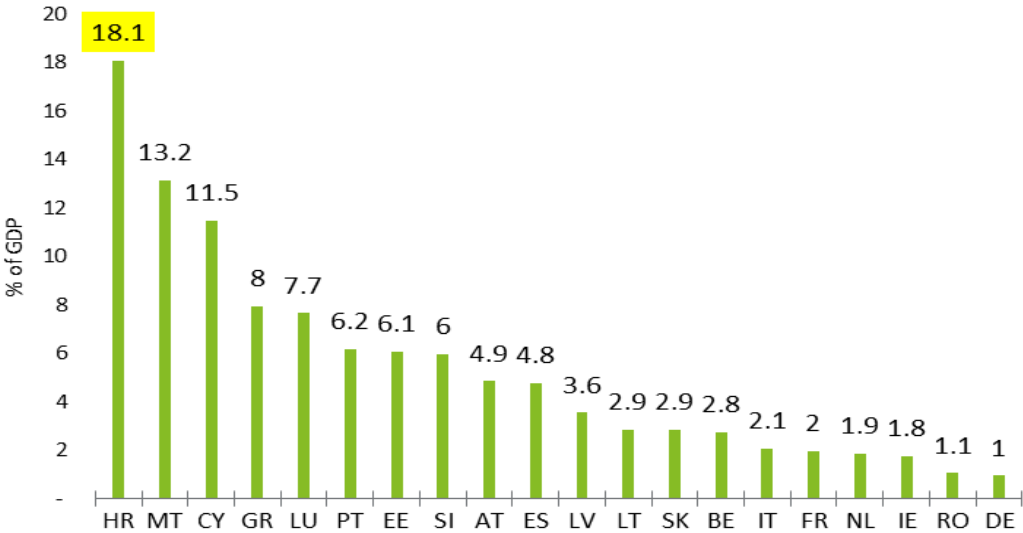
Adapted from Brkić and Šabić (2018).

As seen in figure 18, in 2015, Croatia had the highest exchange revenues from tourism services among all euro area member states around 18.1% of GDP, ahead of Malta and Cyprus (also very tourism-oriented countries).

Figure 19: Share of travel and tourism's total contribution to GDP in European Union member countries (EU 28) and the UK, data for 2019-21

Country	2019	2020	2021	Ranking
Croatia	24.8	13.2	16.1	1
Greece	20.7	9.2	14.9	2
Portugal	17.1	8.7	10.9	3
Cyprus	13.7	3.7	9.3	4
Italy	10.6	6.1	9.1	5
Luxembourg	10.3	7.9	8.6	6
Spain	14.0	5.9	8.5	7
Netherlands	11.1	7.8	8.1	8
Slovenia	10.8	7.2	7.7	9
Austria	10.7	7.9	7.1	10
Malta	15.0	4.9	6.7	11
France	8.4	5.0	6.5	12
Germany	9.8	6.3	6.4	13
Estonia	12.1	6.1	6.0	14
United Kingdom	9.9	4.3	5.7	15
Finland	7.9	4.9	5.5	16
Sweden	7.2	4.7	5.3	17
Bulgaria	9.9	4.2	4.9	18
Hungary	8.3	4.0	4.6	19
Denmark	6.5	4.8	4.6	20
Belgium	5.5	3.6	4.3	21
Latvia	7.7	4.2	4.3	22
Romania	6.0	3.5	3.8	23
Slovakia	6.4	3.4	3.8	24
Czech Republic	6.2	3.9	3.6	25
Lithuania	6.0	3.0	3.3	26
Poland	4.8	2.6	2.8	27
Ireland	4.2	1.2	1.2	28

Adapted from Statista (2022).

As shown in figure 19, Croatia has the highest share of travel and tourism to its GDP among all EU member states at 16% as of 2021. This share did drop from 24.8% in 2019 to 13.2% in 2020 due to the pandemic but did climb back up in 2021.

According to Brkić and Šabić (2018, pp. 12), if a large negative shock significantly reduced tourism income, Croatia's current account balance. which is already negative. would undoubtedly worsen, causing market turbulence and devaluation pressure on the Croatian kuna. Another flaw in Croatia is the significant proportion of the country's overall value-added that is attributable to the manufacture of less technologically advanced goods. Brkić and Šabić (2018, pp. 13) add that products having a strong technology component, including motor cars, machinery, and equipment, have a much larger share in the GDP of core euro area countries compared to Croatia.

To further analyse the similarity in trade structure in terms of the intra-industry trade specialisation, I calculated the Grubel-Lloyd Index (hereinafter: GLI) to be able to compare the share of intra-industry trade of Croatia to euro area members. Invented by Herb Grubel and Peter Lloyd in 1971, it measures the degree of trade within the same branch at the product level, which is intra-industry trade. Its values range from 0 to 1 and can be calculated for countries as well as industries. The index takes on values between 0 and 1 measuring the share of intra-industry trade.

The GLI was calculated based on a 4-digital level of HS classification, which divides production into 1,645 different product categories.

The GLI index is calculated by using the following equation:

$$GLi = \frac{(Xi+Mi)-|Xi-Mi|}{(Xi+Mi)} = 1 - \frac{|Xi-Mi|}{(Xi+Mi)} \qquad (1)$$

In equation (1), Xi and Mi denote the export and import of good i.

On the other hand, the aggregate GLI index is calculated by using the following equation:

$$GLj = \sum i \frac{(Xi+Mi)}{\sum i\,(Xi+Mi)} * shareIITi \qquad (2)$$

As can be seen in equation (2), the aggregate index is the weighted average of all sectoral GL indices, where the shares (share IIT) are the industry's share in the total trade of the country.

Table 12: GLI values for Croatia and euro area countries for 2019 (left) and 2020 (right)

Country	GLI index 2019	Country	GLI index 2020
Germany	0.754	Germany	0.746
Belgium	0.734	Belgium	0.720
France	0.650	France	0.661
Austria	0.649	Austria	0.647
Italy	0.629	Spain	0.630
Spain	0.620	Slovenia	0.620
Slovenia	0.616	Italy	0.619
Netherlands	0.613	Netherlands	0.613
Estonia	0.581	Estonia	0.595
Portugal	0.563	Portugal	0.570
Latvia	0.562	Latvia	0.552
Slovakia	0.496	Slovakia	0.499
Lithuania	0.491	Croatia	0.487
Croatia	0.483	Lithuania	0.465
Luxembourg	0.437	Malta	0.429
Finland	0.433	Luxembourg	0.426
Greece	0.415	Finland	0.399
Malta	0.323	Greece	0.389
Ireland (Eire)	0.268	Ireland (Eire)	0.245
Cyprus	0.250	Cyprus	0.178

Adapted from Comext (n.d).

As visible in table 12, Croatia's GLI was 0.483 in 2019 and 0.487 in 2020. Croatia ranks well below the top countries (Germany and Belgium) but fares much better than other countries such as Malta, Greece, Ireland, and Cyprus. This means that Croatia fulfils this criterion only partially as its economic diversification with the euro area is not as good as the diversification of some other euro area member states (such as Slovenia). This means that sector-specific shocks (especially in the tourism sector) can have dire consequences for the Croatian economy.

Figure 20: Average GLI values for the period 2015-2016 for certain EU member states (left) and Croatia (right) for the period between 2006 and 2016
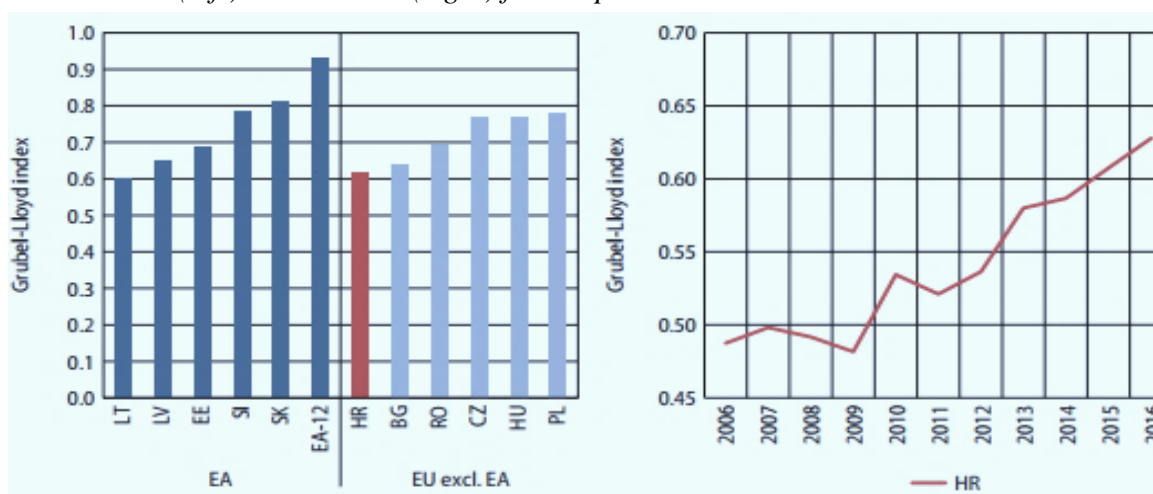
Source: HNB (2018[16]).

As it can be noticed in figure 20, HNB (2018) found that Croatia's GLI index is below the euro area average, but also below the GLI values of non-euro member states, but emphasised that the GLI has been steadily increasing, especially after Croatia entered the EU in 2013. In this period Croatia's GLI rose from below 0.5 in 2006 to just below 0.65 in 2016.

Brkić and Šabić (2018) explain that judging on this criterion alone, the euro area is not an OCA for Croatia as it cannot use its monetary policy when its tourism sector is hit by an asymmetric shock, but point out that, in light of the fact that Slovenia, Slovakia, and, in particular, the Baltic states' industrial structures were very different from those of the core countries of the euro area at the time they joined the ERM II, Croatia's resilience may increase as the risk of an asymmetric shock putting pressure on the kuna as the national currency is eliminated.

Despite Croatia not fully satisfying this criterion, improvement is evident, and it is possible that when Croatia enters the EMU that its economic structure would become more diversified (due to endogeneity) and that some of its tourism revenues would be lost (elimination of transaction costs). It must be emphasised that currently, this criterion is the most obvious issue for Croatia when it comes to fulfilling the OCA criteria.

4.4 BCS

Any candidate country must satisfy the BCS criterion because it is extremely vulnerable to asymmetric shocks if its business cycles are not in synchronisation with those of the currency union it aims to join. According to Brkić and Šabić (2018), under this criterion, Croatia is a suitable candidate for joining the euro area.

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[16] Unlike the author's calculation of the GLI index based on Comext data and 1,645 different product categories, HNB (2018) calculated the GLI index using Eurostat's Standard International Trade Classification which divides it into only seven product categories.

Šonje and Vrbanc (2000) and Belulo, Šonje and Vrbanc (2000) both discovered that real economic developments in Croatia closely follow the trends of the German economy, with shocks arising in the German economy causing significant cyclical fluctuations in Croatia. Broz (2010) analysed the BCS of Croatia and developed euro area countries for the period 1995-2006 and concluded that while the BCS is modest when the full period is considered, it gradually rises over time following the increased economic and financial integration between Croatia and other euro area members.

Figure 21: Cycle phase synchronisation (left) and cycle similarity (right) between Croatia and the peripheral euro area member states with core euro area member states
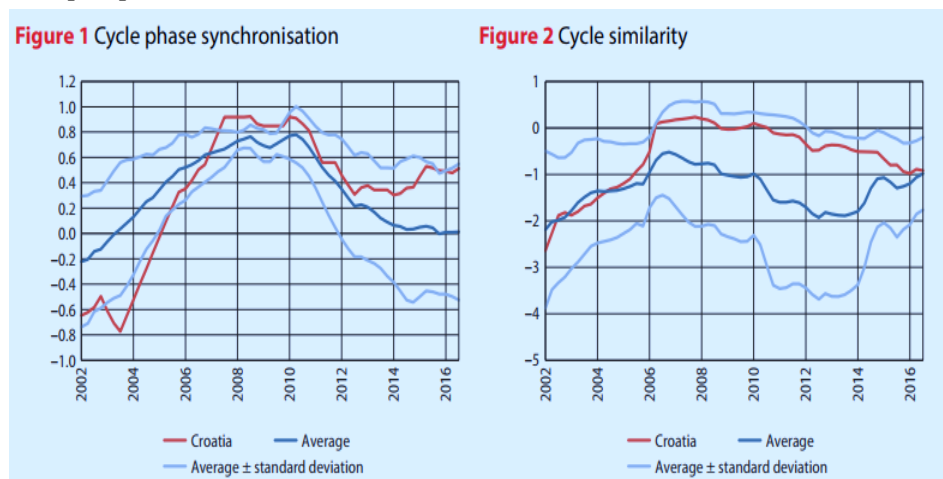
Source: Kotarac, Kunovac and Ravnik (2017).

The important work on this topic is done by Kotarac, Kunovac and Ravnik (2017), which point out that BCS between the euro area and Croatia has gradually risen and reached an extremely high level, which can be noticed in the left part of the figure 21. Kotarac, Kunovac and Ravnik (2017) explained that Croatia's cycle phase synchronisation with core euro area member states is above average, adding that shocks that affect core euro area member states also affect Croatia simultaneously.

Figure 22: Contributions of symmetrical shocks to GDP in Croatia and the euro area

Source: Kotarac, Kunovac and Ravnik (2017).

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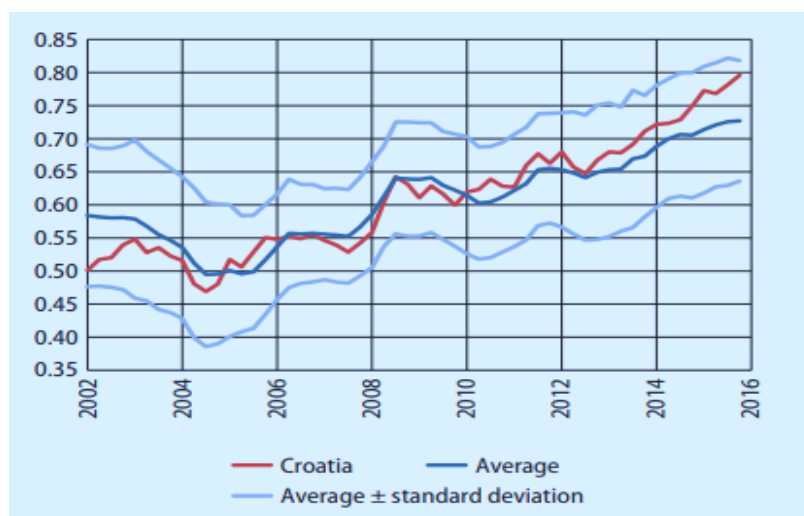
As shown in figure 22, Kotarac, Kunovac and Ravnik (2017), by using a vector autoregressive model, found that the contribution of symmetric shocks to GDP in Croatia was much like those of peripheral euro area member states between 2003 and 2010, but was higher in the period after 2011.

To see whether Croatia's business cycles are highly correlated with the euro areas, I calculated the correlation coefficient between Croatia and the euro area for real GDP growth to get a better picture of how close the real GDP of Croatia follows the real GDP of the euro area. In the calculation of the correlation coefficients between the real GDP growth of euro area members and the total euro area real GDP growth, I excluded the member state in question from the total euro area GDP growth to avoid a correlation of one euro area member state with itself. As countries such as Croatia, Romania, Hungary, Denmark, Sweden, and Poland are not part of the euro area, this procedure was not done in their case. They are coloured green in table 13.

Table 13: Correlation coefficients between individual EU member states' real GDP growth with the euro area's real GDP growth (2010 to 2021)

Country	Correlation coefficient	Rank	Compared to Croatia
Denmark	0.96	1	0.02
Spain	0.95	2	0.01
Croatia	0.94	3	
Belgium	0.93	4	-0.01
Portugal	0.93	5	-0.02
Sweden	0.93	6	-0.02
Bulgaria	0.93	7	-0.02
Hungary	0.93	8	-0.02
Netherlands	0.93	9	-0.02
Italy	0.91	10	-0.04
Czechia	0.90	11	-0.04
Slovakia	0.89	12	-0.05
Austria	0.89	13	-0.06
France	0.88	14	-0.06
Malta	0.88	15	-0.07
Poland	0.87	16	-0.07
Romania	0.87	17	-0.07
Slovenia	0.84	18	-0.11
Luxembourg	0.81	19	-0.13
Greece	0.77	20	-0.17
Germany	0.76	21	-0.19
Estonia	0.71	22	-0.24
Finland	0.64	23	-0.30
Latvia	0.64	24	-0.30
Cyprus	0.63	25	-0.32
Lithuania	0.62	26	-0.32
Ireland	0.30	27	-0.65

Adapted from Eurostat (2021d).

As can be noticed in table 13, in the period between 2010 and 2021, the Croatian real GDP growth is highly correlated with the euro area real GDP growth, just trailing behind Denmark and Spain. This means that unlike counties such as Latvia, Cyprus, Lithuania, and Ireland (which can be considered an outlier as, in 2015, its real GDP grew by 25.2%), its real GDP

growth closely mirrors the real GDP growth of the euro area. For example, Croatia's correlation coefficient is 0.19 higher than Germany's 0.32 larger than Cyprus and 0.65 larger than Ireland's. The correlation coefficient means that for every 1 percentage point increase in the euro area's real GDP, Croatia's real GDP increases (on average) by 0.945 percentage points, which means that the BCS is remarkably high.

Figure 23: Croatia's and the euro area's real GDP growth (2010 to 2021)
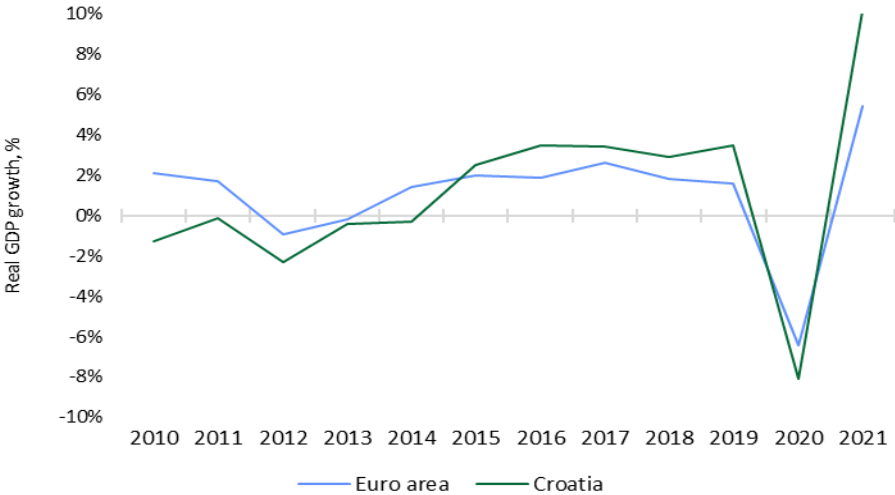
Adapted from Eurostat (2021d).

As can be noticed in figure 24, In the period between 2010 and 2021, Croatia's real GDP closely followed that of the euro area, albeit experiencing slightly higher fluctuations. All this indicates that indeed, Croatia's business cycles closely follow the euro area's business cycles.

If we were to assess Croatia's BCS by the correlation between its real GDP growth and the euro area's real GDP growth, Croatia successfully satisfies this criterion and it can be expected that due to endogeneity, the BCS will additionally increase when Croatia introduces the euro.

4.5 Wage and price flexibility

Similar to labour mobility, wage and price flexibility in Croatia is not at a satisfactory level, similarly to the situation in the EU and the euro area. Kunovac and Pufnik (2013) and Brkić and Šabić (2018) emphasised that prices in Croatia fluctuate on average every eight quarters under normal macroeconomic conditions, highlighting their inflexibility, but noted that price flexibility in Croatia is substantially stronger than in euro area member states in case of major shocks, indicating that Croatia partially satisfies this requirement.

Regarding wage flexibility, the share of corporations that lowered basic wages between 2010 and 2013 in Croatia was 26%[17], way above the EU average of 5%, which points out that

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[17] Large wage cuts and lay-offs were also a frequent phenomenon in the Baltic states, Cyprus, and Greece during this period

there is some wage flexibility, especially during times of crisis. Brkić and Šabić (2018) pointed out that nominal wages are rather rigid in normal times but are very flexible in conditions of recession. To try to compare Croatia's wage and price flexibility I used two easy, yet very insightful and useful tests.

Table 14: Correlation coefficients for individual EU member states between median salary growth and GDP growth (2014 to 2021)

Country	Correlation coeficient	Rank
France	0.911	1
Spain	0.911	2
Czechia	0.900	3
Germany	0.836	4
Euro area	0.818	
Sweden	0.806	5
Finland	0.772	6
Greece	0.745	7
Latvia	0.720	8
Poland	0.694	9
Slovakia	0.570	10
Hungary	0.526	11
Denmark	0.499	12
Croatia	0.497	13
Belgium	0.484	14
Lithuania	0.473	15
Estonia	0.434	16
Romania	0.407	17
Slovenia	0.258	18
Portugal	0.252	19
Austria	0.093	20
Bulgaria	0.072	21
Luxembourg	0.031	22
Italy	-0.083	23
Ireland	-0.084	24
Malta	-0.258	25
Netherlands	-0.366	26

Adapted from Eurostat (2021d), Eurostat (2021e).

In the first test, shown in table 14, I calculated the correlation coefficient between the median salary growth and the GDP growth for the period between 2014 and 2021. The table is missing data for Cyprus, for which Eurostat does not have data for the median salary growth in the observed period. France and Spain are leading the way, with a correlation coefficient of 0.911, which means that wage increases are closely in line with GDP growth (and vice versa). Croatia is ranked 13th, trailing behind other EU countries that do not use the euro such as Denmark, Hungary, Poland, and Sweden, but is in front of Bulgaria and Romania. As this period incorporates both positive and negative GDP growth periods, I decided to conduct another test to see what happens to the salary when the country experiences a strong negative shock (such as the Covid-19 pandemic). I considered 2019 and 2020 and calculated the differences between the GDP growth rate and the median salary growth rate. The smaller

the difference, the higher the wage flexibility, as wage increases/decreases are more in line with GDP growth/decline.

Table 15: Difference between GDP and median salary growth (2020 compared to 2019), all EU member states (left), only those with negative GDP growth (right)

Country	GDP growth	Wage growth	Difference	Rank	Country	GDP growth	Wage growth	Difference	Rank
Hungary	2.4%	1.7%	0.7%	1	Germany	-3.0%	-0.6%	2.4%	1
Denmark	0.7%	2.3%	1.6%	2	Finland	-2.1%	0.6%	2.7%	2
Germany	-3.0%	-0.6%	2.4%	3	Czechia	-4.6%	-1.6%	3.0%	3
Finland	-2.1%	0.6%	2.7%	4	Portugal	-1.3%	1.7%	3.0%	4
Luxembour	1.3%	4.0%	2.7%	5	Sweden	-0.8%	2.9%	3.7%	5
Czechia	-4.6%	-1.6%	3.0%	6	France	-5.5%	-1.8%	3.7%	6
Portugal	-1.3%	1.7%	3.0%	7	Austria	-1.6%	2.2%	3.8%	7
Ireland	4.6%	1.5%	3.1%	8	Greece	-9.8%	-5.0%	4.8%	8
Sweden	-0.8%	2.9%	3.7%	9	Euro area	-4.8%	0.3%	5.1%	
France	-5.5%	-1.8%	3.7%	10	Estonia	-3.2%	1.9%	5.2%	9
Austria	-1.6%	2.2%	3.8%	11	Belgium	-4.5%	1.2%	5.7%	10
Greece	-9.8%	-5.0%	4.8%	12	Slovakia	-3.1%	2.8%	5.8%	11
Euro area	-4.8%	0.3%	5.1%		Spain	-9.8%	-4.0%	5.9%	12
Estonia	-3.2%	1.9%	5.2%	13	Poland	-4.6%	1.5%	6.1%	13
Belgium	-4.5%	1.2%	5.7%	14	Slovenia	-1.9%	4.5%	6.4%	14
Slovakia	-3.1%	2.8%	5.8%	15	Malta	-5.9%	2.9%	8.8%	15
Spain	-9.8%	-4.0%	5.9%	16	Bulgaria	-0.4%	8.5%	8.9%	16
Poland	-4.6%	1.5%	6.1%	17	Netherlands	-7.0%	4.4%	11.4%	17
Slovenia	-1.9%	4.5%	6.4%	18	Croatia	-9.7%	2.4%	12.1%	18
Malta	-5.9%	2.9%	8.8%	19	Romania	-6.7%	5.5%	12.2%	19
Bulgaria	-0.4%	8.5%	8.9%	20	Italy	-7.8%	4.8%	12.6%	20
Netherlands	-7.0%	4.4%	11.4%	21	Latvia	-6.0%	7.0%	13.1%	21
Croatia	-9.7%	2.4%	12.1%	22	Lithuania	-3.9%	10.1%	14.0%	22
Romania	-6.7%	5.5%	12.2%	23					
Italy	-7.8%	4.8%	12.6%	24					
Latvia	-6.0%	7.0%	13.1%	25					
Lithuania	-3.9%	10.1%	14.0%	26					

Adapted from Eurostat (2021d), Eurostat (2021e).

As can be noticed in the left side of table 15, in 2020, Croatia's GDP slumped by 9.7%, while the median salary rose by 2.4% compared to 2019, indicating low wage flexibility (downward rigid). On the other hand, in Hungary, the difference between GDP growth and wage growth was only 0.7 percentage points. Croatia was ranked 22nd among 26 EU member states (Cyrus was excluded due to a lack of data). To get an even better insight, I decided to consider only those EU member states that experienced negative GDP growth in 2020. Among them, the smallest difference between GDP and wage growth was recorded in Germany, where GDP fell by 3% while median wages decreased by 0.6%. On the other hand, Lithuania was at the bottom of the list as while its GDP fell by 3.9%, its median wages grew by 10.1%.

Based on tables 14 and 15, we can conclude that while there is some positive correlation between GDP and wage growth in Croatia but when negative shocks are present, the wages in Croatia are downward rigid, meaning that they increase when GDP growth is positive but

do not decrease when GDP growth is negative. Croatia, as does the EU[18], has rigid prices and wages, and poorly satisfies the wage and price flexibility criterion.

4.6 Fiscal and political integration

These two OCA criteria are very ambiguous and extremely hard to be properly defined in quantitative terms. Political integration means that EU members must abide by common guidelines and align economic policies so that the euro area can function properly. Unfortunately, many member states still oppose various fiscal rules (especially now with the situation with the SGP rules) and it is unlikely that fiscal integration in the EU would increase any time soon.

The Covid-19 pandemic has had a significant effect on how the EU focuses on fiscal rules and what flexibility EU members can have in case of such a shock. Unlike during the euro debt crisis when countries were forced into austerity policies, during the Covid-19 pandemic, the European Commission and the ECB were much more flexible in letting member states use active fiscal policies to mitigate the effects of the pandemic. When Croatia joins the euro area, it will be subject to even harsher regulations that are exclusive to euro area members. No EU member state, including Croatia, meets the fiscal integration criterion, according to HNB (2018). This is because, unlike political integration, which grew stronger following the GFC and the euro debt area crisis, fiscal integration has remained incredibly low since the euro area is not a fiscal union. Under the current circumstances, with the euro area lacking fiscal transfers such as those in the US and with common unemployment schemes present, which would be beneficial if member states are hit by an asymmetric shock, the fulfilment of the fiscal integration criterion is impossible for any EU or euro area member state, including Croatia.

Brkić and Šabić (2018, pp. 14) emphasise that the degree of political and fiscal integration between Croatia and the euro area primarily depends on the current structure of the euro area and in some ways corresponds to the degree of integration of other EU member states that use their national currencies, adding that while Croatia started participating in the European Semester when it joined the EU, it is not directly subject to fiscal penalties for failing to implement the programme. As previously touched upon, Croatia has had previous experience with the euro and around one-half of its citizens support its introduction, which means that although it is unlikely that fiscal integration will deepen with the euro area (unless the euro area as a whole decides to change its policies), political integration is expected to further increase, especially if the entire process of the adoption of the euro is successful and efficient.

4.7 Financial integration

Croatia is highly connected with the euro area when it comes to financial integration as most of the banks in Croatia are owned by euro area-based banks. Of the 7 largest Croatian banks (in terms of market cap), only one is domestically owned (Hrvatska poštanska banka d.d.),

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[18] Frankel (1999) also emphasises that wages and prices in the EU are very rigid

while three of them (Erste & Steiermärkische Bank d.d., Raiffaisen Banka d.d. and Addiko Bank d.d.) are owned by Austrian banks, two of them are owned by Italian banks (Zagrebačka banka d.d. and Privredna banka Zagreb d.d.), and one is owned by a Hungarian bank (OTP banka d.d.).

Figure 24: Structure of Croatia's banking system, by country of owners' head office (left) and currency structure of Croatia's total debt (right) at the end of 2016
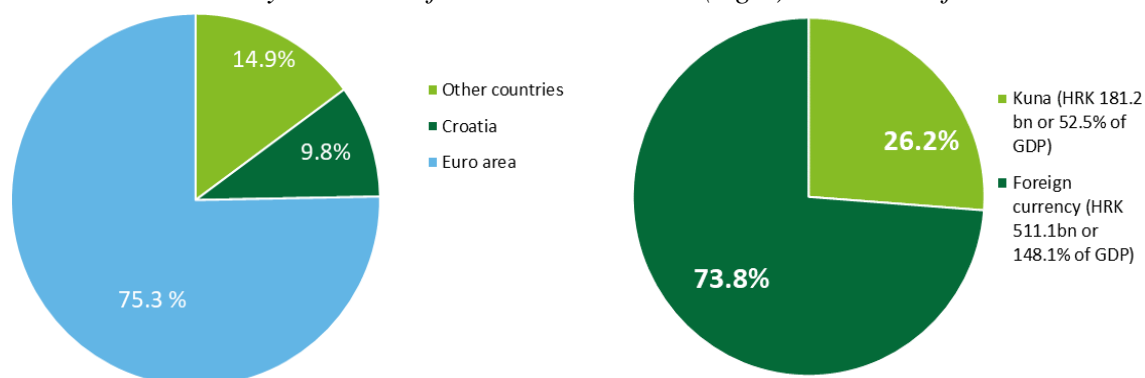
Adapted from Brkić and Šabić (2018).

As can be seen in figure 25, Brkić and Šabić (2018, pp. 11) note that, at the end of 2016, just over three-quarters of the assets in the Croatian banking sector were held by banks owned by financial firms from the euro area. It is also notable that a sizeable amount of Croatia's external debt is owned by investors from the euro area and is denominated in euros. Namely, banks from euro area member countries hold a 75.3% share of the Croatian banking system, while HRK 511.1 billion, or 73.8%, of Croatia's total debt, was denominated in foreign currency (predominantly in euros)

Table 16: List of Croatian banks by total assets (in thousand HRK) at 31.03.2022

No.	Name	Total assets (HRK 000)	Market share (%)	Ownership
1	Zagrebačka banka d.d.	134,317	27%	Italy
2	Privredna banka Zagreb d.d.	106,916	21%	Italy
3	Erste&Steiermärkische Bank d.d.	86,887	17%	Austria
4	OTP banka d.d.	49,802	10%	Hungary
5	Raiffeisenbank Austria d.d.	39,255	8%	Austria
6	Hrvatska poštanska banka d.d.	28,741	6%	Croatia
7	Addiko Bank d.d.	16,623	3%	Austria

Source: HNB (2022b).

As of 31.03.2022, seven of the eight largest Croatian banks were owned by euro area financial institutions. The seven banks owned 85% of the Croatian banking system's total assets, which can be noted in table 16. In the words of Brkić and Šabić (2018), the large percentage of the euro area in overall inflows of foreign direct investment, which was the source of nearly three-quarters of all foreign direct investment to Croatia between 1993 and 2016, is another indicator of the financial integration between Croatia and the euro area. On the other hand, the financial integration of Croatia's capital market is much weaker as this market is very shallow, illiquid, and unattractive for foreign investors.

Croatia also has a high the greatest share of credit euroization of all EU members that do not use the euro as a currency (without Denmark) because 58% of placements by domestic banks to other domestic sectors and 68% of placements to the government are tied to foreign currencies, primarily the euro, which can also be noticed in figure 14.

Table 17: Unofficial financial euroisation in central, eastern, and south-eastern European countries

Country	Share of outstanding euro deposits in total deposits	Share of outstanding euro loans in total loans
Serbia	61.1%	63.8%
Croatia	51.0%	53.4%
Albania	44.3%	46.4%
North Macedonia	35.8%	40.4%
Bosnia and Herzegovi	33.2%	54.7%
Bulgaria	29.5%	33.7%
Hungary	16.1%	22.8%
Poland	7.7%	10.2%
Czech Republic	6.3%	13.2%

Source: Moder (2021).

As shown in table 17, euro deposits account for more than 50% of all the deposits in Croatia, while euro loans account for 53.4% of all loans, figures much higher than almost all other EU members (Denmark was not included in the analysis) that are do not use the euro such as Bulgaria (which aims to adopt the euro in 2024), Romania, Hungary and the Czech Republic and Poland.

Table 18: Interest rate pass-through of the euro area shadow rate by country, adjusted for multiple testing

Country	Cointegrated with unadjusted critical values
North Macedonia	54.5%
Croatia	53.7%
Albania	42.9%
Bulgaria	38.5%
Bosnia and Herzegovina	38.5%
Hungary	21.4%
Romania	18.8%
Serbia	8.3%

Source: Moder (2021).

It is also important to emphasise the interest rate pass-through of the euro area shadow rate on the Croatia economy as a high, as shown in table 18. A high reading on this indicator means that a high percentage of the retailed bank rates are linked to the euro area shadow rate. Croatia's percentage is 53.7%, just below North Macedonia's 54.5% reading, which can be seen in table 18. Moder (2021) notes that the long-run pass-through effect, which is to what extent changes in the shadow rate is being passed through to retail rates, is stronger

for lending rates than for deposit rates. To conclude, Croatia is very highly integrated with the euro and is the most integrated among all EU member states that are obliged to introduce the euro when it comes to its financial sector (albeit its capital market is less so), so it successfully fulfils this criterion.

4.8 Discussion

At the moment, Croatia fulfils some of the OCA criteria better than the others. As summarised in table 18, Croatia gets an exceptionally good mark on the financial integration, the BCS criterion and the trade integration criterion and gets a passable mark on McKinnon's openness criterion and Kenen's diversification criterion. It fares the worst when it comes to Mundell's labour market flexibility criterion, the wage and price flexibility criterion and the political and fiscal integration criterion. All this might not be all that problematic for Croatia due to two reasons.

Firstly, due to endogeneity, even if it does not fulfil the OCA criteria now, it could fulfil them in the future as these two of the criteria, BCS and trade integration are endogenous. As shown in table 3 and table 4, due to being a member of the euro area, Croatia's trade with the euro area is expected to increase, and its business cycles would become more correlated with the euro area. Rose (2009) explains that the EMU has been linked to an increase in trade of 8% and that each 1% increase in bilateral trade causes an increase in BCS of 0.02 and an increase in the correlation coefficient of detrended outputs of 0.16 but points out that while this decrease in idiosyncratic national business cycles is significant, it is difficult to say whether it is sufficient to eliminate the need for national monetary policy.

According to Brkić and Šabić (2018), one of the key reasons why the OCA theory should not be regarded as a perfectly accurate framework for evaluating the economic justification when a country considers whether it should join a monetary union is the existence of endogeneity. Various authors, including de Grauwe and Mongelli (2004) have confirmed that there is endogeneity in the euro area, especially regarding the financial integration criterion, while Darvas and Szapáry (2008), Furceri and Karras (2008), Gogas (2013) have shown that the adoption of the euro has enhanced the BCS among euro area member states. Thus, even if Croatia does not form an OCA with the euro area ex-ante, it could form one ex-post. Secondly, the OCA criteria might not be entirely relevant for Croatia.

According to Tavlas (1993), the OCA theory has a fundamental flaw in that its criteria frequently result in opposing policy recommendations. In the case of Croatia, for instance, the OCA theory is unable to address the issue of whether the BCS and high level of trade integration with the euro area are sufficient justifications for adopting the euro despite the lack of adequate economic diversification and insufficient labour mobility.

It is important to note that the OCA theory ignores currency risk and overestimates the efficiency of monetary policy in small open economies. As was previously said, the theory underlying the OCA criteria was developed in the 1960s, a time when central banks were more effective and global capital flows were scarce and constrained. HNB is quite unlikely

to be able to effectively use the exchange rate mechanism and other policy instruments as a tool to mitigate shocks in 2022 as the US Fed is most likely the only central bank that can pursue a completely autonomous monetary policy in the current environment.

This is even more relevant for Croatia due to the high level of foreign debt, which means that if the kuna depreciates by 10% against the euro, the principal of Croatia's domestic sectors' debt would rise by HRK 51 billion or around 15% of its GDP. By comparing how Croatia is faring on the OCA criteria, one could get a better insight into how Croatia fares compared to other euro area members as it is important not to check whether Croatia successfully fulfils the criteria but to also get an anchor, a benchmark, on how good it is fulfilling it compared to the others.

On some criteria, it fares extremely well, especially when it comes to the trade integration criterion, the BCS criterion and the financial integration criterion. If judged by just these three criteria, Croatia is the ideal candidate to join the euro area. On other criteria, such as McKinnon's openness criterion and Kenen's diversification of the economy, Croatia is partially successful as it is a small, open country whose economy is diversified. Croatia fares worse when it comes to Mundell's labour market criterion and the wage and price flexibility criterion, which could mean that in case of an adverse shock, Croatian workers are not very mobile and are unlikely to accept a cut in wages, which could pose a serious threat to the Croatian labour market, which could additionally increase the unemployment rate. In addition, the unemployment rates across Croatia vary significantly, making Croatia even more vulnerable in such a scenario. Regarding the fiscal integration criterion, Croatia can do little to improve its ranking and must hope that the EU decides to make radical changes in its fiscal policy regarding fiscal transfers and distributions.

Touching upon my first hypothesis, it is impossible to unambiguously decide whether Croatia is a suitable candidate based on the OCA criteria. Touching upon my second hypothesis, due to endogeneity, Croatia might be able to satisfy the criteria (BCS and trade integration) ex-post even if its performance on these two criteria is poor ex-ante as they are **endogenous.**

Table 19: Croatia's performance regarding the OCA criteria

Criterion	Satisfied?	Ranking
Labour market flexibility	Poorly	23rd
Openness	Partly satisfied	18th
Trade integration	Completely satisfied	3rd for imports/9th for exports
Diversification of the economy	Partly satisfied	13th (compared to euro area members)
BCS	Completely satisfied	3rd
Fiscal integration	Impossible to answer	
Political integration	Partly satisfied	
Financial integration	Completely satisfied	1st among all non-euro EU member states
Wage and price flexibility	Poorly	13th/22th

Source: Own work

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5 CONCLUSION

The OCA theory is a landmark theory. By using it, economists can determine whether a country should join a monetary union with other countries. Although its foundations were laid out in the 1960s and 1970s, it is as relevant today as it was back then. The theory does have some deficiencies as it most importantly, overestimates the effectiveness of independent monetary policy in the contemporaneous environment.

The logic behind the theory is quite simple, it has pre-specified criteria, which, if fulfilled, point out that the country should stop pursuing an independent monetary policy and join a monetary union. The criteria include Mundell's labour market mobility criterion, Kenen's diversification criterion, McKinnon's openness criterion, the trade integration criterion, the BCS criterion, the wage and price flexibility criterion and the financial integration criterion, which are all mostly economic criteria, as well as political criteria such as the fiscal integration criterion and the political integration criterion.

One deficiency of the OCA theory, as pointed out by Tavlas (1993) is that in cases where a country performs well on certain criteria but not so well on others, the OCA theory does not provide a definitive, unequivocal answer as to whether or not it should join a currency area. For example, the OCA theory is unable to point out how much openness or BCS is sufficient to compensate for low labour mobility and prevent asymmetric shocks.

Croatia is an interesting candidate to examine using the prism of OCA criteria. The will and motivation for the euro adoption are present in the country, and the country is already familiar with the euro as a currency as the euro is often used in Croatia (especially when it comes to loans and deposits). Since it became independent, the country has managed to resurface from a country torn apart by the war with Serbia into a developed, modern country. In June 2022, in its Convergence Report, the European Commission decided that by considering all factors, Croatia successfully fulfils the Maastricht criteria.

Croatia fares better on some criteria and worse on others. For example, it fares extremely well on the trade integration and the BCS criteria since it trades a lot with the EU and its business cycles mirror those of the euro area. It also satisfies the financial integration criterion as it has the highest degree of financial integration with the euro area among all EU member states that do not use the euro. It also partly satisfies the trade openness and political integration criteria but fails to satisfy Mundell's labour market flexibility and the wage and price flexibility criteria.

The fascinating part is that even though its performance is far from ideal, there is one more phenomenon that can help Croatia, after it enters the euro area, to successfully fulfil the OCA criteria. Namely, due to endogeneity, Croatia's trade with the euro area (and the EU) will increase further and its business cycles could become more correlated to the euro area's business cycles. As these two criteria are endogenous, Croatia, which at the moment does

not fulfil some of the OCA criteria, could fulfil them at some point in the future when it becomes a euro area member. Various authors have proven that there is some magic in joining the euro area (although it is implausible to expect that the Rose effect for Croatia would be 200%) and that endogeneity is there as a token that Croatia can use to its advantage.

Croatia, in the last 20 years, has been on a steady path of economic development and growth. During this period, it has been a successful member of the EU and the ERM II. Its entry into the euro area will further improve its economic situation and help Croats ensure an even better future for themselves and future generations.

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APPENDICES

Appendix 1: Povzetek (Summary in Slovene)

Teorija OCA je prelomna teorija. Z njo lahko ekonomisti določijo, ali naj se država pridruži monetarni uniji z drugimi državami. Čeprav so bili njeni temelji postavljeni v šestdesetih in sedemdesetih letih prejšnjega stoletja, je danes enako pomembna kot takrat. Teorija ima nekaj pomanjkljivosti, saj predvsem precenjuje učinkovitost neodvisne denarne politike v sodobnem okolju.

Logika teorije je precej preprosta, saj ima vnaprej določene kriterije, ki, če so izpolnjena, kažejo na to, da mora država prenehati izvajati neodvisno denarno politiko in se pridružiti monetarni uniji. Kriteriji vključujejo Mundellov kriterij mobilnosti trga dela, Kenenov kriterij ekonomske diverzifikacije, McKinnonov kriterij odprtosti, kriterij trgovinske integracije, kriterij BCS, kriterij prilagodljivosti plač in cen ter kriterij finančne integracije, ki so večinoma ekonomska kriterija, pa tudi politična kriterija, kot sta kriterij fiskalne in politične integracije.

Ena od pomanjkljivosti teorije OCA, na katero je opozoril Tavlas (1993), je, da v primerih, ko je država po nekaterih kriterijih zelo uspešna, po drugih pa ne, teorija OCA ne daje dokončnega in nedvoumnega odgovora, ali naj se država pridruži valutnemu območju ali ne. Teorija OCA na primer ne more pokazati, koliko odprtosti ali sinhronizacije poslovnih ciklov zadostuje za nadomestitev nizke mobilnosti delovne sile in preprečevanje asimetričnih šokov.

Hrvaška je zanimiva kandidatka, ki jo je treba preučiti z uporabo meril OCA. V državi sta prisotna volja in motivacija za uvedbo eura, država pa že pozna euro kot valuto, saj se euro na Hrvaškem pogosto uporablja (zlasti ko gre za posojila in vloge). Od osamosvojitve ji je uspelo iz države, ki jo je razdejala vojna s Srbijo, preroditi v razvito in sodobno državo. Evropska komisija je junija 2022 v konvergenčnem poročilu odločila, da Hrvaška ob upoštevanju vseh dejavnikov uspešno izpolnjuje maastrichtska merila.

Pri nekaterih merilih se Hrvaška odreže bolje, pri drugih pa slabše. Na primer, zelo dobro se odreže pri kriterijih trgovinske integracije in BCS, saj veliko trguje z EU in njeni poslovni cikli odražajo cikle euroobmočja. Izpolnjuje tudi kriterij finančne integracije, saj ima najvišjo stopnjo finančne integracije z euroobmočjem med vsemi državami članicami EU, ki ne uporabljajo eura. Delno izpolnjuje tudi kriterij odprtosti trgovine in politične integracije, ne izpolnjuje pa Mundellov kriterij prožnosti trga dela ter prožnosti plač in cen.

Zanimivo je, da kljub temu, da so njeni rezultati daleč od idealnih, obstaja še en pojav, ki lahko Hrvaški po vstopu v euroobmočje pomaga uspešno izpolnjevati merila OCA. Zaradi endogenosti se bo namreč hrvaška trgovina z euroobmočjem (in EU) še povečala, njeni

poslovni cikli pa bi lahko postali bolj povezani s poslovnimi cikli euroobmočja. Ker sta ta dva kriterija endogena, bi Hrvaška, ki trenutno ne izpolnjuje nekaterih kriterijih, bi lahko te iste izpolnila v prihodnosti, ko bo postala članica euroobmočja. Različni avtorji so dokazali, da je v pridružitvi euroobmočju nekaj čarobnega (čeprav je neverjetno pričakovati, da bi bil učinek Rose za Hrvaško 200-odstoten) in da je endogenost tu kot simbol, ki ga lahko Hrvaška izkoristi v svojo korist.

Hrvaška je bila v zadnjih 20 letih na poti stalnega gospodarskega razvoja in rasti. V tem obdobju je bila uspešna članica EU in ERM II. Z vstopom v euroobmočje se bo njen gospodarski položaj še izboljšal, Hrvati pa si bodo lahko zagotovili še boljšo prihodnost zase in za prihodnje generacije.

Appendix 2: Various studies of the effect of currency union on trade (left) and trade on BCS (right)

Table 1 Recent Studies of Currency Union and Trade

			Gamma	SE
1	Bun and Klaassen	2002	0.33	0.1
2	de Souza	2002	0.17	0.24
3	de Nardis and Vicarelli	2003	0.061	0.027
4	Cabasson	2003	0.63	0.24
5	Micco, Stein, Ordonez	2004	0.089	0.025
6	Barr, Breedon and Miles	2004	0.25	0.033
7	Baldwin and Taglioni	2004	0.034	0.015315
8	Faruqee	2004	0.082	0.018
9	de Nardis and Vicarelli	2004	0.093	0.039
10	Clark, Tamirisa, and Wei	2004	0.22	0.38
11	Baldwin, Skudelny, and Taglioni	2005	0.72	0.06
12	Yamarik and Ghosh	2005	1.8285	0.30475
13	Adam and Cobham	2005	1.029	0.039486
14	Baxter and Koupritsas	2006	0.47	0.22
15	Flam and Nordstrom	2006b	0.139	0.02
16	Berger and Nitsch	2006	-0.001	0.036
17	Gomes, Graham, Helliwell, Kano, Murray and Schembri	2006	0.069	0.011
18	Baldwin and Taglioni	2006	-0.02	0.03
19	Baldwin and Di Nino	2006	0.035	0.01
20	Flam and Nordstrom	2006a	0.232	0.024
21	Tenreyro and Barro	2007	1.899	0.351
22	Bun and Klaassen	2007	0.032	0.016
23	de Nardis, De Santis and Vicarelli	2007	0.04	0.01278
24	Brouwer, Paap, and Viaene	2007	0.067	0.025769
25	Flam and Nordstrom	2007	0.248	0.046
26	de Nardis, De Santis and Vicarelli	2008	0.09	0.033962

Table 4 Recent Studies of Trade and Business Cycle Synchronization

			Beta	SE
1	Baxter and Kouparitsas	2005	0.134	0.032
2	Bower and Guillenmineau	2006	0.02055	0.00528
3	Calder	2007	0.013	0.004
4	Calderon Chong and Stein	2007	0.015	0.003055
5	Choe	2001	0.027	0.008333
6	Clark and van Wincoop	2001	0.09	0.03
7	Crosby	2003	0.048	0.063
8	Fidrmuc	2004	0.021	0.044872
9	Fiess	2007	0.123	0.062
10	Frankel and Rose	1998	0.086	0.015
11	Gruben, Koo and Mills	2002	0.059	0.017206
12	Imbs	2003	0.03089	0.020058
13	Imbs	2004	0.074	0.022289
14	Inklaar, Jong-a-Pin and de Haan	2005	0.115	0.041071
15	Kose and Yi	2005	0.091	0.022
16	Kose, Prasad and Terrones	2003	0.0107	0.0045
17	Kumakura	2006	0.0575	0.0354
18	Kumakura	2007	0.05555	0.01232
19	Otto, Voss and Willard	2001	0.0461	0.090999
20	Shin and Wang	2004	0.07665	0.07665

Source: ECB (2009).