EKONOMICKÁ UNIVERZITA V BRATISLAVE
NÁRODOHOSPODÁRSKA FAKULTA
UNIVERZITA KOMENSKÉHO V BRATISLAVE
PRÁVNICKÁ FAKULTA

Evidenčné číslo: 101002/B/2024/36122358761681156

The current state of the monetary transmission mechanism in the euro area

Bakalárska práca

2024 **Boris Gerát**

EKONOMICKÁ UNIVERZITA V BRATISLAVE
NÁRODOHOSPODÁRSKA FAKULTA
UNIVERZITA KOMENSKÉHO V BRATISLAVE
PRÁVNICKÁ FAKULTA

The current state of the monetary transmission mechanism in the euro area

Bakalárska práca

Študijný program: Ekonómia a právo
Študijný odbor: EKONÓMIA A MANAŽMENT
PRÁVO
Školiace pracovisko: Katedra ekonómie
Vedúci záverečnej práce: Ing. Marcel Novák, PhD.

Bratislava 2024 **Boris Gerát**

Čestné vyhlásenie

Čestne prehlasujem, že som túto bakalársku prácu písal samostatne, a že som v bibliografických odkazoch uviedol všetku použitú literatúru.

V Bratislave, dňa 1.5. 2024 Gerát

(podpis študenta)

Abstrakt

GERÁT, Boris: Súčasný stav menového transmisného mechanizmu v eurozóne. – Ekonomická univerzita v Bratislave. Národohospodárska fakulta; Katedra ekonómie. – Vedúci záverečnej práce: Ing. Marcel Novák, PhD. – Bratislava: NHF EU, 2024, 62 s.

Cieľom tejto záverečnej práce je poukázať na súčasný stav menového transmisného mechanizmu v eurozóne pomocou VAR modelov. Práca je rozdelená do troch hlavných kapitol s viacerými podkapitolami v každej z nich. Prvá kapitola stanovuje teoretické aspekty práce so zameraním na viaceré aspekty EMU a jej históriu, fungovanie a vysvetlenie mechanizmu menovej transmisie a jej kanálov. Druhá kapitola je zameraná na vysvetlenie našich dát a metodológie, ktorá bola použitá na odhad VAR modelov. Nasledujúce kapitoly sú zamerané na prezentáciu a diskusiu o výsledkoch našich VAR modelov a na hľadanie možných príčin daných reakčných funkcií. Práca sa končí záverom, v ktorom sa vyjadrujeme k našim výskumným otázkam a zdôrazňujeme náš hlavný prínos k výskumu transmisného mechanizmu. Prácu uzatvára zistenie, že dynamika jadra a periférie v krajinách eurozóny je stále prítomná.

Kľúčové slová:

Monetárny transmisný mechanizmus, EMU, VAR model

Abstract

GERÁT, Boris: The current state of monetary transmission mechanism in euro area. – University of Economics in Bratislava. Faculty of National Economy; Department of Economy. – Supervisor: Ing. Novák Marcel, PhD. – Bratislava: NHF EU, 2024, 62 pp.

Goal of this final thesis is to show current state of monetary transmision mechaism in euro area by means of VAR models. The work is devided into the three main chapters with multiple subchpaters in each. The first chapter lays down theoretical apsects of work with focus on multiple aspects of EMU and its history, functioning and explanation of monetary transmission mechansim and its channels. The second chapter is focused on explanation of our data and methodlogy that was used for estimation of VAR models. Chapters following are focused on presenting and discusiing results form our VAR models and fidning possible causes for given reaction functions. The work ends with final conclusion in which we adrees our research quatstions and higlight our main contributes to the research of monetary transmission mechanism. The work is concluded with finding that the core and periphery dynamic in euro area countries are still present.

Key words:

Monetary transmission mechanism, EMU, VAR model

Table of contents

Introduction

The creation of the European Economic and Monetary Union (EMU) is to this day the biggest economic project in European history. There was never a time in Europe when many countries came together under one single currency with the idea of shared prosperity. The EMU was a step toward fulfilling the vision which foundations were set by previous projects, mainly the European Union in 1993. “In Variate Concordia” is the main motto of the European Union meaning “united in diversity”. It was meant to represent the heterogeneity of many countries brought together to form a single strong economic body. The diversity that was unifying at first however proved to be a great threat towards shared currency. Academic disputes about whether this monetary union will work started from the beginning of its creation and sparked a great amount of research which this final thesis is part of.

The thesis will not try to say if the monetary policy decisions were right or wrong but will try to evaluate the impacts of monetary policy through the theory and empirical evidence of the monetary transmission mechanism and its various channels. Through this method, we should be able to find strong and weak spots in reach of the European Central Bank ECB from now on. The observation timeline for this thesis starts in 2003 when the euro area was created and ends right before the outbreak of the pandemic in 2020. With this observation timeline, we can evaluate the reach of ECB monetary policy through inflationary pressures at the beginning, the financial crisis in 2008, the sovereign debt crisis shortly after, and the low inflation period that lasted near the end of our observation period. Unfortunately, empirical data at the time of writing this thesis are not long enough for us to split the observation into two parts pre pre-crisis and post-crisis, but with our approach will get a great overall look at the first 20 years of monetary policy of ECB. The thesis will try to bring empirical evidence on all main channels of monetary transmission mechanism in the euro area as a whole and various countries in the euro area to see differences between them. For this, we have chosen two countries from the euro area core with them being Germany and Netherlands, and three countries from the periphery Italy, Spain, and Slovakia.

The impact on the economy will be measured through vector autoregression models which have become standard tools in evaluating monetary policy shock and economic shocks in general since being introduced in 1980 by Christopher A. Sims. We will use the reduced structural form of the VAR model to better distinguish each of the monetary policy

shocks in the model. The empirical results are made by first creating a benchmark model for each economy from which we will get an overall outlook on the impact of monetary policy on the economy. To model results for each channel, we will extend the benchmark model with the method of G. Peersman, and Smets (2001) when more endogenous variables are added to the model without directly affecting benchmark variables.

The final thesis consists of three main chapters first being the current state of the problem at home and abroad, where we will show and analyze the history and main principles of ECB monetary policy which can give us better explanations for empirical results later in the work. Also, part of the first chapter is a summary of knowledge about the euro area transmission mechanism and its channels. The second chapter, the aim of the work and the methodology of the work and research methods as its name may suggest focuses on methods that have been used for creating our empirical results, we will show the structure of our benchmark models, extended models, and data transformations we did before we began modeling. We present our results in the third chapter with graphs of our impulse response function and the coefficient we got from our models. In the discussion, we evaluate our results with relevant literature try to understand our results from various views, and raise topics for further research. The thesis ends with a conclusion which sums up our most important findings and directly answers our research questions.

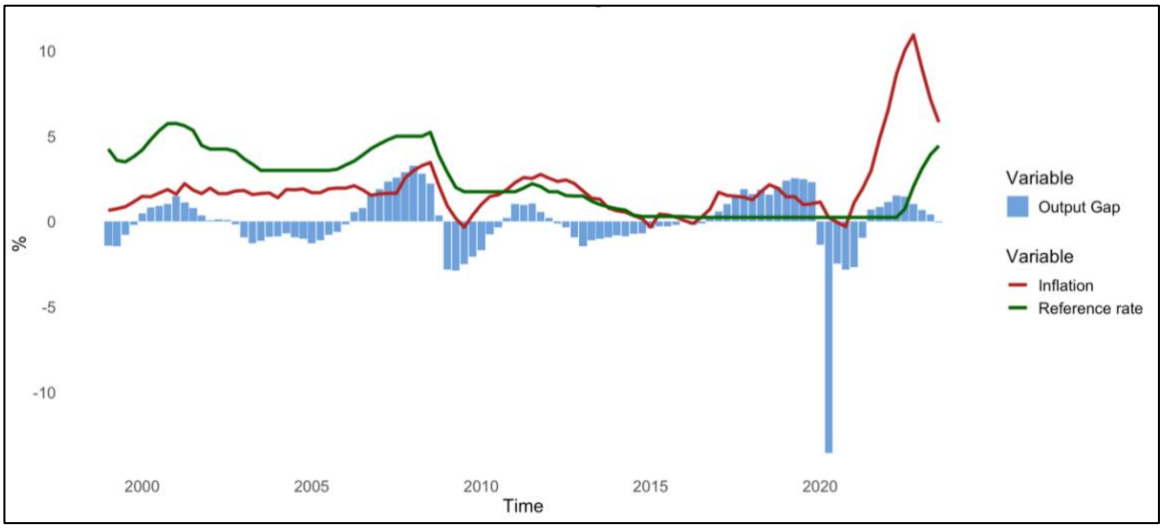
1. The current state of the problem at home and abroad

In this chapter, we will lay down the theoretical basis for upcoming empirical work, which will be done by first examining in the first subchapter history of the first twenty years of ECB monetary policy and the main pillars of banks' functioning. This is then followed by a summarization of the impacts of the euro on Slovakia's economy and delving more into the core-periphery dynamics. The chapter concludes with a larger part about the functioning of the monetary transmission mechanism and its channels.

1.1. ECB monetary policy and its main principles

There are not a lot of banks in the world that were hit severely by many crises as the ECB in its first 20 years of functioning. The newly established central bank had to withstand pressures ranging from the tech bubble recession to high oil prices but without a doubt, it was a financial crisis at the end of 2008 and a sovereign crisis that tested the limits of the ECB the most. At the start of its functioning, the ECB implemented a popular central banking framework named inflation targeting where inflation is targeted directly instead of targeting inflation indirectly by focusing on money in circulation. However, despite the empirical usefulness of the framework and its popularity in academia (L. Svensson, 2010), (G. Hammond, 2012) inflation targeting has not solved all the problems. When it was caught that the conventional monetary policy toolbox would not suffice in the given situations, unconventional monetary policies were used like putting main interest rates to zero bound with the main deposit rate even going to negative percentage points. Quantitative easing was the main tool of this unconventional monetary policy and there are still disputes in academia about its results, it has certainly helped the economy to go slightly away from the threat of deflation until the COVID-19 pandemic broke out.

Figure 1: Outlook for the Euro Area Economy: 1999-Q1 to 2023-Q3



Source of data: ECB database and Eurostat

The whole twenty-year timeline with a focus on inflation, the output gap, and the marginal lending facility can be seen in Figure 1 above. We will focus more on macroeconomic development over twenty years in a later subchapter. The backbone of this subchapter is based on P. Hartmann and Smets (2019) which serves as a source of summing up the first twenty years of ECB functioning by people who are there from the beginning. But first, the next subchapter will discuss the theory behind the three main principles of ECB monetary policy.

1.1.1. Legal framework of ECB

Before we delve deeper into specific principles and tools that have been ECB using we need to clarify its legal framework. Primary sources of knowledge about this topic are the founding treaties of the European Union such as TFEU and TEU and other legislatures of the EU such as the Statute of ESCB and ECB. We have used too research from M. Ioannidis, Hlásková and Zilioli (2021) which summarized the legal standpoint of the ECB.

The legal framework of ECB is mainly defined in article 127 TFEU where the main goals and secondary goals are broadly defined with conditioning that the goals set in article 3 TEU cannot be disregarded. The main goal of ECB should be the stable price levels which are too not clearly defined. A more specific definition is oftentimes given by a Court of Justice of the European Union (CJEU) from now on. CJEU helped specify the inflation target in 2003 to be under but close to 2%. ECB is in this framework placed as the main and only

sovereign in implementing monetary policy. However, we can see differences in the definition of its monetary policy and general economic policy. ECB should stay only in its competence of monetary policy and not interfere with general economic policy of countries. The intervention is acceptable only if it is beneficial to the goals of the European Union and mainly if it is not contrary to its primary goal of stable price levels. This is again written broadly, and better specification can be found by combining multiple articles of these treaties. CJEU stated that in times of need, the ECB is competent to make policies that may affect the real economy of member states. However, the ECB should always try to stay away from the economic policies of member states. On the other hand, when the primary goal is achieved, ECB should try to help with general economic policies which benefit the union as a whole. This is again very uncertain ground to stay on because of article 130 TFEU when the ECB should stay sovereign, and its policy should not be influenced by any outside institution. We can see in Article 121 TFEU that the only institution eligible to suggest general economic policies to the ECB is the European Council. This article helps the ECB with choosing its secondary goal hierarchy. Another competence of the ECB is to the governance of the European system of central banks in articles 29 TFEU and 132.

During the financial and sovereign debt crisis, we could see the importance of the newly established ombudsman of ECB which was created in 2013. The ombudsman despite his weaker legal competencies managed to use them to enhance transparency with the right formulated questions to the ECB (C. Duran, Steinberg, 2019). When we compare the ECB with its closest counterpart FED we can see the main difference in their primary mandates. The mandate of the FED is dual with a focus both on inflation and on employment which serves way to balance hawkish interest rate rites. ECB on the other hand has only a singular primary mandate with one purpose of keeping the price levels optimal. As was already mentioned there are other secondary goals however these goals are hierarchically secondary which means that during turbulent times they may not get enough attention needed. However, the decision to choose a singular mandate is understandable and may be necessary due to heterogeneity among euro-area countries. If the ECB had a goal of keeping employment or output on some targeted level the results could be vague and undermine its credibility.

1.1.2. Main principles of ECB

All great institutions that want to have credibility with the public and stay consistent within their mandate must represent themselves with some guiding principles. In the case of ECB, we are talking about three main principles with them being (i) a numerically defined inflation target which serves as an anchor for inflation expectations (ii) economic and monetary analysis for decision making (iii) communication and accountability. The first and third principles are necessary for the sake of inflation targeting mandate, but where the ECB stands out is its commitment to still give significant weight to monetary analysis in contrast with other central banks. The principles and weight given to each were dynamic in the past 20 years. There were times when monetary analysis was more useful like before the financial crisis or when the ECB was fully committed to quantitative easing. The same can be said about the role of communication of ECB with the general public. At first the future moves were often not shared outside of the institution but after 2013 we could see fully-fledged forward guidance. The form of principles was mainly shaped by the current management of the ECB and the economic situation in which the euro area was.

1.1.2.1. Inflation target

The numerical definition of the inflation target has been a key component of inflation targeting frameworks from the start of their existence in 1989 with the Central Bank of New Zealand as the first institution which publicly announce it. Without a clear definition of the target the monetary policy can be adjusted to the desired outcome and the public does not have a way to shape its expectations. Most inflation targets are around 2% so that inflation is not too high but not too close to zero so the economy does not face the threat of deflation. Although there are still disputes in academic fields about the 2% inflation rate, some are calling for the target to be higher around 4% (O. Blanchard, 2018), and some just want symmetrical or asymmetrical adjustments to the 2% target. From the perspective of historical evolution, we can see that the ideal inflation target had various forms. Keynesians suggested that inflation should be zero, and monetarists said that inflation should even be negative (G. Hammond, 2012). Now with a good amount of empirical evidence, we can say that neither of the two targets would work in our current economic environments. The zero inflation target would put the economy under the dangerous threat of deflation which is often more harmful to the economy than slightly higher inflation as we could see in the euro area after a sovereign debt crisis. A low inflation target becomes even more volatile when we take into

account that the inflation measures tend to be off by about 0.5% as we can see in (M. Boskin et al, 1997).

A specific attribute of the ECB is that euro area inflation is tracked in the harmonized consumer prices index instead of the traditional consumer prices index. The main purpose of HICPI is to have an index with the same methodology of calculation for all euro area centuries, in contrast to CPI which is more country-specific. The HICPI includes a broad variety of common goods that are used jointly in euro area countries and an important aspect of the index is that it does not directly include owner-occupied housing prices and includes only rents. Not including housing prices at first glance does not seem like a big change in the value of the index but after a closer look, we can see great diversity across euro area countries when it comes to the cost of buying private property. In countries where renting property to live is more popular like Germany or the Netherlands, private property prices do not rise as severely as in cases like Slovakia or Croatia where the homeownership rate is above 90%. This could lead to a situation where housing price bubbles could affect the index. Residential real estate can create a variety of services and it is the price of these services that should HICPI capture more than the price of the asset itself (S. Dullien, Toboer, 2021).
ECB started its mandate with a 2% inflation target without any lower bound to it. It is important to state that this was announced before any significant threats of deflation were sighted. However, this target did not last very long because in 2003 due to a minor recession caused by the technology bubble, the target was changed to being below but close to 2%. This gave the target much-needed symmetry and for the first time accounted to some degree for the threat of deflation. This is the last time that the inflation target was changed till the end of our observation period, despite drastic changes in the upcoming economic environment.

1.1.2.2. Economic and Monetary Analysis

The second principle stands on economic and monetary analysis which is often defined as monetary policy based on inflation and monetary targets. ECB was presenting itself this way from the start which raised many disputes and concerns mainly because of the inclusion of a monetary targeting framework which was at the time considered slowly becoming more and more obsolete. Monetary targeting became relevant shortly after the fall of the Bretton Woods system with the strategy to control economic variables through money in circulation. This was for the period quite a useful system however new financial assets

that were invented over time and could not be captured in traditional monetary aggregates slowly forced central banks to change the framework. The most notable and successful user of this framework was Bundesbank which in a significant way influenced the creation of the ECB, so there is no surprise that monetary targeting was passed on. Academics focused on the impact of monetary targeting on ECB monetary policy decisions from the start and the results were often similar. With monetary targets not playing as significant a role as the ECB claims it does. At first, we could see studies that came out around 2000 like L. Svenson's (2000) with his study claiming the launch of the euro was successful but he did not seem much usefulness in including monetary targeting. Svenson later in his study in 2003 demonstrated US data simulating the euro area economic environment and showing that money growth does not always correlate with inflation and money demand is not stable which could cause problems. The key point from his studies was that monetary targeting should only be used as the secondary part of monetary policy evaluation. A similar point was drawn by K. Cabos, Funke and Siegfried (2001) who said that the ECB should stick to inflation targeting despite the success of monetary targeting with the Bundesbank. However, it is important to mention the other side (M. Barell, Dury 2000) which is more in favour of monetary targeting for smaller and closed economies, in the case of the United States and economies similar to them like the eurozone inflation targeting seems like a better framework. This debate was again partly open by S. Kim and Mehrotra (2018) in which the author concludes that the usefulness of macroprudential targeting is on same level as monetary targeting. The policy making bank should however be careful because the combination of both methods may hard to predict. After a short time, it was clear that monetary targeting is not of the same importance as inflation targeting as we can see in (P. Surico, 2007) which says that M3 is not a targeted variable. This merits to some part ended in 2006 when a conference was held about this topic and was found that monetary targeting is not as precise as inflation targeting mainly because the quantitative equation is evolving (B. Fisher et al, 2009). Monetary targeting has stayed an important part of the ECB monetary policy to this day but its importance is only secondary. This may raise the question of why the ECB made monetary targeting so important at the start. We could see that the share of words directed towards monetary analysis in public statements of the ECB was initially higher in the start but later slightly decreased (H. Berger, Haan, Strum 2011). However, monetary topics stayed consistent in ECB communication going forward and a correlation between words directed to the topic and changes in monetary policy can not be found. Another explanation is given by (M. Woodford 2008) who stated that this was done to gain

credibility and build upon the foundations of the success of Bundesbank with the framework. It is fair to say that monetary targeting as for its classical form is outdated in the current economic environment, but M3 monitoring is a useful component of many central banks around the world. Whether the importance of monetary aggregates is different in the case of the ECB stays unknown, but research suggests that it is not and the difference is only in communication.

1.1.2.3. Communication and transparency

Communication is a main part of the toolkit of every central bank and it will be later explained as one of the channel of the monetary transmission mechanism. At first role of the communication was often overlooked and not that strong for the public, with bond and trade markets reacting most promptly (J. Stein 1989). This however changed drastically in recent years, and we can see the great influence of central bank communication on the general economy and its expectations. We could see in the case of the ECB that communication played the most important aspect during the sovereign debt crisis and deflationary period. The power of communication helped the public to gain confidence which in the end pushed the economy from the zero-bound area. When we talk about communication in the ECB context the main tools for communications are monetary policy press conferences held by the president and vice president after every governing council meeting, and monthly bulletin with the latest information about monetary and economic development in the euro area. The main influence on the public going through press conference speeches, could be seen mainly in the after-crisis period and during the sovereign debt crisis when the frequency of these meetings was higher. But when we look at how the ECB approached communication closely to its start we can see that its communication was not that transparent and was without forward guidance. This caused some critique from academics and it became one of the points besides monetary targeting that was often shown as room for improvement (W. Buiter 1999). Although the transparency was not that high from the start, credibility was because the words that were said in the speeches were followed by the same actions. The information that was said was true and was not changed until at least two governing council meetings (C. Rosa,Verga 2005). We can see that the communication channel was relatively strong from the start but it became even more important when the crisis period approached. This can be best seen in works that tried to quantify ECB communication and found a direct influence of it on the economy (M. Picaut, Renault 2017), (H. Benani, et al 2020). Both works quantify

ECB communication and divide the form of communication into the three categories of dawn, neutral, or hawkish, and try to link them to the economic outcomes that they cause. Both studies have found a very strong link between public speeches on the economy and even can predict what the next speech will be based on the previous speech and economic outlook. The important part of the strength of the communication of ECB is forward guidance that was not present until 2013 when the sovereign debt crisis was already in motion and the threat of deflation unavoidable. The forward guidance was best demonstrated in 2015 when it had its target with the target being inflation around 2% and duration with no limit until the target is met. This sparked more confidence in the economy and the quantitative easing pushed the economy out of deflation. From that point on forward guidance stayed a useful part of the toolkit as it is in many other central banks around the world. Central bank transparency is another topic that is hard to correctly set in the current economy. We can certainly see a shift in the central bank transparency after the banks started using the inflation targeting framework, but still, transparency levels differ between these banks. High levels of transparency are often expected from independent institutions like central banks and even more so from the ECB which is the main bank for over twenty countries. As was mentioned ECB transparency from the start was under minor criticism but it later made up for it by using forward guidance and more openly talking its intentions forward, which tends to be enough in comparison with other central banks.

As for the content of this subchapter, we can see that the role of communication evolved, and ECB gained experience with controlling public expectations. However, no matter how good the communication of the central bank may be, it still mostly depends on the consumer. How and if he will consume the information that is made and what the public does with given information. Information access is better than in the past because of communication technologies. This can be seen mainly when we compare it with previously mentioned (J. Stein, 1989) where the people mostly interested in the decisions of central banks were bond marketers or stock traders, which they still definitely are, but the general public is more interested than it ever was.

1.1.3. ECB pre and post-crisis

Dividing this subchapter into two separate pre and post-crisis parts in our view is not that necessary because the short duration of ECB functioning before the crisis period was mostly tranquil. The start of the ECB in 1999 was taken as a success inflation and output gap were relatively stabilized and around the target. In 2003 we can see the second business

cycle of the euro zone with the bursting of the tech bubble which was caused by many technological startups going out of business. This for two years created a negative output gap but did not have a significant impact on inflation. Although no significant deflation threats were seen it is around this time that the inflation target is adjusted to be below but close to 2%. Another problem that the ECB had to deal with around this time was higher oil prices. Works like (L. Svennson, 2005), say that in times when oil prices are higher, they should be incorporated into the inflation forecasting frameworks and reaction functions. Oil prices can have a significant impact on the output gap and are often an extensive factor in rising inflation. This was worse given that the euro area and EU aren't producers of oil and all oil in the area is always imported. Crude oil prices however continued developing significantly until the financial crisis. The two-year minor recession ended at the end of 2005 and the euro area economy as the USA started to slowly overheat until the financial crisis at the end of 2008. This can be seen mainly in Figure 1 when there are constantly high levels of output gap of around 2% with the rise of inflation. This was happening despite the highest-ever policy rates which shows how the economy was overconfident which later drastically changed. During high prosperity before the crisis, many countries were accumulating high levels of private and public debt. In the case of private debt, it was countries like Ireland, Portugal, and Spain and in the latter, it was Greece and Italy.

This unsustainable economic expansion comes to an end in late 2008 with the default of the prevalent investment bank Lehman Brothers. The situation was made even worse when the FED refused to bail out the bank because of morality issues with the hazardous lending that they were practicing. This led to the domino effect in the US economy and quickly transferred to the other economies with the euro area being no exception. In the end, only a few banks in Germany collapsed but the crisis in the long run left the euro area economy in worse shape than that of the USA. When the crisis broke out ECB was mainly focused on money and banking markets and tried to stabilize the economy (S. Fahr ,et al 2011). The recession caused by the financial crisis lasted till the second quarter of 2009 given the ECB data, which is very similar in comparison to the USA. But shortly after the ECB got a second hit in the form of a sovereign debt crisis which was set in motion by the crisis before mainly due to the mentioned public and private borrowing of some countries. This sovereign crisis created a double-dip recession in 2012 mainly due to new banking regulations imposed after the financial crisis (P. Hartmann, Smets 2018). The reforms lowered economic confidence and made access to liquidity harder which made the debt crisis worse. When the sovereign crisis broke out ECB responded promptly and started buying

bonds and trying to supply liquidity. This continued by lowering both their refinancing rate and demands for collateral and obligatory banking reserves. There were introduced new refinancing operations with longer-term horizons and refinancing operations with very long-term horizons. During the severe debt crisis, the ECB started to notice that countries were responding to its policy homogenously and channels of transmission mechanism started to be weaker mainly channels of interest rate and credit. This was followed by the introduction of outright monetary transactions in 2012 which should serve to purchase sovereign bonds on the secondary market. The main refinancing rate was pushed near to the zero bound at a level of 0.25% and the deposit facility rate hit the zero bound for the first time in 2012. ECB for the first time could see imperfections in euro area creation like a missing banking union with shared deposit insurance which caused liquidity to travel to countries where the public confidence was bigger like Germany thus worsening the position of crisis countries. However, the ECB reacted promptly, and with the reform for banking unions in 2012 added for the first time banking insurance with single supervision and resolution. Even though the great struggle of the ECB to maintain liquidity in the euro and prevent any further defaults and accumulation of debt rose to 90% in 2013 which was 25% more than in 2008. When the ECB Started to see that the conventional tools of a central bank that were tired so far were not working, a door opened to unconventional tools like quantitative easing, forward guidance, and negative interest rates. In 2013 forward guidance was first used to inform the public that the interest rates would stay low. In 2013 was clear that the interest rate channel was not working and the euro started to gain strong exchange rates. Before starting with quantitative easing ECB first used negative interest rates in 2014 on its deposit facility rate at -0.02%. The possible intention behind this was to make banks pull out money from the ECB and use it or store it in a less secure environment. From Figure 1, we can see that until now nothing has pushed the confidence of the euro area and the situation was getting progressively worse mainly with the economy pushed into slight deflation. This may be a reason why the ECB in 2015 decided to start a quantitative easing program called the Asset Purchase Program. The program was progressively broadened but started at 60 billion euros monthly. In 2016 both negative interest rates on deposits and the APP program pushed even further with interest rates hitting -0.04% and quantitative easing broadened to 80 billion monthly and extended to 2017. We can see that these programs managed to push the economy from the worse and gain a positive output gap. The APP program was extended multiple times ending in August 2018 with 15 billion monthly.

The quantitative easing era of the ECB is often a popular topic among research

mainly due to the question of how much share it has in pushing the economy from deflation and stagnation. The result is palpable, ECB managed to bring the euro area back to prosperity with multiple tools mainly due to its great communication and prompt responses to economic development. The joy of the triumph was short and in the first quarter of the 2020 COVID-19 pandemic came and with it new challenges for the ECB. The pandemic brought with itself the demand and supply shock which seriously stunted and reversed the growth of the economies around the world. At first, the ECB tried to boost confidence with expansionary monetary policy and issued special pandemic emergency purchase program bonds PEPP also known as corona bonds. These bonds were designed to help governments to gain liquidity at lower interest rates. However, the ECB was hesitant with this move in the beginning with some academics criticizing it for it as K. Bernoth, Dany-Knedlik and Gibert (2020). The bonds were mainly issued because traditional tools did not function properly. Besides PEPP we could see an extension of TLTROS which was partially changed to be more suited for the current situation. The role of these bond programs has proven to be significant and without them, the economic recovery would not have been that quick and significant (J. Nelimarkka, Laine 2021). The upcoming inflation was not present from the beginning with some academics like G. Claeys (2020) worrying about the possibility that the inflation will be artificially caused by the ECB to help governments repay their debts. This was however in his words unlikely and the inflation that followed the pandemic was mainly caused by excess spending by governments to boost demand and by rising energy prices caused by the war in Ukraine at the start of 2021 (H. Herr, Nettekoven 2022). The influence of communication during the pandemic period has been unchanged, with the pandemic gaining the main spot among the topics (L. Alferi, et al 2022). The inflation in the euro area reached its peak in October 2022 and at the time of writing this final thesis, it is quickly stabilising.

1.2. Slovakia and EMU

Slovakia was not one of the first founding fathers of the euro area but was one of the newcomers in 2009. The initial prospects for joining were to have stable inflation and exchange rates for more sustained economic growth. Research from the National Bank of Slovakia provides great coverage from the process of joining until the pandemic crisis. The initial adoption of the euro was accompanied by financial recession. For this reason, the demand decreased due to worldwide demand decrease and higher exchange rate appreciation of the euro (T. Latinsky, 2010). This decreased output after the adoption of the euro due to lower exports. Economists at the time were sure that this decrease was only temporary and

would be mitigated after the end of recessions. This was supported by the research on business cycle synchronization with the rest of the euro area. The research from M. Benčik (2011) found that the countries of V4 are becoming more correlated with the rest of the EU. And the adoption of the euro would put Slovakia in a better spot for faster correlation. Despite this, the research found that the Slovakia is least correlated country from V4 countires and with the rest of the euro area with the costs of membership in monetary unions may be initially higher. The inflation drives in Slovakia after the adoption of the euro were more supply-side driven (M. Alexova, 2012). One of the most significant drivers of inflation was wage pressures. However, the overall inflation volatility after the adoption of the euro was considered lower and should stabilize more with time. The impact of quantitative easing was present in the Slovak economy with boosting borrowing of households and economic sentiment A. Lojschova (2017). This study not only found out that the quantitative easing had positive effects on borrowing but also that the lending channel is prominent and functional in Slovakia. The unconventional monetary policy of the ECB seems to be effective in Slovakia not only with quantitative easing but with targeted long-term refining operations too. Their impact was monitored in a study by J. Falath et al (2023) which concludes that the program boosted loans to households and nonfinancial corporations. So far from empirical evidence, we can conclude that the presence of Slovakia in EMU was beneficial but did not use its full potential due to two crises that accompanied it.

1.3. Core and periphery dynamics

Dividing countries in a monetary union into groups based on economic performance has been here for a long time. We can see that some countries tend to benefit more than others from shared currency. The same categorization has been present from the beginning of EMU with some researchers as P. De Gravue and Mongelli (2005) saying that countries such as Spain are not sufficiently prepared to join. The main source premise was that these specific countries need special policy conditions otherwise they will slowly degrade in the union. These worries were considered to be unjustified initially for some time due to the high performance of the whole euro area before the crises. However, when the financial and then sovereign debt crisis came pessimism arose again. S. Skaperdas (2011) blamed the current situation with countries like Spain, Greece, and Ireland on insufficient initial economic integration before joining the EMU. With time most of the blame was transferred to providing liquidity to the affected countries and their conditions that were considered too harsh and were labelled as austerity. From the theoretical perspective, the problems of

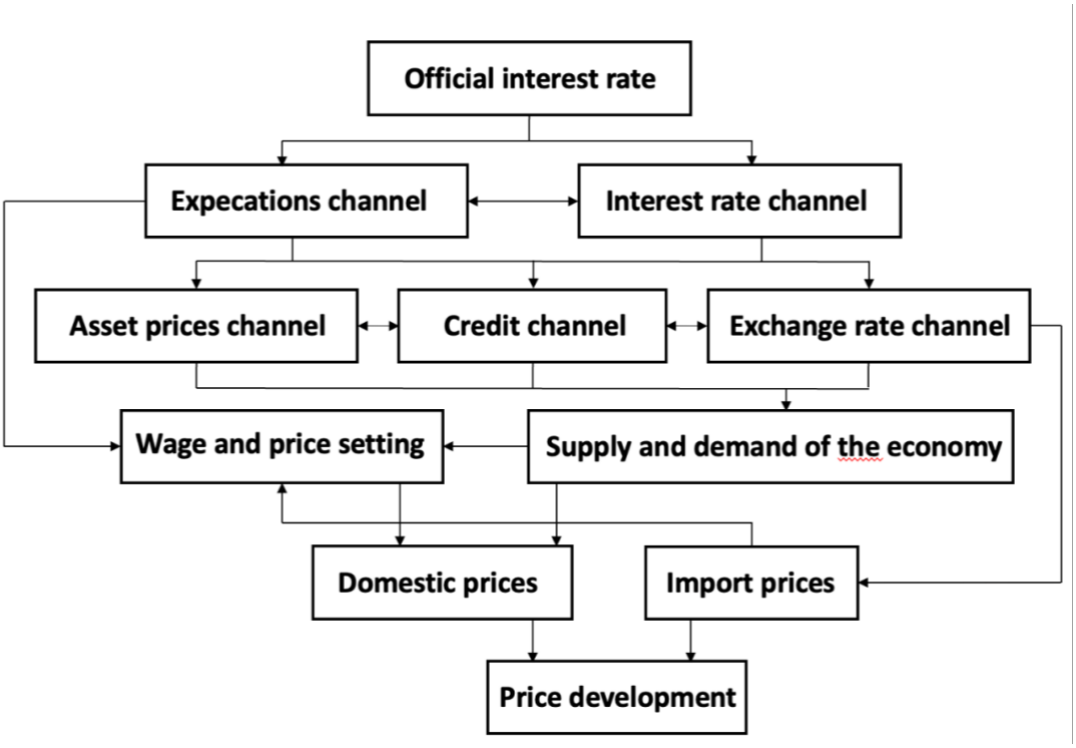
peripheral countries were not entirely caused by membership in EMU but by the austerity policies and bad public spending before the crisis. This gave rise to a new wave of research about core and periphery dynamics that is not blaming EMU but rather the governments of individual countries and austerity policies like N. Dooley (2019) and P. De Grawe and Yuemei (2018). This new wave of research is aimed at an argument that every country may transfer from the periphery to the core and vice versa and is rejecting the beggar thy neighbour stigma that was created during a sovereign debt crisis. The potential for high performance is due to the shared monetary policy available to most of the countries and its usage lies only in the hands of each government. This work uses using categorization of core and peripheral countries based on the work of N. Campos and Machaielli (2021).

1.4. Monetary transmission mechanism and its channels

The theoretical foundations of the monetary transmission mechanism from now as MTM are the core of our understanding of the effects of monetary policy on the economy. It is too core of this final thesis so in this chapter considerable attention will be given to the topic. The theory of monetary transmission mechanism came to a great distance in its development with economic schools moulding its shape. At first, we could see neo-Keynesians explaining MTM with the use of interest rate channels and consumption channels, mainly referring to the demand side of the economy. The exchange rate channel was too part of their explanation but at this time we cannot talk about a complex scheme of MTM as we know it today. It was soon clear that interest rate channels and exchange rate channels on their own could not explain all the effects of the economy, because inflation was still hard to manage. The innovations in the financial sector that will be later explained in more detail in the credit channel subchapter brought more complexity to the transmission process (J. Bolvin, Kiley, Mishkin, 2010). The classical neo-Keynesian channels expected that the financial markets were perfect which became over time further from reality. Because of this credit channel and asset channels were created and their special subchannels as bank lending channels and broad money channels. But still with this progress Alan Greenspan in his testimony before Congress in 1994 talked about MTM as a “black box” in which transmission to the real economy is still to some degree hard to explain. His words are justified because of always changing economic conditions, but we cannot undermine research and knowledge that was gathered to this day about the topic. We are consistently moving more from a black box towards a more understood and predictable transmission process. This can be seen in literature where is mainly used some form of VAR model that

is capable of showing the impact of interest rate on economic variable of interest. From this, we can estimate to what degree and time monetary policy will affect the real economy. This can be seen in works that shaped the theoretical skeleton of this chapter mainly B. Égert and MacDonald (2009), (F. Coricelli, Égert, MacDonald, 2006), and (J. Bolvin, Kiley, Mishkin, 2010).

Figure 2: Structure of monetary transmission mechanism



Source: G. Strasser (2018)

The representation of the current transmission mechanism of ECB can be seen in Figure 2 above. It is based on the figure from the seminal work of G. Strasser (2018), but the components were aggregated into specific channels of MTM. The transmission process starts with a change in the official policy rate that is transformed, through the main expectations channel and interest rate channel. As was mentioned above the role of interest rate channel was considered main from the start and has significant influence to this day. However, its place in the scheme can be debatable and it is possible to move it one step down next to other channels, leaving the expectations channel alone. The role of the expectations channel is undoubted and it is gaining more power when CB has an inflation-targeting mandate. The exchange rate channel is last from the original channels that were observed from the start and has often a lower impact in already developed economies. With the fact that the euro is the currency of the monetary union its impact becomes more diminished and

fractured through countries. However, it is still one of the main factors in shaping price development and maintaining the desired trade balance. The credit channel is often brought beside the interest rate channel as one of the most influential in MTM. It is used to control amounts of credit and liquidity in the economy which is progressively getting harder due to broader possible sources of credit in advanced economies. And lastly, the asset channel reflects developments in the prices of assets in the economy. Prices of equity-like houses and stocks became a large part of economies with asset bubbles threatening the stability of the markets. This was perhaps best shown during the financial crisis of 2008 which started in the overheated real estate market.

Through all these channels demand, supply, and wages are affected which results in the end in the movement of price level. It is in the best interest rate of each central bank to study this mechanism to get the best outlook of its reach on the economy and when and how to act in times when stimulation is needed. However, as was mentioned economy is always rapidly changing, and with the theoretical concept as broad as MTM which contains almost all aspects of the economy its form is never set in stone. In the upcoming subchapters, we are going to look at the theoretical foundations of each channel of MTM and its prominent subchannels.

1.4.1. Interest rate channel

The interest rate channel was and still is the main channel of MTM and the main tool of any central bank around the world. As was already mentioned it was the main point of focus in studying and understanding MTM from the start with many academics considering it as the most important channel (J. Taylor, 1995). However, it was clear from the start that the interest rate channel in the context of the ECB cannot explain MTM on its own (I. Angeloni et al, 2003). When we are evaluating its role in MTM we are usually looking at how commercial banks adjust their lending rates to the central bank interest hike. We can summarize transmission mechiams in interest rate channel with equation sowed bellow.

$$\uparrow \textit{CB rate} = \uparrow \textit{Lending rate}, \uparrow \textit{Interbank rate} \quad (1)$$

The increase in Central bank interest rate leads to increase in lending rates for general public and higher interbank interest rates. Higher lending rates of the commercial banks should slow the supply of liquidity to the economy thus slowing the rise of price levels and stopping the economy from overheating. If the reaction of commercial banks to the hike of

interest rates of CB is proportional or considerable, we can say that the interest rate channel is strong and has a high passthrough. The meaning of passthrough in the context of MTM is what portion of CB rate adjustment passes to the economy. Reasons for lower pass trough are many and are one of the main topics when it comes to the interest rate channel. The first possible cause of interest rate passthrough is that commercial banks have other sources of gaining credit besides CB, so they do not feel pressure to adjust their lending rates (R. Adams, Amel, 2005). Another reason can be that commercial banks do not adjust their rates because of menu cost and adjust their rates only when it is necessary but with a greater hike, thus in the end possibly eliminating passthrough (F. Coricelli, Égert, MacDonald, 2006). A big factor regarding interest rate passthrough is banks' portfolios. If the bank's liabilities are covered in the long run and bank will not adjust its rates promptly (M. Weth, 2002). This can be seen too in fact that the banks whose main income comes from deposits do not hike their rates severally and so often as lending banks (H. Sander, Kleimeier, 2004). The reasons for the interest rate passthrough are many but they are sharing common factor. It is that when the commercial bank has another source of liquidity and can gain a competitive advantage it will naturally do it. Hover research found that the differences between countries of EA are only minor when it comes to the short rate passthrough, the long rate passthrough was found to be slightly varying between countries (F. Coricelli, Égert, MacDonald, 2006). The reason for variance between long rate pass-throughs can be to some degree attributed to the information channel and situation in each economy. This homogeneity in short interest rate pass-through is mainly due to shared currency and conditions required to join the EU. But things have not been so certain from the start with academics like B. Mojon (2003) worrying about countries that had volatile interest rate hikes before like Spain will struggle to adjust. This is different when we look at the role of interest rate channels in emerging economies. Although the interest rate channel is still their main tool the pass tough was found to be smaller (N. Mehrotra, 2007). The strength of the interest rate channel seems to correlate with the level of transparency of the central bank as was found in (S. Papadomu, Sidirpoulos, Spyromitros, 2015). Another study supporting this claim says that the interest rate channel has more strength in inclusive and developed economies (G. Ndubuisi, 2014).

From this, we can conclude that the interest rate channel is the main channel in every economy with developing economies having a slight disadvantage in fully relying on it. From the correlation of transparency and strength of the channel, we can derive another positive claim for inflation targeting mandate and highlight the role of information in almost

every aspect of monetary policy. The interest rate channel is and will be at the forefront of MTM for some time, with its impact visible in both developed and developing economies.

1.4.2. Exchange rate channel

When it comes to the role of the exchange rate in the economy it is often used as a tool of CB to maintain stable trade accounts and mitigate large surpluses or deficits. It is important to control the exchange rate because of its direct effect on prices in the economy this however depends on how much does country imports. In our scheme, MTM is mainly affected by the interest rate channel and information channel. The modern understanding of the exchange rate channel is dividing it into two subchannels with them being the financial channel and the trade channel represented in equation bellow.

$$\uparrow \textit{CB rate} = \downarrow \textit{Trade channel}, \uparrow \textit{Financial channel} \quad (2)$$

The two channels are opposites of each other and prior serve to control the supply and credit hazard of domestic agents and later affect outside demand.

Trade channel explains the effects of depreciating a country's exchange rate to boost foreign demand for a country's goods and services. Through this method account balance can be achieved and goods and services become more competitive. However, this is not always the case and we can see some forms of passthrough as in interest rate channel. The first reason for the passthrough may be the fact that the passthrough is higher for country-specific goods and not for generic goods which are denominated in global prices (J. Kearns, Patel, 2016). The passthrough is also determined by the level of trade integration of a given economy, with more integrated economies having lower passthrough due to global value chains (C. Gust, Leduc, Vigfusson, 2010). Another cause of passthrough may be the size of the distribution sector in the economy, when the goods are repriced it may serve as a buffer for price hikes (M. Eichenbaum, Rebelo, Burstein, 2004). Interestingly services seem to react more promptly to the changes in the interest rates in the short run (D. Cole et al, 2016).

Financial channel on the other hand is focused on foreign supply and the ability of economic agents to borrow from abroad. With the depreciation of currency, the supply of possible loans is decreasing and it is harder to repay debts in foreign currency. This may raise problems when a lot of firms have their asset portfolio containing lots of liabilities in foreign currency which can raise credit risk if the depreciation is long-term. Depreciation of currency harms foreign investment so the countries can stunt their growth with it to some

degree (R. Banerjee, Hofmann, Mehrotra, 2020). CB needs to find the right trade-off between these two channels, because possible depreciation to stimulate net exports may be outweighed by strong financial channels thus causing recession and stunted growth (J. Kearns, Patel, 2016).

The exchange rate channel is very different in emerging economies and already developed ones. In emerging economies, we can see greater power of exchange rate channels mainly due to relatively small and open economies (C. Soto, Salaive, 2003). This is supported by literature like M. Kiriljenko (2003) and S. Mukhtarov et al (2019) which later showed that the exchange rate in Azerbaijan is a viable and useful tool to stimulate account balance. Already developed economies cannot affect their markets with exchange rates as emerging economies but they do usually not face volatile exchange rates. The stable exchange rates are often one of the main arguments for joining a monetary union as in the case of EA. This can sometimes cause problems mainly when it comes to account balance or when the interest rate is not sufficiently functioning for example in a liquidity trap. In the case of Japan and EA exchange rate has proven insufficient in pushing it out of the liquidity trap and quantitative easing had more weight in this situation (J. Nagayasu, 2007), (M. Cecioni, 2018). J. Nagaysu (2007) claims that for the exchange rate to sufficiently affect the real economy international cooperation of CBs would be necessary. Communication plays an important role in this case too with the ECB having only to say their intentions and the exchange rate would react though only for a short time (M. Fratzscher, 2008). The importance of an exchange rate channel is like in the case of an interest rate channel permanent for any CB, but its viability drastically depends on the largeness and openness of an economy. The already emerged economies seem to have quite a disadvantage when it comes to the exchange rate channel, but this can be offset by better control of interest rate passthrough than emerging economies as could be seen in the previous chapter.

1.4.3. Credit channel

The branch of credit channel is one of the newer ones that were established by B. Bernake and Blinder (1988) as a way to better explain MTM because the traditional interest rate channel and exchange rate channel were not sufficient anymore. Sources of the changes can be assigned to the innovations in financial markets with liberation and democratization of credit (J. Bolvin, Kiley, Mishkin, 2010). The representation of functioning of credit channel is showed bellow.

$$\uparrow \textit{CB rate} = \downarrow \textit{Loans to households}, \downarrow \textit{Loans to Non-Fin} \quad (3)$$

The credit channel functions mainly based on the interest rate channel with its main power deriving from banks' willingness to lend. With interest rate channel plays a first part and setting interest rates higher and the credit channel explains how much credit is issued. When the interest rate passthrough is high and the hikes of the CB interest rates are reflected in the lending rates the supply of credit is decreased to the economy. For this to function properly we must assume that most of the economic agents have limited or no sources of substitution of CB credit (F. Coricelli, Égert, MacDonald, 2006). This is however becoming with time further from reality due to the size and openness of the financial markets around the world. This is the reason for splitting the credit channel into two main subchannels the bank lending channel and the broad credit channel.

The bank lending channel functions as the main and most reliable part of the credit channel. The process of its functioning is the same as explained above with commercial banks reacting to the CB interest rate hike by contracting credit supply to the economic agents. This is mainly done by the raising main interest rate in the country, obligatory reserves did not prove significant in the inflation targeting frameworks (B. Égert, MacDonald (2009). But as can be expected same thing that was the problem with the interest rate channel is the problem for a channel that is amplifying it. We often can see heterogeneity among the banks and their reaction to credit channels due to passthrough. This is mainly due to banks wanting to gain a competitive edge and exploit their favorable position if they have them. This can be done in multiple ways, but they are the same in the fact that the banks are using other sources of credit than the CB. We can see this in banking alliances in larger economies like Germany or Finland where banks together can offset monetary tightening (O. Hulsewig, Winker, Worms, 2004). The high degree of capitalization in the banking sector has similar effects too, because banks do not feel the need to react promptly to the changes (R. Adams, Amel, 2005), (L. Gambacorta, Mistrulli, 2004) (L. Gambacorta, Maques-Ibanez, 2011). With the size of the banking sector, it is expected that the smaller banks are slowly acquired by the bigger banks which as was mentioned are usually shielded from the tightening (A. Kaketsis, Sarantis, 2006). Despite many possible reasons for the passthrough in bank lending channel remains one of the most influential for CB to control credit and liquidity in the economy. M. Ciccarelli, Madaloni and Peydró (2015) pointed out that if neutralized bank lending channel reach of the central bank on RGDP would fall by

about 35%-40%. Another fact that his study revealed is that EA may have a better-functioning credit channel than the USA.

The second biggest part of the credit channel is the broad credit channel which can be explained as all credit circulating through the economy. The theory of this channel is that in addition to the CB as the source of credit, there are added exogenous sources of credit. This subchannel however still maintained to some degree "black box" nature. It is hard for CB to distinguish how it will react to the stimulation and often it tends to have low values of passthrough. It is usually monitored by M3 or M4 monetary aggregates which tend not to respond to the monetary tightening the same way that M2 and M1 aggregates do. This is as expected amplified by the largeness and openness of the economy, with bigger economies having a larger pool of possible choices of credit that are not in reach of the central bank. When it comes to the power of credit channels in emerging and emerging markets it tends to be relatively the same highly depending on the development of the banking system of countries. Emerging markets have limited sources of credit with CB being the main option as is in the case of India (S. Bhaumik, Dang, Kutan, 2011). The credit channel is a viable and useful amplification of the interest rate channel and with the progressive growth of financial markets and types of assets, it will only with time become more prevalent.

1.4.4. Asset price channel

The asset price channel is sometimes subsumed underneath the credit channel, but in modern MTM schemes, it is more often explained as an independent channel. This channel helps us better understand the results of the interest rate channel and credit channel and shows us how these two channels affect the real sector and prices of assets. The theory is that economic agents with excess liquidity or due to accessible credit through credit channels are capable of investing some portion of their credit into equity (B. Égert, MacDonald (2009). This can lead to output growth and the creation of more investments domestic or foreign. The asset price channel functions through two main subchannels the wealth channel and Tobin's q channel with the first being more important. The functioning of channel can be seen in equation 3 bellow.

$$\uparrow \textit{CB rate} = \downarrow \textit{Real estate prices}, \downarrow \textit{Share prices}, \downarrow \textit{Wealth channel} \quad (4)$$

Wealth channels function on the theory that the rise in the price of assets due to monetary easing or other exogenous factors can raise the wealth of the economic agent and thus boost his consumption or investments. We can see this with house prices and stock

prices in households and firms alike. However, it is important that the rise in the asset price is not short-term and the economy is not going through a volatile period (F. Altissimo et al, 2005). The rise in consumption and investment is always positive but is heterogeneous among the countries and the main increase in wealth is often only in the households with higher income brackets (C. De Luigi et al, 2023).

When it comes to Tobin's q channel is based on an indicator introduced by Nicolas Kaldor in 1966 which is calculated by dividing a firm's market asset evaluation by the replacement cost of its assets. If Tobin's q is larger than one the firm is overvalued and thus is attracting larger investments to its shares. With investments from the economic agents, it can make investments of her own thus expanding even more and creating a growth cycle. For this to happen it is however expected that the monetary easing will affect the prices of shares positively. Which usually is not a problem and stock markets are often prone to react to interest adjustments and information available about them. Tobin's q can be used with housing prices too. When the price of the house is higher than the cost of rebuilding it, economic agents have more incentives towards new investments in real estate. This cannot be only due to economic agents wanting real estate for their own, but it is often due to the opportunity to invest their money towers profitable equity. This creates again cycle that generates consumption and investments in the economy. This cycle can often get out of hand and end up in asset price bubbles which can lead to severe damage to the economy. As was the case with the recession in 2000 caused by overvalued stock prices and already mentioned recession in 2008 due to the real estate bubble. Managing asset price bubbles is an important part of the role of the central bank and good knowledge about the asset price channel can make it easier. However, the debate about whether CB should react to asset price baubles seems to be closed. CB should react to price bubbles only if price bubbles are visible and it should be an ad hoc reaction and not a long-term targeted variable (F. Mishkin, 2001). Incorporating asset prices as a targeted variable would put CB in a weak position because these prices are often shaped by forces outside of CB's reach.

When we look at asset price channels in emerging countries we can see often a strong influence of asset prices on real economies. This can be due to the smaller size of economies with changes in the prices of assets having a larger influence. S. Shah et al (2015) found out that the asset price channel has similar relationships as in developed economies with interest rate lowering leading to higher stock and housing prices. However, an important point from his work is that emerging economies tend to suffer higher volatility due to exogenous factors such as war, terror, and political instability. Due to these factors, it is difficult sometimes to

clearly distinguish what source of asset price movement. Individual studies can shed more light on this problem with T. Mukhtar and Johunas (2018) finding a strong link between share prices in Pakistan and their influence on the output of the economy and P. Adukunle et al (2018) finding that the asset price channel is the third strongest channel in Nigeria.

We can conclude that the asset price channel has at certain times great importance to the monetary policy evaluation. Keeping it as an independent channel of its own seems justified because the differences between it and a credit channel are notable. With financial and real estate markets steadily growing it seems that this channel too will gain more strength with time.

2. Aim of the Work, Methodology and Data

In this chapter, we are going to explain the aim of the work and questions that we want to answer and lay down our methodology. Our models will be in the leading subchapter discussed in greater detail. Another concern of this chapter is the explanation of the choice of our data and its transformation for linear time series modelling.

2.1. Aim of the work

After firmly setting the theoretical foundations of this final thesis we want to build upon them with our practical part of the work. We want to test the working of the monetary transmission mechanism in the euro area and see how different variables respond to interest rate hikes. The main questions can be summarized as this: (i) What are the strengths of different channels of monetary transmission mechanism? (ii) Are the strengths of the channels different in core countries and periphery counties? For the second questions we have decided to split our countries into core: Germany and Netherlands and periphery: Spain and Italy with addition of Slovakia as home country.

2.2. Data

Our choice of variables for benchmark models is based on previous studies that were concerned with monetary transmission mechanisms such as G. Peersman and Smets (2001), M. Kremer (2015), and A. Meinusch and Tillman (2016). The benchmark model includes RGDP, the HICPI index, the M3 monetary aggregate, the Marginal lending facility of the ECB as a reference rate, and the effective exchange rate for the euro. In our first model, we tried to experiment with including the output gap instead of RGDP but the performance of the model was not sufficient. The HICPI index was chosen due to working with the euro area in which this index is preferred and should reflect price levels more precisely. The inclusion of the M3 monetary aggregate was suggested by Peersman and Smets (2001) which shows that the benchmark model can benefit from its inclusion due to covering a larger part of the economy. Choice of reference rate is not essential because all of them usually move in the same direction except the deposit rate which is viable in different research contexts. The benchmark model ends with an effective exchange rate for the euro which is deprived of inflation and serves as an index of multiple exchange rates with different currencies. The effective exchange rate serves as a way to capture the exchange rate part of the monetary transmission mechanism. To observe individual monetary transmission channels we have

chosen two channel-specific variables. The chosen variables should reflect the influence of monetary shock in observed parts of the economy. The interest rate channel is presented with a lending rate which in our context is the average interest rate for which commercial banks are willing to lend to economic agents. With the lending rate, we were trying to collect data on loans that were longer than one year but shorter than five. The lending rate is accompanied by 90-day interbank interest rate for each country which should bring perspective from different sides of the lending spectrum. The credit channel is represented in our work by the amount of lending granted to households and nonfinancial corporations. An aspect of credit channel however can be seen too in the benchmark model due to M3 inclusion. And lastly, the asset channel is represented by real estate prices and share prices in a given country.

Due to a wider range of countries and a large variable pool, the data collection process was more difficult forcing us to make a trade-off between data length and number of variables. We aimed to capture the MTM of countries that first joined the eurozone in a period of 1999-Q1 to 2019-Q4 right before the covid pandemic started. The period was changed from 2003-Q1 to 2019-Q4 after having difficulties finding sufficient data due to submodel variables. This places us on the edge of what is possible with VAR models and restricts us to observing only one channel-specific variable at a time. In the case of Slovakia which joined the eurozone in 2009-Q1, we are forced to work with this start of observation and extended the observation period to 2023-Q3. This makes the Slovak results harder to compare with the rest but it is the only way to include Slovakia as the home country in this thesis. Observation in this period however enables us to see what dynamics were at play after the COVID-19 pandemic.

The transformation of data before modeling is one of the most important steps when working with VAR models. To accomplish relatively the same input shape of the data we first seasonally adjusted each time series by removing its seasonal trend. After that, we transformed the time series into a logarithm and took the first difference of it. All the time series have been then tested trough Augmented Dickey fuller test to see if the data is stationary.

2.3. VAR model

We are using a standard reduced form of the VAR model with contemporary restrictions provided through the Cholesky decomposition method. The equations presented in the methodology are based on Hamilton (2020). This method was first popularized by C. Sims (1980) and has become a signature model in econometric analysis. The model can

include several variables and find underlying relationships between them. Its main usage in this work is to get theoretical impulse responses of variables. The impulse response will simulate the reaction of a given variable to positive monetary policy shock represented by the reference rate. The methodology of the VAR model starts with the presentation of its initial form which can be seen in Equation 1 below.

$$X_t = \phi X_{t-1} + B\varepsilon_t \tag{5}$$

*X i*s a vector of (*n x 1*) time series of dependent variables which are of interest in a given model. The autoregressive process can be seen in the first part of the model where the *X* consists of past lags of itself X_{t-1} with coefficients of ϕ which is in the form of (*n x n*) vector and stores dynamic processes of the model. The second part of the equation can be characterized as the impact part where the shocks are created through (*n x 1*) unobservable zero mean white noise process denoted by ε_t in combination with coefficient *B.* We can write this in a matrix which is shown in equation 2 below.

$$\begin{bmatrix} X_{1t} \\ X_{2t} \\ \vdots \\ X_{pt} \end{bmatrix} = \begin{bmatrix} \phi_{11} & \phi_{12} & \cdots & \phi_{1p} \\ \phi_{21} & \phi_{22} & \cdots & \phi_{2p} \\ & \vdots & & \\ \phi_{p1} & \phi_{p2} & \cdots & \phi_{pp} \end{bmatrix} \begin{bmatrix} X_{1t-1} \\ X_{2t-1} \\ \vdots \\ X_{pt-1} \end{bmatrix} + \begin{bmatrix} b_{11} & b_{12} & \cdots & b_{1p} \\ b_{21} & b_{22} & \cdots & b_{2p} \\ & \vdots & & \\ b_{p1} & b_{p2} & \cdots & b_{pp} \end{bmatrix} \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \vdots \\ \varepsilon_{pt} \end{bmatrix} \tag{6}$$

In matrix form it is better visible how all variables and their lags are dependent on each other. If we wanted not to impose any structure on our model and would not be interested in specific shocks of each variable, we would stop here. However, due to the stochastic and unobserved nature of ε_t we are unable to estimate coefficient *B*. This can be solved by reducing the whole impact side of the equation into one (*n x 1*) vector denoted u_t as can be seen in the equation below.

$$\begin{cases} u_{1t} = b_{11}\varepsilon_{1t} + b_{12}\varepsilon_{2t} \cdots + b_{pp}\varepsilon_{pt} \\ u_{2t} = b_{21}\varepsilon_{1t} + b_{22}\varepsilon_{2t} \cdots + b_{pp}\varepsilon_{pt} \\ \vdots \\ u_{pt} = b_{p1}\varepsilon_{1t} + b_{p2}\varepsilon_{2t} \cdots + b_{pp}\varepsilon_{pt} \end{cases} \tag{7}$$

Despite this solving our problem with an estimation of coefficient *B* and u_t.The coefficients will be estimated by the ordinary least square method and u_t will be considered as residuals. This creates reduced from the VAR model which can be seen in equation 4 below.

$$X_t = \phi X_{t-1} + u_t \tag{8}$$

If we wanted only to estimate this model for forecasts or other general uses without structure our methodology could end here. But we want to estimate theoretical impulse response functions thus we need to impose the structure of the model through restrictions. We have decided to use short-term restrictions based on economic knowledge that was commonly used in previous papers like G. Peersman and Smets (2001). We are going to reduce variables in matrix *B* with the method of Cholesky decomposition which can be seen below in equation 5.

$$B = \begin{bmatrix} b_{11} & 0 & 0 & 0 & 0 \\ b_{21} & b_{22} & 0 & 0 & 0 \\ b_{31} & b_{32} & b_{33} & 0 & 0 \\ b_{41} & b_{42} & b_{43} & b_{44} & 0 \\ b_{51} & b_{52} & b_{53} & b_{54} & b_{55} \end{bmatrix} \tag{9}$$

By this specification, we are estimating only one more parameter at a time and we are reducing the number of estimations from 25 to 15. The estimation starts with autoregressive lags of only one variable being denoted b_{11} and then progressively increase with more coefficients. The logic behind this restriction is that some variables do not affect each other in each period therefore their autoregressive lags are not present immediately in the estimation of parameters in matrix B. There were two main candidates among variables who might be chosen for initializing shock with them being inflation and RGDP. Due to more usage in research, we have chosen to use RGDP as the starter of this causal chain which is then followed by inflation and M3 aggregate. In the first place, we have decided to place our reference rate which is then followed by the effective exchange rate. This structure is economically reasonable because there is a lag before the reference rate can affect RGDP, inflation, and M3. These variables however can shape central bank response in each period and all variables are capable of causing movements in effective exchange rates.

Our selection of lags to include in each model was based on the Akaike information criterion. We have tried to limit number of lags to maximum 5 but preferably lower to reduce noise that the model may capture.

2.3.1. Extended model

For the evaluation of each transmission channel, we are using the concept of the extended VAR model. After tuning and estimating the benchmark model we can extend

several variables in the vector $X_t$to incorporate channel-specific time series. The extended model can be seen in Equation 6 below.

$$\begin{bmatrix} X_t \\ Z_t \end{bmatrix} = \begin{bmatrix} \phi X_{t-1} \\ \phi Z_{t-1} \end{bmatrix} \begin{bmatrix} X_{t-1} \\ Z_{t-1} \end{bmatrix} + \begin{bmatrix} u_{Xt} \\ u_{Zt} \end{bmatrix} \tag{10}$$

The endogenous vector of benchmark variables X_t is extended by a vector of channel-specific variables denoted by Z_t. However, we are assuming that these channel-specific variables do not impact benchmark variables in the first period therefore they are placed at the bottom of our restriction matrix. This way we can estimate theoretical impulse response function on variables that were not part of our initial model.

3. Results

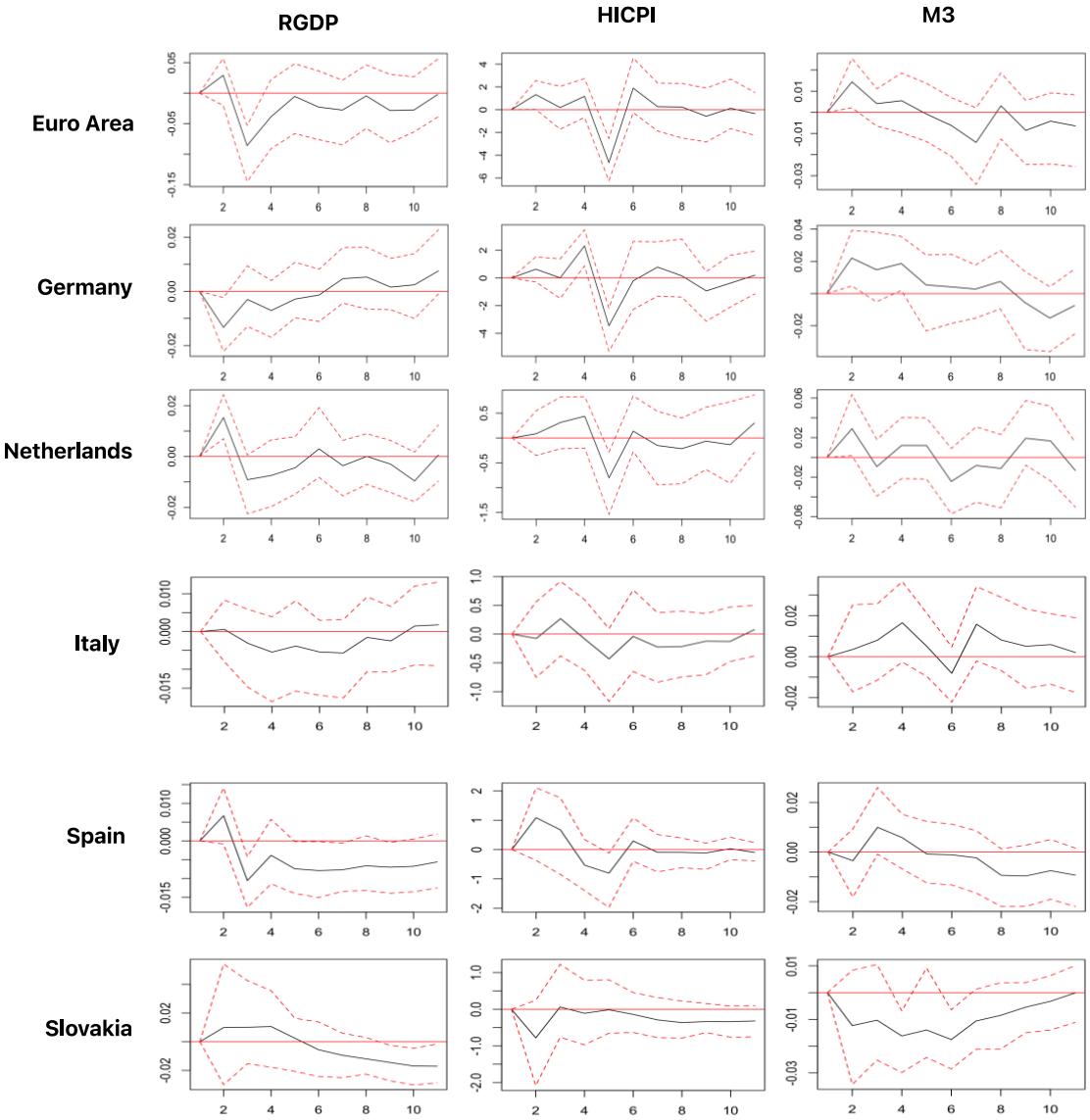
In this section, we are going to present results that were estimated by our models. We divided this chapter into subchapters based on results from each channel type. We have chosen to present our results in the form of graphs that contain theoretical impulse responses of the chosen variable to monetary policy shock. In the results for benchmark models, we're going to include the euro area and all other countries, however, the euro area is present only in this benchmark block due to the character of channel-specific variables. All countries are observed in the same periods starting 2003-Q1 to 2019-Q4 except Slovakia which is observed in the period 2009-Q1 to 2023-Q3.

3.1. Benchmark results

Our benchmark results can be seen below in the figure 3. We are focusing on three main parts of our benchmark model with them being RGDP, HICPI, and aggregate M3. The countries ordered from the euro are core to the euro area periphery to better see differences

that are associated with these groupings. Slovakia is last and associated with periphery countries because the observation period is different from the previous four countries.

Figure 3: Reaction of variables to the monetary policy shock



Source: Source of data: FRED and databases of individual countries

If we get a closer look at our results we can see great similarities and differences between them. Euro area observation which serves to aggregate all economies into one body is an indication strong reach of ECB monetary policy. We can see that the impact of monetary policy shock is visible in RGDP within the third quarter but not substantially to cause significant harm to output. However, when we look at inflation, we can see a significant shock to price levels after one year which is the strongest that was captured among the countries. That is then reduced and disappears as it was in the case of RGDP. In

the case of M3, we can see subtle increase at the end of the first quarter but from then we are unsure where what the actual values are. The interval bands and centre line indicate that the trend is decreasing and after a year and a half, most of the predictions lie below zero.

In the observations of Germany, we can see one of the main representatives of the euro is the core. The reaction of its RGDP to the monetary tightening is minimal but still negative, which is for the decreasing of the output gap optimal. The effect is then reduced and at the end of the graph catches some noise. The inflation is affected as was expected significantly with price levels dropping in the third quarter as was the case for the whole euro area, with another slight decrease in the tolerance band around two years. In the M3 we can see a slight increase which is greater than was in the case of the euro area but from then response comes back to be around zero till the end of the graph.

We can see kind of an odd sighting in the response of Netherlands RGDP. The graph begins with a minor positive spike which is then followed by a decrease in the interval trend around the third quarter. It seems that in the case of Netherlands, the monetary policy lag is larger therefore the first spike might be a price puzzle that was not mitigated by the model structure. Reaction of inflation is negative around the third quarter with a weaker impact than Germany or the euro area. The impact is however still more significant than upcoming periphery countries. M3 has a similar behaviour as in the case of Germany however we cannot see any significant decrease in interval bounds and the whole response could be around zero.

With observations of Italy, we are transitioning into periphery countries. The whole impact on the RGDP of Italy is uncertain with interval bands being broadly spaced around zero. However, we can see that the first part of the graph has most of its possibilities below zero so we can assume that this is the impact of ECB and after seventh quarter its diminishing. In the case of inflation, the impact is more visible with the main impact coming similarly as in core countries after one year. Despite this the impact is not clear and interval bands are between zero, and the range of predictions on the x-axis is smaller than in previous observations. The first noticeable difference between core and periphery countries can be seen in response to the M3 aggregate which tends to react more to monetary tightening. Despite the predictions being uncertain we can see a clear trend of interval bounds decreasing after a year and a half. In the case of Spain, we can see quite a large decrease in RGDP in the third quarter similar to core countries. Response of inflation to rate hike is in the case of Spain is better with a clear negative reaction with possible significant decrease. In the case of M3, we can see an initial rise in the first quarter which is then followed by a downtrend

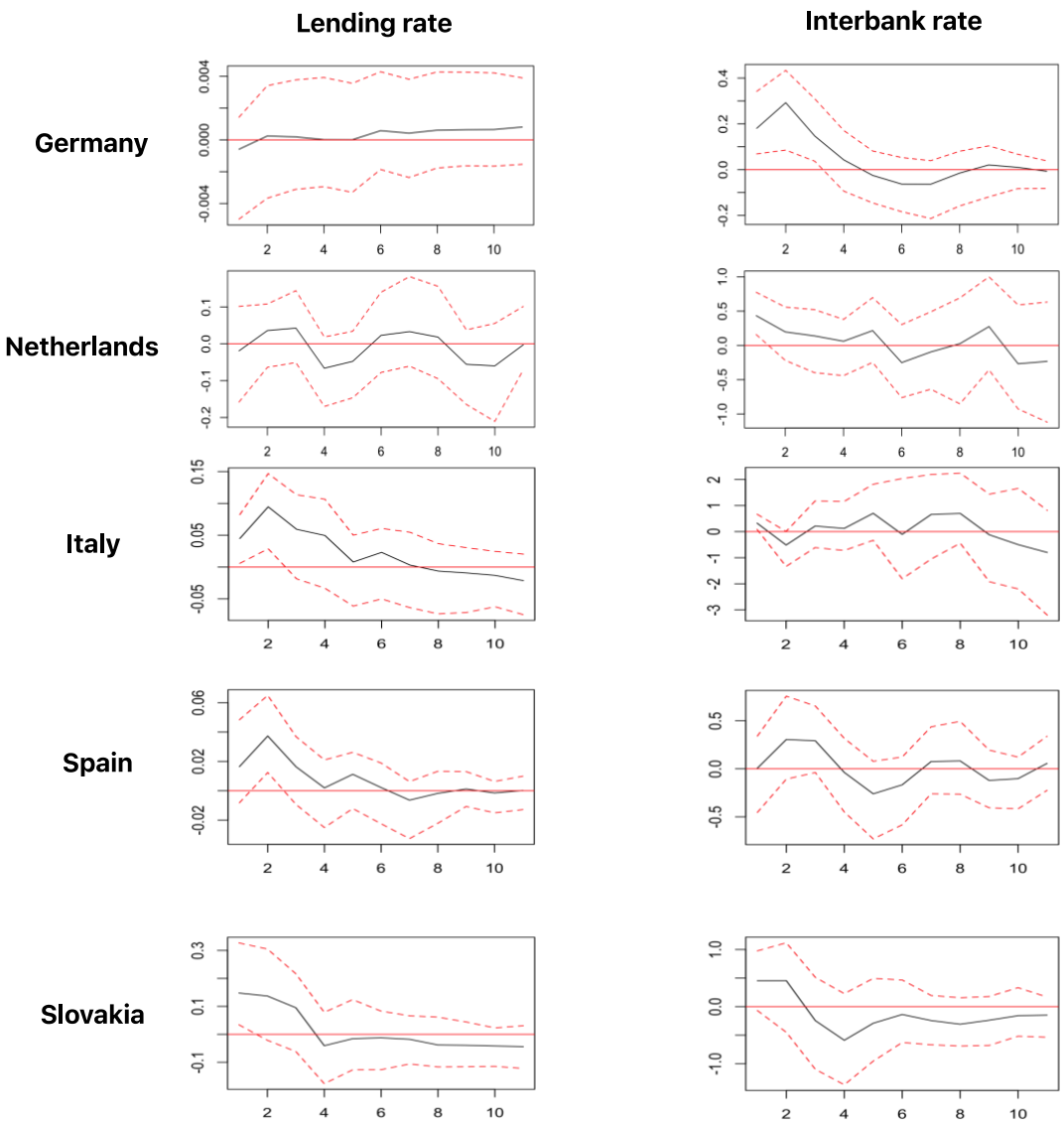
till the end of the graph.

Benchmark observation ends with Slovakia which is estimated in different period. The reaction of RGDP is largely uncertain with the decreasing trend till the end of the graph. The reaction to inflation is slightly better captured but too uncertain. Due to most predictions lying below zero in the first quarters, we can assume that the transmission lag is lower than in previous observations. In the case of M3, we can see a decrease from the start with two points of decrease that we are sure of, with the end of the shock coming after a year and a half.

3.2. Interest rate channel results

In this section, we are going to present our results from the extended model after including interest rate-specific variables. The results can be seen in Figure 4 below.

Figure 4: Reaction of interest rate variables to the monetary policy shock



Source of data: FRED and databases of individual countries

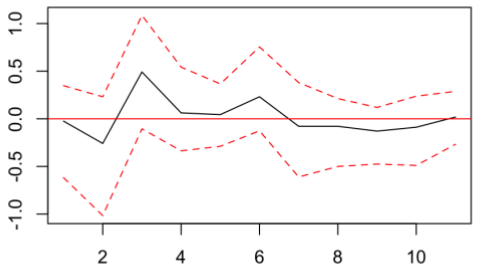
Starting with Germany we can see that there is almost no effect on lending rates with interval bands being unable to capture the trend during the whole time. The interbank rate is however clearly positively reacting to the interest rate hike with the reaction lasting around one year. In the case of the Netherlands, we are again unsure about the specified reaction of the lending rate. The intervals indicate an initial rise of predictions about the zero but that is not enough to conclude. Interbank rates are reacting more clearly with the rise from the first quarter which is shorter but more significant than in the case of Germany. In periphery countries, however, we see again differences in contrast to their core counterparts. In the case of Italy, we are seeing an initial rise in the lending rate that lasts half a year. Interbank rates have reacted as in the case of Netherlands with them rising similarly at the start but then keeping most of the predictions above zero which may indicate that the lending rate has

been elevated for some time. Spain is having a similar increase in the lending rate from the first quarter that lasts only half a year and then diminishes. In the case of interbank rates the interval bands are most of the time between zero, but we can assume that the main rate rise happens around the third quarter which little bit later than in other countries. Despite being estimated in different observation periods Slovakia has still similar reactions to other periphery countries. The lending rate rises in the first quarter, however, goes back to normal after the second quarter. The reaction of interbank rates is short but its significance as in response of Netherlands.

3.3. Exchange rate channel results

In this section, we are going to briefly show the response of the exchange rate to the monetary tightening that we have got from the benchmark model for euro area. The response is visible in the figure below.

Figure 5: Reaction of exchange rate to the monetary policy shock



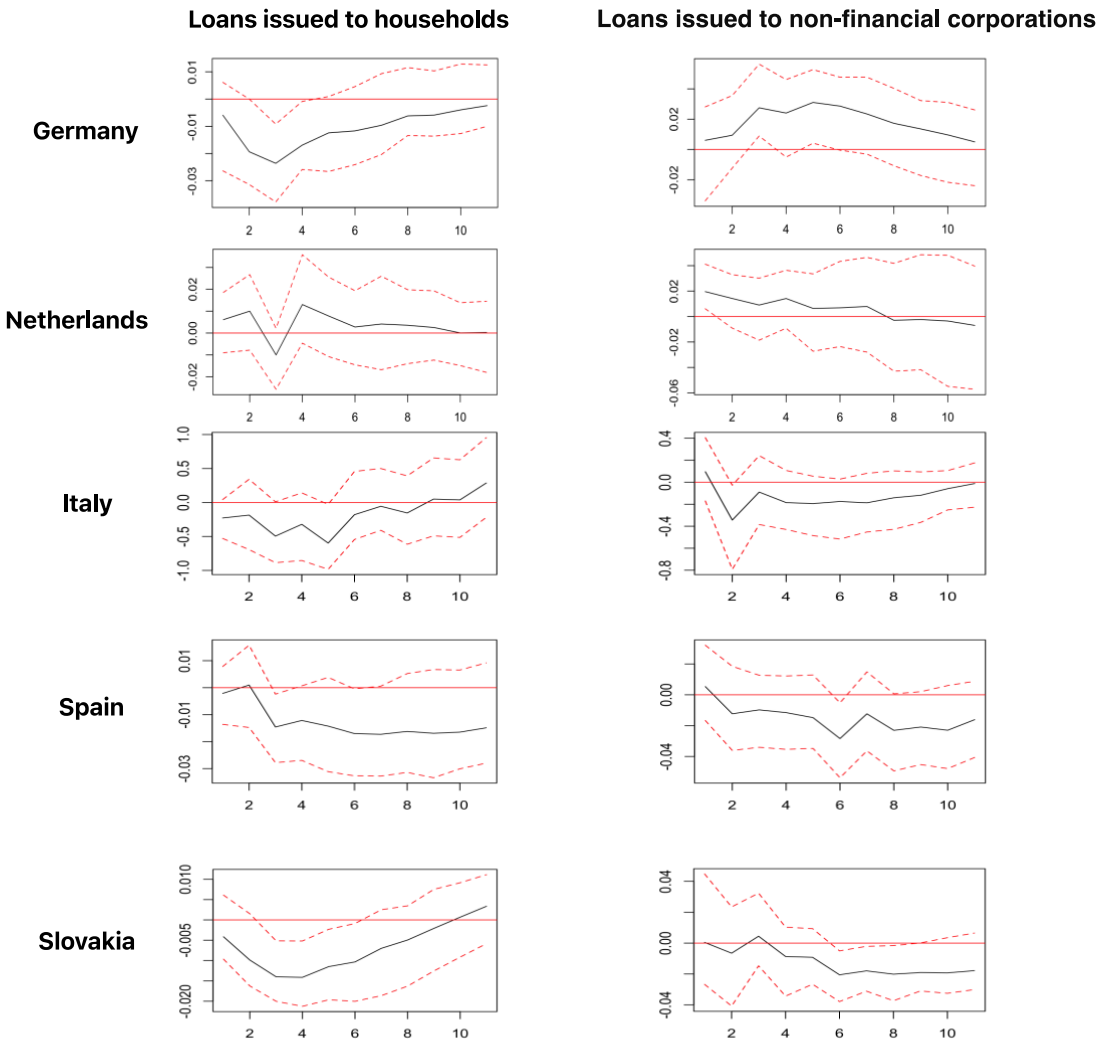
Source of data: ECB database

The main appreciation of the exchange rate seems to happen during the third quarter. However, response is not clear but the majority of predictions are lying above zero. This spike is then quickly mitigated, and the shock disappears.

3.4. Credit channel results

In this section, we are going to present results from our extended models with credit channel variables namely the number of loans issued to households and non-financial corporations.

Figure 6: Reaction of credit channel variables to the monetary policy shock



Source of data: FRED and databases of individual countries

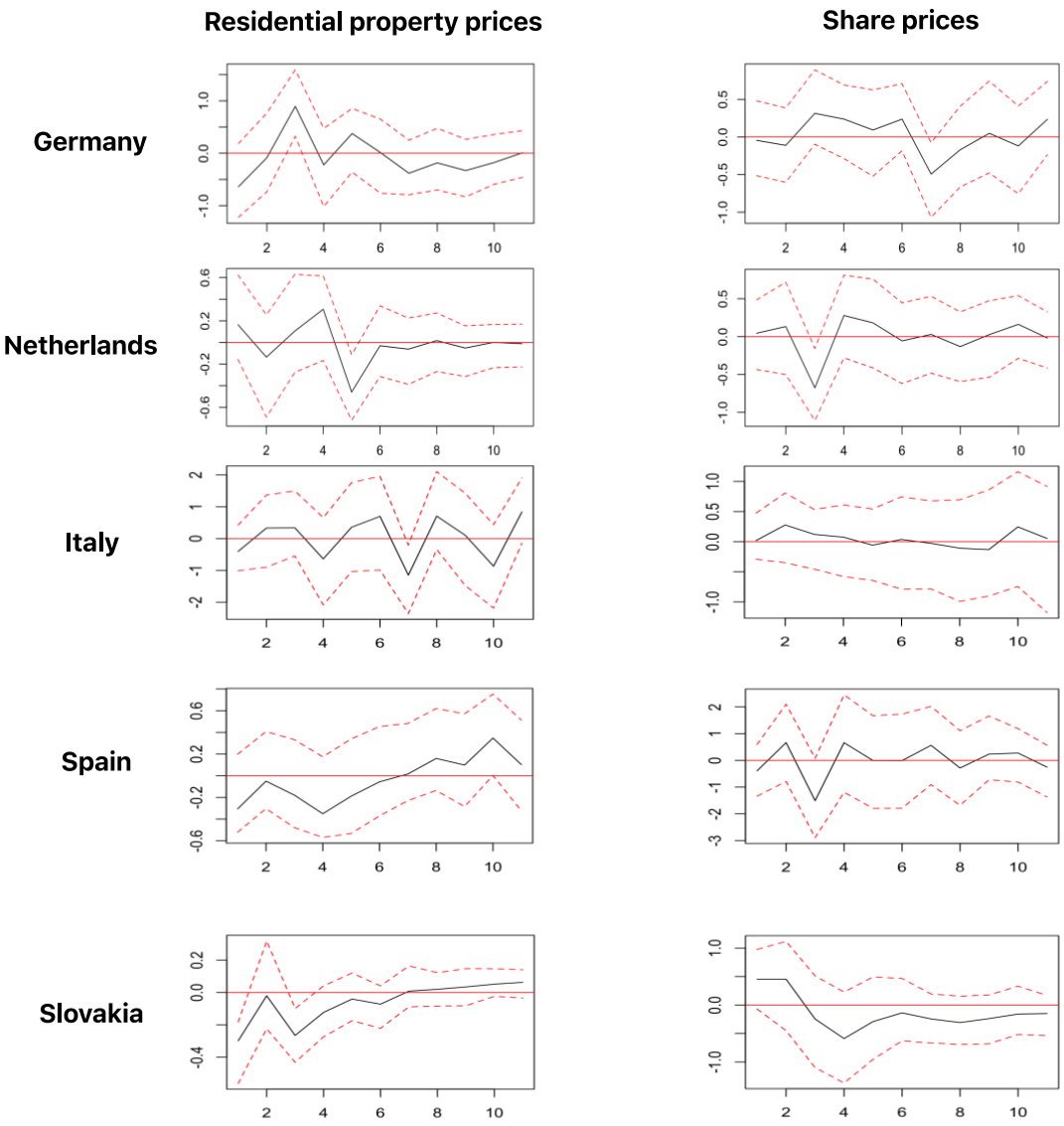
We can see a decrease in issued loans to households in Germany around the third quarter however from there they are stabilizing. In the nonfinancial ones, we see again a sign that is typical for core countries and that is that the interest rate hike has a positive or no influence on them. The number of loans rises in the third quarter after the hike but the rise is not significant. In the case of Netherlands, household loans decrease in interval bands, but the intervals are still between zero. But from the fact that most predictions are below we can assume that the main effect is there. In the case of nonfinancial loans, we can, an see initial total rise that ends in the second quarter not because of a decrease but because of a wide interval. In the periphery countries we can similar decreases in the loans issued to households, however, the nonfinancial loans are decreasing too. In Italy, the decrease in household loans is the most significant among all countries lasting from the second to the

fifth quarter. In the non-financial loans, we see a clear contraction in second quarter from where most of the predictions stay below zero. In the case of Spain, the decrease in household loans is not that severe with only a clear drop being visible in the third quarter with the majority of predictions being below zero. The loans to nonfinancial corporations show a clear decrease after the year and a half but they are too most of the time below. Loans issued to households in Slovakia show contraction with the lowest t point being after one year and from them, the reaction is stabilizing. In the case of nonfinancial loans, the start of the reaction is vague with the contraction visible after a year and a half as it was with Spain.

3.5. Asset channel results

In this subchapter are shown results from our extended model with the inclusion of asset channel-specific variables. We have chosen the main pillars of assets in every economy with them residential property prices and share prices. Results can be seen in the figure below.

Figure 7: Reaction of asset channel variables to the monetary policy shock



Source of data: FRED and databases of individual countries

Starting results for Germany we can see other behaviour in our model when it comes to real estate prices. The prices of these assets tend to rise in the third quarter, but the elevation ends suddenly, and the reaction disappears. This reaction may be a price puzzle where the trend of increasing prices before the tightening still captured at the start of the reaction. Despite this possibility, there is no significant contraction after. In the share prices, we can see a decrease in their price after a year and a half making Germany the country with the longest reaction lag. Real estate prices in the Netherlands seem to decrease after a year and one quarter and then shortly rise towards zero. The reaction of Dutch share prices to interest rate hikes is similar to Germany but happens more quickly in the third quarter. We can see the sharpest contraction in real estate prices in the case of Italy where in the sixth quarter prices drop significantly. However, our model was unable to find any noticeable

reaction to Italy's share prices. In the case of Spain real estate prices do not react any defiantly. The different picture is visible in reaction of share prices. The share prices tend to significantly decrease in the third quarter and then quickly stabilize. Real estate prices in Slovakia tend to drop right after the interest rate hike. The duration of the contraction seems to be around one year. Based on intervals that are visible in response to share prices we can see a slight increase after monetary tightening which is then followed by a downward trend.

4. Discussion

In this section, we are going to analyze our results with the incorporation of theory and try to assume the causes of certain reactions. From all models, it is clear that the periphery and core countries still have some differences. These differences are in reaction of some variables weaker and in others stronger. In the benchmark model, it is visible that the reach of interest rate hikes has a large impact on RGDP and price levels in the euro area core. The reactions were more visible and predictions were in narrower intervals. The clearer reaction was only in the case of Spain's RGDP. This may create worse economic conditions for periphery countries mainly in times when there is no reduction of the output gap or inflation. The low passthrough is captured but its source is unknown. However, we can assume that the structure and less developed banking sector may play an important role. The low effect of monetary policy on production is nothing new. The interesting sighting is the initial rise in the RGDP of the Netherlands after the interest rate hike. Our explanation of this may be the fact that the Netherlands has an economy largely based on imports and logistics. The appreciation of currency the purchasing power of the economy and therefore the RGDP rises with it. We have a few possible explanations for the change between the reaction of the core and periphery in the case of M3 aggregate. The first one is that EMU still does not have shared deposit insurance which may cause some investors to withdraw their money after the central bank starts with restrictions. This is the source of critique that has been mentioned in previous chapters mainly from P. De Gravue and Ji (2018) and J. Stiglitz (2016). Another reason may be that the banks that are functioning in the periphery are more dependent on core countries' bank systems. Banks same as investors would withdraw or reduce their flow of capital to countries where a possible recession is in sight. With better-capitalized core countries that may have multiple sources of capital, the impact of monetary policy may not be visible or present at all in the quantity of credit.

Results gathered from interest rate submodels are deepening the differences between core and periphery countries. The lending rate in the Netherlands and Germany has not captured any significant effect after the interest rate hike. This reinforces the argument that was set in the interest rate subchapter when the more capitalized economies have high passthrough of lending rates G. Ndubuisi (2015). The high quality of options to lend from enables them not to raise lending rates and keep most of their profits intact. The periphery countries with not that developed bank systems must raise their lending rates right away. We can see a clear rise in interbank rates however periphery countries seem to react more

significantly to them than their counterparts. That can be explained too with the same arguments as before.

The situation in the credit channel is largely similar. Households in the euro area core are getting less credit, with periphery countries having a slightly deeper contraction. The most of differences can be found in the lack of a contraction in nonfinancial loans in the euro area core. This translates to weaker production in the long run thus lower performance of the periphery. Potential causes for these results too may be found in the higher capitalization of core countries (L. Gambacorta, Maques-Ibanez, 2011). We may raise the assumption too that the largest of companies usually in core countries may sustain higher interest rates then smaller countries in periphery. If this is true then it is one reason why the loans to nonfinancial corporations contracting less in core. The better capitalization of core countries may let them increase interest rates only slightly thus ensuring liquidity to the main companies in the economy.

In the asset price channel results the first odd sighting is the rise of property prices in Germany. There are two possible explanations for this phenomenon. The first is backed by the work of P. Paul (2019) which found that property prices react to interest rates pro-cyclical. Meaning that when the prices are rising interest rate hikes may not be enough to stop them. The reaction of Germany may be largely based on property prices around 2008. Another possible explanation is that the model caught the price puzzle and the contraction is not captured because is not significant. Other countries seem not to have this problem and we can assume that the asset price channel is well-functional both in the core and periphery. When it comes to share prices the main effect was capture in larger economies as was expected. The smaller economies have fewer companies that are publicly traded on stock markets thus the reaction captured is more vague. An outlier from this explanation is Spain in which we can assume that the main movement of share prices comes from government or publicly owned airports. Surprisingly different observation periods in Slovakia have not brought very different outcomes. We still can see that the economy has largely periphery attributes, and the pandemic recession has not shaped outcomes significantly.

5. Conclusion

The story of EMU is becoming longer with each year and despite its shortness in contrast to different institutions it has been tested multiple times. Our final thesis has accomplished capturing these troublesome and peaceful periods with an emphasis on categorizing countries into the core and periphery. In the first part of the work, we have laid down theoretical foundations that helped us understand results more deeply. Not only we have explained and gathered literature for all transmission channels but we have also explained the functioning of the ECB for the first 24 years. But with combination of results from our VAR models, we managed to put theory and empirics into one.

The main research goals of this study can be answered as follows: (i) The strengths of different channels of MTM has been clearly captured and reasons for their variation were raised (ii) The core and periphery dynamic is still present and its presence is more visible in some variables then others. The results reflect the main problems of the euro area on which the criticism was made from its beginnings. The VAR models proved themselves again that they are the right tool for this type of research where is the monitoring of multiple time series needed. Without theoretical impulse responses, we would not be able to simulate the performance of the transmission mechanism and its differences. Our final findings and assumptions can be summarized as follows.

The lack of common deposit insurance is moving capital from periphery countries which need liquidity to more stable core countries. Countries from the periphery still seem to be getting worse with weak inflation reductions after interest hikes and unwanted rises in other variables like lending rates. However, not everything is grey. The reaction of periphery countries which can be seen in main variables like RGDP and inflation is always to some degree visible. The exchange rate channel is functional and reacts to interest rate movements. This leaves periphery countries with a lot of potential for future growth and development if macroeconomic policies are done correctly. The movement from the periphery to the core is documented and possible. Therefore without any austerity programs or crisis lot of periphery countries have great opportunity to use their untapped potential.

6. Resumé

Táto práca sa zaoberala zistením aktuálneho stavu menové transmisného mechanizmu v eurozóne. Vedľa tejto hlavnej otázky práca taktiež zisťovala či sú rozdiely v jadre a periférii eurozóny stále prítomné a v akej miere. Tieto praktické ciele sú postavené na hutnom teoretickom základe, ktorý sa zapodieva viacerými aspektami európskej monetárnej únie (EMU).

Práca začína úvodom v ktorom je načrtnuté hlavne smerovanie práce a výskumne otázky, ktoré boli vyššie spomenuté. V prvej kapitole sa začína teoretický segment, ktorý sa zaoberá fungovaním ECB ako hlavného tvorcu monetárnych opatrení v eurozóne. Doraz je kladený na právne pozadie funkcii ECB ako suverénnej inštitúcie, ktoré však nie je úplne presne zadefinované a líši sa oproti svojmu najbližšiemu dvojníkovi federálnej rezerve v mnohých bodoch. Najväčší rozdiel je v tom že ECB ma iba jediný prioritný ciel, ktorý nesmie odporovať žiadnemu sekundárnemu cieľu a to je cielenie nízkej inflácie. Až keď je tento ciel splnený ma ECB spolupracovať s tvorcami jednotlivých štátov ale iba v opatreniach, ktoré benefitujú ju eurozónu ako celok a nie len individuálne štáty.

Práca sa po tejto podkapitole začína sústrediť na hlavne princípy fungovania ECB a to menovite na inflačný ciel, monetárne cielenie a taktiež komunikáciu a transparentnosť. Inflačný ciel pre ECB nie je zadefinovaný presne ale vývojom sa zadefinoval nepriamo no úroveň okolo 2%. S tým že výskum naznačuje že by tento ciel sa miestami menil podľa toho v akej kríze sa eurozóna nachádzala. Doterajšie štúdie naznačujú to že monetárne cielenie bolo viac prítomne počas prvotného pôsobenia ECB. Po recesii v roku 2008 však tento princíp postupne začal strácať na relevantnosti a da sa predpokladať že je použitý iba na podporne informácie ako v iných centrálnych bankách. Komunikácia ako posledný princíp bola pre fungovanie ECB kľúčová a taktiež prešla transformáciou v priebehu rokov. Na začiatku pôsobenia bola ECB menej transparentná a nepoužívala metódu forward guidance. Počas kríz však prišlo k zmene v dôsledku nefungovania štandardných nástrojov centrálnej banky a popri kvantitatívnemu uvoľňovaniu ECB začala používať aj metódu forward guidance. Metoda bola využitá jej klasickým spôsobom kedy sa centrálna banka zaviaže k tomu že jej politika bude na určitú dobu expanzívna. Vďaka tejto metóde a vystúpeniam vedenia ECB pred verejnosťou sa podarilo eurozóne dostať z nebezpečenstva deflácie späť k stabilnej miere inflácie.

História pôsobenia ECB je v detaile zaznamenaná v nasledujúcej kapitole. Kapitola sa zaoberá zlomovými bodami pre inštitúciu v ktorých sa udalo najviac zásadných zmien

ako bola finančná kríza a taktiež obdobie nižšiej inflácie. Kapitola sa konči recesiou spôsobenou pandémiou aj keď jej obdobie nie je zahrnuté v praktickej časti.

V kapitole dynamika jadra a periférie vysvetľujeme častý aspekt menových únii kedy sa členské krajiny delí podľa ich výkonnosti a konvergencie na jadro a okraj. Tento aspekt je určite stále prítomný v eurozóne nezhody sú však v názoroch prečo tomu tak je. V práci sa prikláňame k názoru že presun z jednej kategórie do druhej je možný a závisí od tvorcov verejných politik v jednotlivých štátoch.

Výskum z domova môže byť nájdený v nasledujúcej podkapitole. Teoretické a empirické aspekty v tejto podkapitole sme najmä čerpali z prac národnej banky Slovenska. Podľa doterajšieho výskumu sme jedna krajín, ktorá stále ešte konverguje k jadru eurozóny. Výskum taktiež prišiel na to že neštandardne nástroje menovej politiky na Slovensko účinkujú veľmi dobre.

Teoretické jadro prace je zakončene väčšou podkapitolou, ktorá sa zaoberá teóriou monetárneho transmisného mechanizmu. Prezentujeme nami vytvorenú schému mechanizmu a taktiež sa zajímame o všeobecne vysvetlenie funkcie tohto mechanizmu. Špeciálna pozornosť je však daná jednotlivým kanálom tohto mechanizmu ako je kanál úrokovej miery, kanál kreditu, kanál výmenného kurzu a kanál majetku. Pri kanále úrokovej miery sme sa rozhodli zaoberať vplyvom úrokovej miery ECB na úrokové miery cez, ktoré komerčné banky poskytujú pôžičky domácnostiam a taktiež ako ECB ovplyvňuje úrokové miery medzi bankami. Z teoretického hľadiska výskum upozorňuje na hlavný problém tohto kanálu fakt že v niektorých ekonomikách ma tento kanál nižší vplyv takzvaný nižší prenik. Toto je spôsobene rôznymi zdrojmi financovania bank alebo silnejším bankovým sektorom v danej krajine. Zároveň tento efekt môžeme pozorovať aj na opačnom spektre kde v rozvojových krajinách, ktoré nemajú rozvinutú štruktúru ekonomiky tento kanál nefunguje taká ako by mal. Z hľadiska optimálnosti tohto kanálu je najlepšie mať rozvinutú centralizovanejšiu ekonomiku, kde však bankový sektor nemá veľa možnosti pre iné zdroje kreditu alebo zahranične financovanie.

Pri kanále výmenného kurzu dostupná literatúra naznačuje že jeho dôležitosť je nižšia ako pred tým, hlavne kvôli tomu že je časťou kompetencie ECB. Ako pozorovanú veličinu sme si vybrali reálny efektívny menový kurz čo je vlastne index kurzov najväčších hlavných v pomere k euru. Teoretická časť sa zaoberá problematikou výmenného efektu kde sa znížením výmenného kurzu zvyšuje export a taktiež problematikou finančného efektu kde silná mena láka zahraničné investície.

Pri kanále kreditu sme sa zamerali na množstvo pôžičiek poskytnutím domácnostiam a taktiež nefinančným inštitúciám. V teoretickej stránke sme sa pozreli na problematiku kanálu bankového kreditu a kanálu širšieho kreditu. Pozorovali sme podobný problém ako pri kanále úrokovej miery kde veľkosť a koncentrácia bankového kanála spôsobujú nižší prenik opatrení ECB.

Ako posledný uvádzame kanál majetku, kde pozorujeme vplyv úrokovej miery centrálnej banky na ceny rôznych aktív v ekonomike. V našom prípade to sú ceny nehnuteľnosti a ceny akcii. Teória naznačuje že tento kanál je funkčný vo väčšine ekonomík a to aj v rozvojových ekonomikách.

Týmto sme uzatvorili našu teoretickú časť a prechádzame na vysvetlenie našej metodológie a dát. Pre náš model sme si vybrali klasický štruktúrny vektorovo auto regresný model v ktorom používame ako reštrikciu Choleského dekompozíciu. Po tom ako je základný model odhadnutý do neho vkladáme špecifické premenné pre daný kanál čím vznikne takzvaný rozšírený model. Hlavný zdroj pre naše dáta je databáza FRED a databázy individuálnych krajín, ktoré v práci skúmame. Výsledky sme sa rozhodli interpretovať pomocou teoretických impulzných reakcii premenných na zvýšenie úrokovej miery. Preto aby sme vedeli posúdiť či je dynamika periférie a jadra prítomná sme si vybrali pre krajiny jadra Nemecko a Holandsko a pre krajiny periférie Slovensko, Taliansko a Španielsko.

Naše výsledky potvrdili že táto dynamika stále prevláda medzi štátmi eurozóny a taktiež že sa líši u rôznych premenných. Vo výsledkoch hlavných modelov môžeme vidieť rozdelí v tom pri krajinách jadra inflácia a RHDP reagujú lepšie na zvýšenie úrokovej miery ECB. Taktiež ich M3 agregát nereaguje tak veľmi na zvýšenie úrokovej miery čím je ich ekonomika stimulovaná no neprenášajú sa na ňu vplyvy, ktoré by mohli viesť k recesii. Pri krajinách periférie vidíme opak kde inflácia a RHDP nereagujú tak silno ako pri jadre a taktiež ich M3 agregát je citlivejší na zvýšenie úrokovej miery.

Pri kanále úrokovej miery sú tieto rozdelí viditeľne hlavne v reakcii úrokových mier komerčných bank. Kde v krajinách jadra je ich nárast nezaznamenaný a pri krajinách periférie je jasne viditeľný. To zanemená že pri zvýšení úrokovej miery ECB si za viac budú požičiavať domácnosti periférie.

Výsledky pre kanál kreditu naznačujú zistenie, že množstvo udelených pôžičiek domácnostiam klesá v celej eurozóne. V krajinách jadra však tento efekt nevidíme pri pôžičkách udelených nefinančným korporáciám. Tento fakt môže znamenať to že si podniky požičiavajú v rovnakom množstve aj počas reštriktívnych politik. Toto značí to že ekonomická aktivita po reštrikcii v krajinách jadra neklesá a sú v menšom ohrození recesie.

Výsledky pre kanál majetku ukazujú pokles po reštrikcii v každej krajine okrem Nemecka, čo však môže byť spôsobene neskoršiu reakciou ich realitných trhov. Taktiež kanál úrokovej miery zachytil svoje najväčšie zhodnotenie v tretom kvartáli.

Zhrnutie, ktoré sme ponúkli v diskusii a záveroch môže byť interpretované v dvoch bodoch. Prvé zistenie nám odpovedá na náš názov práce tým že sme ukázali aktuálny stav monetárneho transmisného mechanizmu pre celu eurozóne a niekoľko individuálnych krajín. Druhé a zistenie je to že efekty transmisného mechanizmu sú stále rozdielne v jadre a periférii eurozóny s tým že krajiny jadra dostavajú hlavne benefity členstva v EMU bez väčších negatíve oproti krajinám periférie. Zaujímame však optimistický pohľad na danú situáciu s tým že potenciál každej krajiny sa presunúť z periférie do jadra je prítomný a môže byť dosiahnutý správnymi ekonomickými opatreniami.

7. References

ADAMS, Robert M. M., AMEL, Dean F. *The Effects of Local Banking Market Structure on the Bank-Lending Channel of Monetary Policy*. In: *SSRN Electronic Journal* [online]. 2005. ISSN 1556-5068. DOI: 10.2139/ssrn.716349

ADEKUNLE, P A et al. *Monetary policy transmission in Nigeria: how important is asset prices channel*. In: *Microeconomics and Macroeconomics*. 2018, roč. 6, č. 3, s. 55-66.

ALEXOVA, Martina. *Inflation drivers in new EU members* [online]. Dostupné na internete: https://EconPapers.repec.org/RePEc:svk:wpaper:1021

ALFIERI, Luca et al. *The Effects of the ECB Communications on Financial Markets before and during COVID-19 Pandemic*. In: *SSRN Electronic Journal* [online]. 2022. ISSN 1556-5068. DOI: 10.2139/ssrn.4109041

ALTISSIMO, Filippo et al. *Wealth and Asset Price Effects on Economic Activity*. In: *SSRN Electronic Journal* [online]. 2005. ISSN 1556-5068. DOI: 10.2139/ssrn.752089

ANGELONI, Ignazio et al. *Monetary Transmission in the Euro Area: Does the Interest Rate Channel Explain it All?* [online]. DOI: 10.3386/w9984

BANERJEE, Ryan, HOFMANN, Boris, MEHROTRA, Aaron N. *Corporate Investment and the Exchange Rate: The Financial Channel*. In: *SSRN Electronic Journal* [online]. 2020. ISSN 1556-5068. DOI: 10.2139/ssrn.3764761

BARMEIER, Marcel et al. *NBS Working paper 2/2023 Impact of TLTRO III on bank lending: The Slovak experience* [online]. Dostupné na internete: www.nbs.sk/en/publications-issued-by-the-nbs/research-publications

BARRELL, Ray, DURY, Karen. *An Evaluation of Monetary Targeting Regimes*. In: *National Institute Economic Review* [online]. 2000, roč. 174, s. 105-113. ISSN 0027-9501. DOI: 10.1177/002795010017400114

BENČÍK, Michal. *Business cycle synchronization between the V4 countries and the euro area* [online]. Dostupné na internete: www.nbs.sk

BENNANI, Hamza et al. *Does central bank communication signal future monetary policy in a (post)-crisis era? The case of the ECB*. In: *Journal of International Money and Finance* [online]. 2020, roč. 104, s. 102167. ISSN 02615606. DOI: 10.1016/j.jimonfin.2020.102167

BERGER, Helge, DE HAAN, Jakob, STURM, Jan-Egbert. *Does money matter in the ECB strategy? New evidence based on ECB communication*. In: *International Journal of Finance & Economics* [online]. 2011, roč. 16, č. 1, s. 16-31. ISSN 10769307. DOI: 10.1002/ijfe.412

BERNANKE, Ben, BLINDER, Alan. *Credit, Money, and Aggregate Demand* [online]. DOI: 10.3386/w2534

BERNOTH, Kerstin, DANY-KNEDLIK, Geraldine, GIBERT, Anna. *ECB and Fed monetary policy measures against the economic effects of the coronavirus pandemic have little effect*. In: [online]. 2020, č. 3. Dostupné na internete: https://hdl.handle.net/10419/219096

BHAUMIK, Sumon Kumar, DANG, Vinh, KUTAN, Ali M. *Implications of bank ownership for the credit channel of monetary policy transmission: Evidence from India*. In: *Journal of Banking & Finance* [online]. 2011, roč. 35, č. 9, s. 2418-2428. ISSN 03784266. DOI: 10.1016/j.jbankfin.2011.02.003

BLANCHARD, Olivier. *Should We Reject the Natural Rate Hypothesis?* In: *Journal of Economic Perspectives* [online]. 2018, roč. 32, č. 1, s. 97-120. ISSN 0895-3309. DOI: 10.1257/jep.32.1.97

BOIVIN, Jean, KILEY, Michael T., MISHKIN, Frederic S. *How Has the Monetary Transmission Mechanism Evolved Over Time?* . 2010, s. 369-422. DOI: 10.1016/B978-0-444-53238-1.00008-9

BOSKIN, Michael J et al. *Consumer Prices, the Consumer Price Index, and the Cost of Living*. In: *Journal of Economic Perspectives* [online]. 1998, roč. 12, č. 1, s. 3-26. ISSN 0895-3309. DOI: 10.1257/jep.12.1.3

BUITER, Willem H. *Alice in Euroland*. In: *JCMS: Journal of Common Market Studies* [online]. 1999, roč. 37, č. 2, s. 181-209. ISSN 0021-9886. DOI: 10.1111/1468-5965.00159

CABOS, Karen, FUNKE, Michael, SIEGFRIED, Nikolaus A. *Some Thoughts on Monetary Targeting vs. Inflation Targeting*. In: *German Economic Review* [online]. 2001, roč. 2, č. 3, s. 219-238. ISSN 1468-0475. DOI: 10.1111/1468-0475.00035

CAMPOS, Nauro F., MACCHIARELLI, Corrado. *The dynamics of core and periphery in the European monetary union: A new approach*. In: *Journal of International Money and*

Finance [online]. 2021, roč. 112, s. 102325. ISSN 02615606. DOI: 10.1016/j.jimonfin.2020.102325

CECIONI, Martina. *ECB Monetary Policy and the Euro Exchange Rate*. In: *SSRN Electronic Journal* [online]. 2018. ISSN 1556-5068. DOI: 10.2139/ssrn.3176930

CICCARELLI, Matteo, MADDALONI, Angela, PEYDRÓ, José-Luis. *Trusting the bankers: A new look at the credit channel of monetary policy*. In: *Review of Economic Dynamics* [online]. 2015, roč. 18, č. 4, s. 979-1002. ISSN 10942025. DOI: 10.1016/j.red.2014.11.002

CLAEYS, Gregory. *The European Central Bank in the COVID-19 crisis: Whatever it takes, within its mandate* [online]. Dostupné na internete: https://hdl.handle.net/10419/237645

COLE, Duke, NIGHTINGALE, Samual, OTHERS. *Sensitivity of Australian Trade to the Exchange Rate| Bulletin–September 2016*. . 2016

CORICELLI, Fabrizio, ÉGERT, Balázs, MACDONALD, Ronald R. *Monetary Transmission Mechanism in Central and Eastern Europe: Gliding on a Wind of Change*. In: *SSRN Electronic Journal* [online]. 2006. ISSN 1556-5068. DOI: 10.2139/ssrn.949468

DOOLEY, Neil. *Who's Afraid of the Big Bad Wolf? Rethinking the Core and Periphery in the Eurozone Crisis*. In: *New Political Economy* [online]. 2019, roč. 24, č. 1, s. 62-88. ISSN 1356-3467. DOI: 10.1080/13563467.2017.1417363

DULLIEN, Sebastian, TOBER, Silke. *ECB strategy: Best practice and new frontiers* [online]. Dostupné na internete: https://hdl.handle.net/10419/237920

DURAN, Camila Villard, STEINBERG, Daniel Fideles. *Guarding the money guardian: How the Ombudsman is enhancing the legal framework for European Central Bank transparency* [online]. Dostupné na internete: https://hdl.handle.net/10419/224116

ÉGERT, Balázs, MACDONALD, Ronald. *MONETARY TRANSMISSION MECHANISM IN CENTRAL AND EASTERN EUROPE: SURVEYING THE SURVEYABLE*. In: *Journal of Economic Surveys* [online]. 2009, roč. 23, č. 2, s. 277-327. ISSN 0950-0804. DOI: 10.1111/j.1467-6419.2008.00563.x

EICHENBAUM, Martin, REBELO, SÃ©rgio, BURSTEIN, Ariel Tomas. *Large Devaluations and the Real Exchange Rate* [online]. Dostupné na internete: https://ideas.repec.org/p/cpr/ceprdp/4810.html

FAHR, Stephan Alexander et al. *A Monetary Policy Strategy in Good and Bad Times: Lessons from the Recent Past*. In: *SSRN Electronic Journal* [online]. 2011. ISSN 1556-5068. DOI: 10.2139/ssrn.1814928

FISCHER, B. et al. *Monetary analysis and monetary policy in the euro area 1999–2006*. In: *Journal of International Money and Finance* [online]. 2009, roč. 28, č. 7, s. 1138-1164. ISSN 02615606. DOI: 10.1016/j.jimonfin.2009.06.012

FRATZSCHER, Marcel. *Communication and exchange rate policy*. In: *Journal of Macroeconomics* [online]. 2008, roč. 30, č. 4, s. 1651-1672. ISSN 01640704. DOI: 10.1016/j.jmacro.2008.07.002

GAMBACORTA, Leonardo, MARQUES-IBANEZ, David. *The bank lending channel: lessons from the crisis*. In: *Economic Policy* [online]. 2011, roč. 26, č. 66, s. 135-182. ISSN 02664658. DOI: 10.1111/j.1468-0327.2011.00261.x

GAMBACORTA, Leonardo, MISTRULLI, Paolo Emilio. *Does bank capital affect lending behavior?* In: *Journal of Financial Intermediation* [online]. 2004, roč. 13, č. 4, s. 436-457. ISSN 10429573. DOI: 10.1016/j.jfi.2004.06.001

GERT PEESMAN, FRANK SMETS. *The Monetary Transmission Mechanism in the Euro Area: More Evidence from VAR Analysis* [online]. DOI: https://dx.doi.org/10.2139/ssrn.356269

DE GRAUWE, Paul, JI, Yuemei. *Core-Periphery Relations in the Eurozone*. In: *The Economists' Voice* [online]. 2018, roč. 15, č. 1. ISSN 1553-3832. DOI: 10.1515/ev-2018-0027

DE GRAUWE, Paul, MONGELLI, Francesco Paolo. *Endogeneities of Optimum Currency Areas: What Brings Countries Sharing a Single Currency Closer Together?* In: *SSRN Electronic Journal* [online]. 2005. ISSN 1556-5068. DOI: 10.2139/ssrn.691864

GUST, Christopher, LEDUC, Sylvain, VIGFUSSON, Robert. *Trade integration, competition, and the decline in exchange-rate pass-through*. In: *Journal of Monetary Economics* [online]. 2010, roč. 57, č. 3, s. 309-324. ISSN 03043932. DOI: 10.1016/j.jmoneco.2010.02.001

HAMILTON, James D. *Time series analysis*. [s.l.]: Princeton university press, 2020.

HAMMOND GILL. *State of art of inflation targeting*. In: *Centre of central bank studies* [online]. 2012 [cit. 21.04.2024]. Dostupné na internete: https://www.bankofengland.co.uk/-/media/boe/files/ccbs/resources/state-of-the-art-inflation-targeting.pdf

HARTMANN, Philipp, SMETS, Frank. *The First Twenty Years of the European Central Bank: Monetary Policy*. In: *SSRN Electronic Journal* [online]. 2018. ISSN 1556-5068. DOI: 10.2139/ssrn.3309645

HERR, Hansjörg, NETTEKOVEN, Zeynep Mualla. *Macroeconomic effects of the Covid-19 Pandemic in Germany and the European Monetary Union and economic policy reactions* [online]. Dostupné na internete: https://hdl.handle.net/10419/261329

HÜLSEWIG, Oliver, WINKER, Peter, WORMS, Andreas. *Bank Lending and Monetary Policy Transmission: A VECM Analysis for Germany / Bankkredite und geldpolitische Transmission: Eine VECM Analyse für Deutschland*. In: *Jahrbücher für Nationalökonomie und Statistik* [online]. 2004, roč. 224, č. 5, s. 511-529. ISSN 2366-049X. DOI: 10.1515/jbnst-2004-0501

IOANNIDIS, Michael, HLÁSKOVÁ, Sarah Jane, ZILIOLI, Chiara. *The Mandate of the ECB: Legal Considerations in the Ecb's Monetary Policy Strategy Review*. In: *SSRN Electronic Journal* [online]. 2021. ISSN 1556-5068. DOI: 10.2139/ssrn.3928298

KAKETSIS, Asimakis, SARANTIS, Nicholas. *The effects of monetary policy changes on market interest rates in Greece: An event study approach*. In: *International Review of Economics & Finance* [online]. 2006, roč. 15, č. 4, s. 487-504. ISSN 10590560. DOI: 10.1016/j.iref.2004.09.003

KEARNS, Jonathan, PATEL, Nikhil. *Does the financial channel of exchange rates offset the trade channel?* In: *BIS Quarterly Review December*. 2016

KEARNS, Jonathan, PATEL, Nikhil. *Does the financial channel of exchange rates offset the trade channel?* In: *BIS Quarterly Review December*. 2016

KIM, Soyoung, MEHROTRA, Aaron. *Effects of Monetary and Macroprudential Policies—Evidence from Four Inflation Targeting Economies*. In: *Journal of Money, Credit and Banking* [online]. 2018, roč. 50, č. 5, s. 967-992. ISSN 0022-2879. DOI: 10.1111/jmcb.12495

KREMER, Manfred. *Macroeconomic effects of financial stress and the role of monetary policy: a VAR analysis for the euro area*. In: *International Economics and Economic Policy* [online]. 2016, roč. 13, č. 1, s. 105-138. ISSN 1612-4804. DOI: 10.1007/s10368-015-0325-z

KRILJENKO, Mr Jorge Iván Canales. *Foreign exchange intervention in developing and transition economies: results of a survey*. [s.l.]: International Monetary Fund, 2003.

LALINSKÝ, TIBOR. *Konkurencieschopnost' podnikov po zaveden\'\i eura na Slovensku*. In: *V\`yskumná štúdia NBS*. 2010

LOJSCHOVA, Adriana. *Did quantitative easing boost bank lending? The Slovak experience*

DE LUIGI, Clara et al. *Quantitative Easing and Wealth Inequality: The Asset Price Channel**. In: *Oxford Bulletin of Economics and Statistics* [online]. 2023, roč. 85, č. 3, s. 638-670. ISSN 0305-9049. DOI: 10.1111/obes.12543

MEHROTRA, Aaron N. *Exchange and interest rate channels during a deflationary era—Evidence from Japan, Hong Kong and China*. In: *Journal of Comparative Economics* [online]. 2007, roč. 35, č. 1, s. 188-210. ISSN 01475967. DOI: 10.1016/j.jce.2006.10.004

MEINUSCH, Annette, TILLMANN, Peter. *The macroeconomic impact of unconventional monetary policy shocks*. In: *Journal of Macroeconomics* [online]. 2016, roč. 47, s. 58-67. ISSN 01640704. DOI: 10.1016/j.jmacro.2015.11.002

MOJON, Benoit. *Financial Structure and the Interest Rate Channel of ECB Monetary Policy*. In: *SSRN Electronic Journal* [online]. 2000. ISSN 1556-5068. DOI: 10.2139/ssrn.356001

MUKHTAR, Tayyaba, YOUNAS, Muhammad Zeeshan. *Monetary Policy Transmission Mechanism of Pakistan: Evidence from Bank Lending and Asset Price Channels*. In: *Asian Journal of Economic Modelling* [online]. 2019, roč. 7, č. 3, s. 121-139. ISSN 23132884. DOI: 10.18488/journal.8.2019.73.121.139

MUKHTAROV, Shahriyar et al. *The effectiveness of exchange rate channel in Azerbaijan: an empirical analysis*. . 2019

NAGAYASU, Jun. *Empirical analysis of the exchange rate channel in Japan*. In: *Journal of International Money and Finance* [online]. 2007, roč. 26, č. 6, s. 887-904. ISSN 02615606. DOI: 10.1016/j.jimonfin.2007.05.002

NDUBUISI, Gideon Onyewuchi. *Interest Rate Channel of Monetary Policy Transmission Mechanisms: What Do We Know About it?* In: *SSRN Electronic Journal* [online]. 2015. ISSN 1556-5068. DOI: 10.2139/ssrn.2623036

NELIMARKKA, Jaakko, LAINE, Olli-Matti. *The Effects of the ECB's Pandemic-Related Monetary Policy Measures*. In: *SSRN Electronic Journal* [online]. 2021. ISSN 1556-5068. DOI: 10.2139/ssrn.3915828

PAPADAMOU, Stephanos, SIDIROPOULOS, Moïse, SPYROMITROS, Eleftherios. *Central bank transparency and the interest rate channel: Evidence from emerging economies*. In: *Economic Modelling* [online]. 2015, roč. 48, s. 167-174. ISSN 02649993. DOI: 10.1016/j.econmod.2014.10.016

PAUL, Pascal. *The Time-Varying Effect of Monetary Policy on Asset Prices*. In: *The Review of Economics and Statistics* [online]. 2020, roč. 102, č. 4, s. 690-704. ISSN 0034-6535. DOI: 10.1162/rest_a_00840

PICAULT, Matthieu, RENAULT, Thomas. *Words are not all created equal: A new measure of ECB communication*. In: *Journal of International Money and Finance* [online]. 2017, roč. 79, s. 136-156. ISSN 02615606. DOI: 10.1016/j.jimonfin.2017.09.005

ROSA, Carlo, VERGA, Giovanni. *Is ECB Communication Effective?* In: *SSRN Electronic Journal* [online]. 2004. ISSN 1556-5068. DOI: 10.2139/ssrn.621641

SANDER, Harald, KLEIMEIER, Stefanie. *Convergence in euro-zone retail banking? What interest rate pass-through tells us about monetary policy transmission, competition and integration*. In: *Journal of International Money and Finance* [online]. 2004, roč. 23, č. 3, s. 461-492. ISSN 02615606. DOI: 10.1016/j.jimonfin.2004.02.001

SHAH, Salman Ali et al. *'Monetary Policy and Asset Price Channel: Recommendations for he Policy Makers of Developing Countries*. In: *College of Public Administration, Huazhong University of Science and Technology, Wuhan, China, Institute of Management Sciences, Peshawar, Pakistan, Developing Country Studies*. 2015, roč. 5, č. 2

SIMS, Christopher A. *Macroeconomics and Reality*. In: *Econometrica* [online]. 1980, roč. 48, č. 1, s. 1. ISSN 00129682. DOI: 10.2307/1912017

SKAPERDAS, Stergios. *Policymaking in the Eurozone and the Core vs Periphery Problem*. In: *CESifo Forum* [online]. 2011, roč. 12, č. 2, s. 12-18. ISSN 2190-717X. Dostupné na internete: https://hdl.handle.net/10419/166430

SOTO, Claudio, SELAIVE, Jorge. *Openness and imperfect pass-through: implications for the monetary policy*. In: *Documentos de Trabajo (Banco Central de Chile)*. 2003, č. 216, s. 1-40.

STEIN, Jeremy C. *Cheap Talk and the Fed: A Theory of Imprecise Policy Announcements*. In: *The American Economic Review* [online]. 1989, roč. 79, č. 1, s. 32-42. ISSN 00028282. Dostupné na internete: http://www.jstor.org/stable/1804771

STIGLITZ, Joseph E. *The euro: How a common currency threatens the future of Europe*. [s.l.]: WW Norton & Company, 2016.

SURICO, Paolo. *The Monetary Policy of the European Central Bank*. In: *The Scandinavian Journal of Economics* [online]. 2007, roč. 109, č. 1, s. 115-135. ISSN 0347-0520. DOI: 10.1111/j.1467-9442.2007.00485.x

SVENSSON, Lars. *Oil prices and ECB monetary policy*. In: *Briefing Paper for the Committee on Economic and Monetary Affairs of the European Parliament* . 2005, s. 1-4.

SVENSSON, Lars E. O. *The First Year of the Eurosystem: Inflation Targeting or Not?* In: *American Economic Review* [online]. 2000, roč. 90, č. 2, s. 95-99. ISSN 0002-8282. DOI: 10.1257/aer.90.2.95

SVENSSON, Lars E.O. *Inflation Targeting*. . 2010, s. 1237-1302. DOI: 10.1016/B978-0-444-53454-5.00010-4

TAYLOR, John B. *The Monetary Transmission Mechanism: An Empirical Framework*. In: *Journal of Economic Perspectives* [online]. 1995, roč. 9, č. 4, s. 11-26. ISSN 0895-3309. DOI: 10.1257/jep.9.4.11

WETH, Mark Andreas. *The pass-through from market interest rates to bank lending rates in Germany*. . 2002

WOODFORD, Michael. *How Important Is Money in the Conduct of Monetary Policy?* In: *Journal of Money, Credit and Banking* [online]. 2008, roč. 40, č. 8, s. 1561-1598. ISSN 0022-2879. DOI: 10.1111/j.1538-4616.2008.00175.x