

**UNIVERSITY OF PUBLIC SERVICE**  
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**THESIS Book**

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**The possibilities of monetary policy after the 2008 Global  
Financial Crisis**

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## **1. Significance and objectives of the research**

The research focuses on the changes and monetary policy developments brought by the 2008 global financial and economic crisis (GFC). These changes will be crucial in the economic policy of the 2020 decade, including the activities of central banks. It is even more important that these processes set new directions in a broader perspective, which at the same time lead to the change of economic thinking as a whole.

The aim of the research is to create a single framework for the factors influencing monetary policy and more broadly, the monetary macroeconomic processes, which has led to the emergence of a period of 'new normal'. The theoretical foundation of the research takes into account in detail the historical evolution of the principles of monetary policy. The overview also covers the most important achievements of the 2020 decade (technological developments, globalization, etc.). The empirical part of the dissertation serves as a further support for the above findings and allows further more nuanced conclusions to be drawn.

The significance of the research is given by the fact that although the unfolding of the problem can be traced back to 2008, it continues to raise relevant issues in the early 2020s. In order to identify the long-term consequences, it is essential to get to know the processes of the past as fully as possible and to interpret them properly. New developments (including, among many other factors, negative interest rate policies or the fact that quantitative easing programs are becoming part of the normal functioning of monetary policy) have pushed economics to new heights compared to previous decades. An accurate understanding of how these processes work should be interpreted as a task for the present age. The emphasis is on identifying some potential side effects, unintended spill-over effects (overheating, income inequalities, etc.)

## **2. Research questions and hypotheses**

The structure of the dissertation follows five main research questions. The focus of the research questions and therefore of the dissertation as a whole, is on the monetary policy of developed countries, primarily the practice of the Federal Reserve (FED) and the European Central Bank (ECB). The research questions and their hypotheses are summarized in Figure 1:

**Q1:** What changes can be observed in the role of monetary policy following the global financial and economic crisis of 2008?

•**H1:** Following the global financial and economic crisis of 2008, central banks are operating along new paradigms.

**Q2:** What were the main risks and effects of monetary expansion after 2008?

•**H2:** The expansionary monetary policy stance of the decade after the global financial crisis has caused overheating in the financial markets.

**Q3:** How does monetary transmission work in negative nominal (NIRP) and near-zero (ZIRP) interest rate environment?

•**H3:** In the period of near-zero and negative interest rates, short-term interest rates have already proved insufficient to meet inflation targets.

**Q4:** How do near-zero and negative interest rates affect banks' profitability?

•**H4:** Banks' profitability is adversely affected by negative interest rates.

**Q5:** How does monetary policy affect social income inequalities?

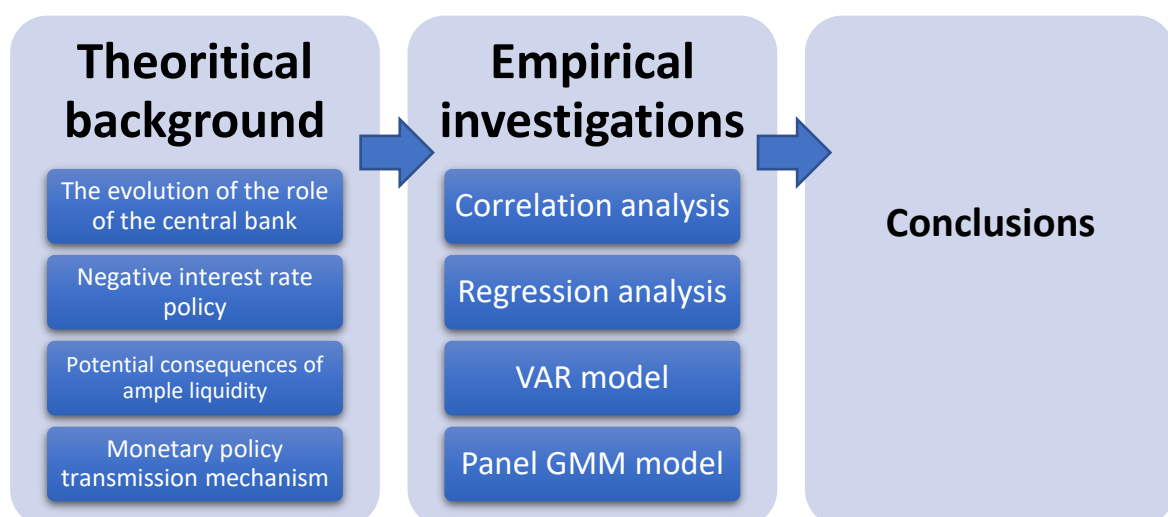
•**H5:** Monetary policy has distributional effects and influences income inequalities.

*Figure 1: Research questions and hypotheses of the dissertation*

Source: own editing

## 2. Structure of the dissertation

The research is divided into three main parts: the theoretical background of the examined topic, the empirical support of the theoretical framework, and the formulation of the conclusions (see Figure 2). The theoretical background, which includes a detailed literature review, consists of four additional chapters.



*2. Figure: Structure of the dissertation*

Source: own editing

The first chapter examines the evolution of the role of the central bank. The topic begins with an overview of the key achievements of the pre-crisis period, with a particular focus on the principles that underpinned the central bank operations of developed countries in previous decades. In 2008, as the crisis erupted, processes began to unfold with far-reaching implications for the conduct of monetary policy. The research places strong emphasis on taking stock of these changes and determining which areas are most affected. De facto transformations in the operational and institutional framework of central banks affect almost all previous pillars (eg. independence, priority of objectives, system of instruments, etc.), albeit with varying degrees of intensity. The expansion of the central bank's toolbox and its wider repository than ever before have redefined the role of central banks. Thus, the tasks to be performed by the central bank increased in parallel with the expansion of their toolbox and the central bank's balance sheet. Monetary policy in previous decades, based on the 'one tool, one target' principle, is already a thing of the past. Therefore, the exogenous shock caused by the coronavirus arrived in a changed environment. Negative economic developments have further fueled trends so far and further delayed the possibility of normalization. The broadening of the role of monetary policy and the weakening of central bank independence will also result in a closer interaction with fiscal policy, which will pave the way for the advancement of Modern Monetary Theory (MMT). The more active role of the central bank than ever before also has distributional effects, so that monetary policy is increasingly affecting the issue of income inequality. Technological changes also require central banks to keep pace with new developments, and measures related to the introduction of digital central bank money are becoming increasingly important. In addition to the above, climate change and the sustainability issues are key issues today, which also have monetary policy implications.

The next chapter of the dissertation focuses on *negative interest rate policy*. In the past, economic theories relied solely on positive interest rates. This prevailing approach began to change in 2012, when Denmark was the first to apply negative nominal interest rate. The group of countries with negative interest rates was later joined by Switzerland, Sweden, Japan and the euro area. The motivation for the application of negative interest rates is to keep the exchange rate and interest rate differentials (Switzerland, Denmark) and to achieve inflation targets (euro area, Japan). The reasons for the use of negative interest rates in each country are illustrated by case studies. The idea behind the negative interest rates is based on the alternative use of money (diverting it to the real economy). Negative interest rates are in fact extra costs imposed on net savers. Similarly to other unconventional measures, negative rates may have a number of

unintended side effects in addition to their intended consequences. The research places special emphasis on the identification of these factors and their potential spillover effects. The impact of the mechanisms of negative interest rates on bank profitability can be mentioned here, and the effects on the risk-taking behavior are also closely related. An important issue is the operation of the monetary policy transmission mechanism with negative interest rates, which is also the basis of the related empirical analysis.

The next section focuses on *the potential consequences of ample liquidity*. Extreme loose monetary conditions for more than a decade have resulted in ample liquidity in the financial markets. However, in many cases, this extra money has not been able to achieve the desired goals, as it has exerted its effects not mainly in the real economy but in the financial markets, contributing to the formation of potential bubbles. The role of quantitative easing and the persistence of low interest rate environment are important motives and raise financial stability concerns by raising asset prices to record levels. Identifying and keeping these risks in mind is key to maintaining and achieving future financial economic equilibrium. Another important aspect of the topic is related to inflation. The lack of inflation or the fact that it falls short of the target level is the most important element of the central bank's challenges. The previous economic relations prevail differently in the current system of conditions. These developments continue to heat up financial markets and make small contribution to meeting inflation targets. In order to evaluate the problem in a complex way, the dissertation also tries to focus on other (globalization, real economy, financial) factors.

The last section of the theoretical part examines the transmission mechanism of monetary policy. I review the most important transmission mechanisms of different (conventional and non-conventional) monetary policy periods. The research draws attention to the importance of spillover effects for each monetary policy measure. It puts into context the effects that are much more pronounced in certain areas of the economy when non-conventional measures are applied. In addition to the traditional channels, special emphasis is placed on the domestic and international channels of quantitative easing measures, as well as on the differences and identities observed during the period of negative nominal interest rates.

## **2.1. Research methods**

The empirical part is based on four main econometric analysis. The transmission mechanism of monetary policy is examined by a basic VAR (Vector Autoregressive) model. Based on data from two periods (pre-crisis and post-crisis ZIRP and NIRP), the focus of the investigations is

on the interaction between key monetary policy indicators. Data for the euro area on a monthly basis include the short-term money market rate, the euro exchange rate against the dollar, the stock market price index, loans to households, the harmonized index of consumer prices and the price index for industrial production. The primary objective of the analysis is to explore the interactions between some financial, and macroeconomic variables based on euro area data. The studies are based on a comparison of the developments over the two periods. The research thus distinguishes between the period characterized by low, close to zero and negative interest rates, and the period based on normal, traditional operation. It tries to answer whether a difference can be detected in the interactions between the individual variables, ie. whether different mechanisms prevail in the period of positive, and close to zero or negative interest rates.

The second empirical analysis focuses on the issue of income inequalities. Although distributional effects, such as inequalities tend to be linked primarily to globalization and fiscal policy developments, a number of side effects of the exceptionally loose monetary policy of the last decade also touch on the issue. The analysis is based on panel database (GMM model) to explore the direction and extent of the impact of each monetary policy variable on Gini inequality. The analysis focuses on the countries of the euro area and three other European countries with negative interest rates (Denmark, Sweden, Switzerland).

The next part of the research is based on a correlation analysis, which examines the relationship between certain macroeconomic and financial variables that are related to inflation and stock market index, focusing on the euro area data. The starting point of the research is that inflationary processes after the 2008 crisis also developed differently than would have been dictated by economic logic. The analysis also contrasts two periods: the pre-crisis period and the post-crisis period. The aim is to explore and prove that in many cases the previous relationships have been reversed. The inclusion of the stock market price index in the analysis is justified by the fact that central bank activities drove investors to the stock markets due to low interest rates and generated inflation in asset prices rather than consumer price index. Breakpoint regressions on euro area and US data provide further support for the correlations. Based on the Bai-Perron break tests applied to the money supply and interest rate data series covering the period 2000-2021, the examined period can be divided into several phases. The periods thus determined provide a basis for comparing the explanatory power of these monetary policy variables in the evolution of the S&P500 and Dow Jones EuroStock50 stock market indices over time.

The last part estimates by OLS regression how banks' profitability is affected by negative interest rates. Focusing on the euro area banking system, the aim of the analysis is to determine which of the relevant variables have a significant impact on the development of banks' profitability during the period of negative interest rates. Whether it can be justified that negative interest rates adversely affect the profitability of banks. The analysis also covers group of banks of different sizes.

The last pillar of the dissertation is the formulation of the conclusions and the evaluation of the hypotheses. Based on the theoretical and empirical investigations, the lessons of the last one and a half decades are formulated. The conclusions aim to provide future guidelines that can serve as a guideline for economic policy in the coming decade.

### **3. Evaluation of research questions and hypotheses**

In the next section, the research questions and hypotheses are evaluated.

- **1<sup>st</sup> research question and hypothesis**

**Q1: What changes can be observed in the role of monetary policy following the global financial and economic crisis of 2008?**

**H1: Following the global financial and economic crisis of 2008, central banks are operating along new paradigms.**

The first research question focused on the change in the role of the central bank. The research question was answered with the help of the literature review and the deep and thorough exploration of the theoretical connections. Based on the pre-formulated line of thought, a new chapter has opened in the theory and practice of monetary policy following the global financial and economic crisis, which should also be interpreted as a paradigm shift in central bank operations. Each of the subsections in the first chapter provided assurance on the above statements by going along different perspectives. Therefore, the hypothesis that '*Following the global financial and economic crisis of 2008, central banks are operating along new paradigms.*' has been verified, and the following thesis has been formulated.

**Thesis 1:** The Global Financial and Economic Crisis was a watershed for monetary policy practice, leading to the emergence of a 'new normal'. The former operation of the central bank with the inviolability of the principle of independence which focused primarily on inflation targeting, was replaced by a monetary policy practice involving a much more complex range of activities and instruments. The fundamental theoretical contexts of monetary policy in previous decades no longer adequately explain certain phenomena that underpin the change in the dominant paradigm. The changes are expected to stay with us permanently.

The research confirmed that the central bank's operations in the decades before 2008 underwent a significant transformation. Developments in financial innovation in the pre-crisis period have made it clear that only central banks with the ability to provide unlimited liquidity are well placed to deal with problems. Central banks are now operating under a much more complex set of conditions. The previous monetary policy, which is mainly based on interest rate adjustments, is no longer effective in the changed economic environment, and changes have taken place in the main pillars. Thus, in line with Kuhn's approach, the old theories are able to explain the present situation only to a limited extent. This has also led to a new era in the functioning of monetary policy. However, central banks have adapted to new developments with sufficient flexibility.

It has become clear that the 'one tool, one target' approach has become obsolete. The operation of the central bank is now carried out along a much wider range of tools, with the dominance of unconventional measures. Following the widespread use of non-conventional measures, they can in fact already be considered as conventional measures. Regarding the central bank's target system, the priority of inflation targeting remained, however, the increased role of financial stability objectives have posed new challenges for central banks. The previous system focusing on inflation targets no longer ensured financial stability, and was no longer sufficient to shape inflation (and, more broadly, to achieve macroeconomic targets). A new set of conditions was created, which required a high degree of adaptation and a new approach on the part of central banks. In addition, central banks have begun to prioritize issues that were previously outside their remit (see inequality, climate change, digital money, etc.).



Negative interest rates have emerged as a completely new element of the monetary policy toolbox. At the same time, this phenomenon can be considered a new milestone in a broader economic sense, as the application of negative interest rates also refutes the principles of rational economic thinking.

In terms of inflation targeting, the flexibility of central banks has increased and they have become more tolerant of inflation in the post-2008 crisis period. This is confirmed by the adaptation of the average inflation targeting in the United States and the symmetry of the ECB's inflation target. The potential dangers posed by inflation and deflation are thus increasingly being given equal weight by central bankers.

Central bank independence has been de facto undermined by closer coordination between fiscal and monetary policy. Central banks (albeit unspoken) engage in monetary financing, and the principles of modern monetary theory are becoming increasingly important.

Extremely loose monetary conditions have stronger distributional effects than before. Price changes in the market for certain assets caused by a low interest rate environment have disproportionately increased wealth and income inequalities between the different groups of the society.

The central bank's compulsion to adapt to the megatrends of the early 2020s is important. These factors (digitalization trends, sustainability issues, demographic factors, etc.) further shape the conditions for central bank implementation. The challenges posed by climate change are also driving central banks to take action, and digitalization developments are highlighting the future importance of central bank digital currencies.

The principles that laid the foundations for central bank operations in the 1970s were thus changed after 2008. Based on the changes listed here, the 2008 crisis transformed and shaped both the system and objectives and institutional characteristics of the central bank. These changes in the early 2020s are as significant as Friedman's achievements in the 1970s. The operation of monetary policy has been placed on whole new foundations. In the post-crisis period, the possibility of normalization was a central issue, but in the era of negative interest rates, the return to normal operation will certainly be a protracted process. Even if we expect to return to a normal interest rate environment, we will not return to the pre-crisis situation in its entirety. The changes (expanded central bank toolbox and scope of activities) will remain with us, although their extent is still an open question.

- **2<sup>nd</sup> research question and hypothesis**

**Q2: What were the main risks and effects of monetary expansion after 2008?**

**H2: The expansionary monetary policy stance of the decade following the global financial crisis has caused overheating in the financial markets.**

At the beginning of the 2020 decade, through the recovery from another recession, monetary policy continues to show traces of the 2008 crisis. Central bank operation is still far from its conventional form: a ‘new normal’ is present, where continuous monetary stimulus has become a condition for normal economic operation. But all this has side effects, and in many cases these impulses have not been enough to achieve the desired goals. One of the most significant side effects is overheating in the financial markets. As a result of the identification of relevant theoretical contexts and empirical research, the hypothesis that ‘the expansionary monetary policy stance of the decade after the global financial crisis caused overheating in the financial markets’ was confirmed, and the following thesis was formulated.

**Thesis 2.:** The research focusing on the euro area and on the US, based on correlation analysis and breakpoint regression has shown in line with the literature that the expansionary monetary stance of the decade after the 2008 crisis has contributed significantly to the rise in stock indices (S&P500 and Dow Jones Eurostock 50). Thus, a significant portion of monetary expansion has flowed to the financial markets as a kind of unintended side effect.

The interaction between financial and macroeconomic processes after the crisis is much stronger than it was before or as previously assumed. Higher risk-taking due to extremely loose monetary policy may be at the root of systemic macroeconomic spillovers. In order to achieve financial and monetary stability, it would therefore be appropriate to embark on the path of monetary tightening. This has begun in part in the United States, but the Covid-19 crisis has also interrupted this process. The European Central Bank entered the Covid-19 crisis in a zero interest rate environment.

In many cases, the effects of monetary measures have been quantified in indicators other than inflation. Asset prices, which have not yet been taken into account by inflation indicators, play a key role in this area. Quantitative easing and the highly expansionary monetary policy stance

posed serious risks to the formation of an unsustainable asset price increase, leading to an asset price bubble. These threats may be present internationally beyond the borders of the country applying the measure. Although there has been a year-on-year growth trend in the equity, bond and real estate markets, the presence of the bubble cannot be clearly demonstrated in any of the areas. The identification of bubbles is very complicated at the stage of their formation and it is rare when such an identification can be made with confidence. The stage of bubble formation is often characterized by economic stability and a period of low inflation. According to Kashkari (2017), this is why the flexibility of the financial system needs to be ensured in order to be able to produce adequate resistance to future corrections. This means that larger banks need to be encouraged to increase their capital stock when markets are strong. Although the presence of the bubble can never be clearly demonstrated, the overheating in the current situation can certainly be considered substantiated. In the wake of the corona virus crisis, the danger of bubbles and the overheating of stock markets have once again come into focus. Several indicators point to the presence of potential hazards.

The correlation analysis used in the dissertation also confirms that financial and monetary variables show a much higher correlation with stock market indices than with inflation. In the case of financial indicators, the signs of the correlation coefficients were reversed in most cases. In recent years, the relationship between interest rates with different maturities and inflation has not been in line with conventional monetary policy contexts. The decline in interest rates was not accompanied by an increase in inflation, and at the same time the values of price indices declined further. With regard to the money supply of M2 and M3, this opposite relationship can also be observed. Monetary policy did not operate in the usual way, and previous correlations were limited. There were a number of factors that weakened central banks' efforts to meet inflation targets. Indicators providing information on the general level of macroeconomic performance, such as the production index, the GDP growth rate and final consumer expenditure, show a weaker co-movement with the stock market index after the crisis. This provides a support for the assumption that real economic performance has begun to break away from soaring stock markets. In the case of money market indicators, the decline in bond yields led to a higher rise in stock markets after the crisis. This is consistent with the central bank activities aimed at long-term interest rates and the rise in stock market prices. The increase in the money supply also reinforces these effects. The expansion of lending is usually accompanied by more favorable economic conditions, and better economic performance is normally accompanied by higher lending and higher stock market indices. The lower value of

the correlation coefficient suggests a weakening of this relationship, i.e. it may again supports the idea that stock market developments have become increasingly detached from real economic developments.

The above effects were also confirmed by breakpoint regressions based on data for the euro area and the United States (covering the period January 2000 to August 2021). For both regions, it has been demonstrated that, following the global financial and economic crisis, monetary expansion (measured in this case by the expansion of the M2 and M3 money supply and the decline in interest rates) had a significantly greater explanatory power in the development of stock indices.

Overall, therefore, it was found that central bank measures had had limited effectiveness in meeting inflation targets after the crisis, and it was confirmed that central bank operations were much more supportive of money markets and stock market indices.

- **3<sup>rd</sup> research question and hypothesis**

**Q3: How does monetary transmission work in a negative nominal (NIRP) and near-zero (ZIRP) interest rate environment?**

**H3: In the period of near-zero and negative interest rates, short-term interest rates have already proved insufficient to meet inflation targets.**

The research examined the operation of monetary policy transmission in a complex framework, i.e. the process by which each monetary policy step influences the development of macroeconomic variables, in particular the price level. In essence, it describes the relationship between central bank action and macroeconomic developments. Following the examination of the topic, based on the theoretical and empirical correlations, the hypothesis ‘in the period of near-zero and negative interest rates, short-term interest rates proved insufficient to achieve inflation targets’ was confirmed, and I set up the following thesis.

**Thesis 3.:** The applied VAR framework on eurozone data, in line with the literature, confirmed that while interest rate hikes previously implemented by the central bank have been effective in reducing inflation (and vice versa), developments in short-term interest rates in the post-crisis period are already insufficient incentives for effective inflation management. The constraints on the traditional operation of monetary policy necessitated new interventions (eg. on the side of long-term interest rates).

After 2008, when unconventional measures became more widely adopted, the monetary policy transmission mechanism also began to paint a more nuanced picture. In addition to short-term interest rates, central banks have placed increasing emphasis on managing longer-term interest rates. In a period of near-zero interest rates, the quantitative easing measure has become dominant. The basis of its operation is the reduction of longer-term interest rates through portfolio equilibrium effects. These processes also affect the interest rates of other assets due to the investors' desire to earn a return and the price-driving effect of demand. However, interest rates may not only fall for securities. Developments in the banking sector are also significant, especially in Europe, where bank financing is much more dominant than in the Anglo-Saxon countries. The effects can also spill over to bank interest rates. Exchange rate and expectation effects also appear. The forward-looking guidelines that shape expectations have become one of the most prominent central bank measures since the crisis, seemingly remaining in the central bank's toolbox forever. The efficiency of monetary transmission at negative interest rates is fundamentally determined by the ability of negative interest rates to pass on to other interest rates. Experience shows that the stickiness of deposit rates is an obstacle to this process. Banks are generally reluctant to charge negative interest rates on their depositors, fearing that they would withdraw their deposits in this case, which would significantly worsen the liquidity position of banks, especially those that rely more heavily on deposit financing. However, as deposit rates remain at zero, banks' interest margins start to decline, meaning that their profitability may deteriorate. The worst-case scenario is if banks raise lending rates in order to maintain their previous interest margins. In this case, the negative interest rates actually exert contraction effects, which is contrary to the objectives initially set. The stickiness of deposit rates is especially true for banks that rely more heavily on deposit financing. Indeed, if bank customers began to withdraw money from the bank, this would significantly worsen the liquidity position of the banks concerned, contributing significantly to the increase in risk levels.

With regard to Sweden, monetary transmission weakened to some extent after the central bank cut its key interest rate to negative territory in February 2015. Yields on 2-year and 5-year mortgages were not or only slightly affected by the shift of the central bank interest rate to the negative range. Nevertheless, yields on the 6-month Treasury bill and the 2-year government bond followed the path of the central bank base rate. In Switzerland, mortgage rates with different maturities followed the decline in the key interest rate to a small extent, but the level of interest rates for each maturity became closer and closer. However, the lower limit of interest rate at around minus 1% was not exceeded in any case. However, it can be observed that at the time of the application of the negative interest rates, some interest rates started to increase. All this may be related to the fact that banks have tried to defend themselves against declining interest margins. However, the contraction effects proved to be temporary and interest rates followed a moderately declining path in the following periods. It can also be observed that in 2020, 26% of mortgages in Denmark were granted at negative interest rates.

For the examination of the transmission mechanism of monetary policy, a VAR framework was constructed, during which I relied primarily on the impulse response functions when formulating the conclusions. The analysis was based on two periods: the period from January 2000 to December 2006 and the period from January 2012 to December 2020. The first period thus represents a situation when unconventional monetary policy measures were not yet present, i.e. monetary policy operated under normal conditions. The years of the crisis are not included in any of the analysis periods, thus eliminating turbulent effects. The second period covers the period during which the ECB created a zero or negative interest rate environment.

Based on the response of the harmonized index of consumer prices to short-term interest rates, while interest rate increases implemented by the central bank have been effective in reducing inflation (and vice versa), short-term interest rates have proved to be an insufficient incentive to manage inflation effectively. This again justifies the more limited room for maneuver of monetary policy and suggests that intervention from other operations and longer-term interest rates will in any case be warranted in order to achieve the central bank's objectives. In terms of exchange rates, the effects before the crisis are much stronger. However, exchange rate effects may be more subdued in the euro area, given the single currency area. These effects may be explained by the fact that intra-euro area trade is much larger than trade with non-euro area partners. Another important factor is that, following the crisis, both the US and the ECB have engaged in intense monetary easing, and even more so in case of the US. The impact of the ECB's monetary easing on the USD exchange rate is thus to some extent offset by the Fed's

activities. The response to stock prices also represents different processes based on the two periods. Inflation reacted to the rise in stock prices with a decline in the pre-crisis period and an increase in the post-crisis period. In view of the higher stock market returns, people were flowing their money to the stock exchanges and money markets, and the volume of spending could not expand to the desired extent. The shock to lending will lead to rising prices in both periods, confirming the normal monetary policy transmission relationship. However, it can be stated that this effect is much more moderate after the crisis. Thus, the expansion of lending after 2008 could not contribute as effectively to the rise in the price level through the expansion of aggregate demand as in previous periods.

- **4<sup>th</sup> research question and hypothesis**

**Q4: How do near-zero and negative interest rates affect banks' profitability?**

**H4: Banks' profitability is adversely affected by negative interest rates.**

Banks strive for a profitable use of their available resources, which includes the spread gained through lending activities, as well as the implementation of alternative (money market) investments. Fees charged for various banking activities also serve as significant revenue. Negative interest rates affect both the revenue and the cost side of banks. However, the extent of these varies depending on individual banking characteristics. Important factors are the willingness to take risks, and the extent to which banks are able to pass on negative interest rates to their customers, which greatly influences the level of interest margins. The business model of the bank's can be mentioned, as well as the strength of the competition, the general economic situation and the savings surplus, which was accompanied by a low level of investment. Under favorable economic conditions, lending activity is typically active and the ratio of non-performing loans is lower, which has a positive effect on bank performance and vice versa.

Negative interest rates reduce the interest margins, and the banks seek to compensate it in various ways. One way to do this is to increase non-interest income. If banks have enough leeway to do this, it also means that banks are not so much forced to take higher risks. Similarly, if banks are able to realize higher revenues through other sources of income (i.e. securities), it is again able to increase their profitability. Lower interest rates also mean a reduction in debt

service, making it easier for bank customers to repay their loans, which also means a lower rate of non-performing loans. However, as negative interest rates generate extra costs primarily on excess reserves, banks seek to reduce these amounts of money, which may include both asset and liability side operations.

However, the long-term effects are unclear and the potential increase in side effects over time needs to be considered. The long-term effects of the coronavirus crisis should also be mentioned here, which could also shift existing processes in several directions.

In the dissertation, the profitability of banks was examined for the data of euro area banks using OLS regression, covering the (NIRP) period of 2014Q4-2020Q3. Overall, it has been established that the development of negative interest rates and excess reserves (which can also be interpreted as a proxy for negative interest rates) do not necessarily contribute to deteriorating bank profitability. This suggests that banks are able to compensate their additional costs through other channels. Other factors also contribute significantly to the development of profitability. The ratio of non-performing loans, the loan-to-deposit ratio and the higher level of credit risk are important. These indicators have statistically significant adverse effects, as opposed to the above. However, the rate of GDP growth, which seeks to capture the overall performance of the economy, did not show significant effects in any of the cases. Analyses based on the data of small, medium and large banks also confirm the above effects.

*The fourth hypothesis, that 'banks' profitability is negatively affected by negative interest rates' could not be clearly substantiated, so no thesis was made here.*

- **5<sup>th</sup> research question and hypothesis**

**Q5: How does monetary policy affect the social income inequalities?**

**H5: Monetary policy has distributional effects and influences income inequalities.**

The fifth research question focused on the issue of inequality, which is becoming more and more important today, and which can be approached from many aspects. The processes of globalization, technological development and the post-crisis period, which are in many ways new, are all crucial. In the context of the latter, in addition to fiscal policy measures, the role of monetary policy can also be underlined, especially with regard to its abnormal functioning.



Following a detailed exploration of the theoretical relationships and empirical estimates, the following thesis was set up.

**Thesis 5.:** Theoretical and empirical correlations have shown that monetary policy variables have a moderate but significant impact on distributional processes. Studies based on data covering countries with negative interest rates covering the period of 2008-2019 have confirmed the significance of the indirect effects. It has been found that monetary easing results in a reduction in income inequalities as measured by the Gini index through inflation and an increase in GDP per capita. At the same time, despite the overall positive effects, the extremely loose monetary policy stance disproportionately favored the richest people of society.

The problem is global in scope, but in a narrower sense, the present research has sought to explore the topic focusing primarily on Europe, with a particular focus on euro area countries. In Europe, income and wealth inequalities are continuously increasing in the 2020 decade, and trends in recent years have shown this to be strengthening. The extremely loose monetary policy stance, which includes negative interest rates, has a number of mechanisms that affect households with different income levels to varying degrees. Based on all this, and on the literature, we have highlighted six main channels that play a role in the effects of monetary policy on inequality: the inflation tax channel, the savings redistribution channel, the interest rate exposure channel, the income composition channel and the direct and indirect effects.

The present research has revealed what conclusions the empirical literature draws from this, that is how each monetary policy instrument and channel affects income inequality. Previous researches shows strong heterogeneity in their results, which can be explained by differences in the research focus of the studies and the lack of detailed knowledge of the income structure of households. After contrasting these approaches, I explored with panel database analysis (GMM model) the extent to which each monetary policy variable influences the inequality measured by the Gini indicator.

The research is based on euro area Member States and three other countries with negative interest rate policies (Denmark, Sweden, Switzerland). The surveys cover five variables related to monetary policy (inflation, short-term interest rates, savings, unemployment rate, GDP per capita), covering the period 2008-2019.

Overall, the impact of monetary policy on inequalities is modest but not negligible. The results confirm the fact that a monetary policy aimed at moderate, stable inflation has a positive effect on inequalities. The moderate growth rate of the price level (which is also in line with the inflation target of around 2-3% for advanced central banks) is leading to a reduction in inequalities. The positive impact of GDP per capita may reinforce the significance of indirect effects. The data also support that changes in the unemployment rate affect different income groups to different degrees, so that its increase exacerbates inequality. Furthermore, based on the results of the applied model, the increase in short-term interest rates increases the inequality, while the increase in savings has the effect of reducing inequality.

Monetary policy stance can affect inequalities through a number of variables. A monetary easing will result in an increase in inflation and GDP, as well as a decrease in short-term interest rates, the unemployment rate and savings. The coefficients for all variables included in the model provide information about the impact of monetary policy. Based on the main findings of the research, it can be concluded that a monetary easing results in a reduction in income inequality through an increase in inflation and GDP per capita. However, numerous studies have shown that developments in the financial markets, through the rise in individual asset prices, have increased the income of the top 1% the most. Thus, the positive effects did not affect the certain social groups in the same way, which further widened the gap between rich and poor.

#### **4. Overall conclusions**

Throughout history, each economic crisis has usually brought about such changes that have also contributed to some extent to the reform of economic thinking. The most significant ones include the Great Depression in the early 1930s or the oil crisis of the 1970s with the related stagflationary phenomena. The global financial and economic crisis of 2008 is also of similar significance, which has once again triggered a change in the prevailing economic paradigms. While the events of the 1930s resulted primarily in the dominance of fiscal policy, the events of the 1970s marked a proliferation for monetary policy. In the decades following 2008, a period seems to be unfolding in which the line between fiscal and monetary policy seems to be blurred in practice.

In a narrower sense, focusing on the changes of monetary policy stance, similarly to the previous periods, the relationship between central bank policies and fiscal policy is now also a determining factor. The changes that began after the 2008 crisis and intensified by the

Covid-19 crisis of 2020 have led to the development of modern monetary theory, which is in fact based on active cooperation between fiscal and monetary policy. In theory, the earlier Keynesian principles emerge that the government must actively expand its budget in order to move the economy towards full employment. As long as the economy has spare capacity, inflationary pressures are lagging behind. MMT will allow the budget deficit to expand and will also allow central banks to buy government debt. Sustainability does not depend on the size of deficits, but on the level of interest rates. Thus, the system of economic conditions resulting from the coronavirus crisis gave rise to the need to put the above contexts into practice.

The protracted recovery from the global financial and economic crisis was followed by the 2020 crisis, which included an exogenous shock to demand and supply, and led to an increasing influence of public sector involvement. Fiscal interventions on a larger scale than ever before have led to a sharp rise in budget balances and government debt levels. The near-zero interest rate environment following the 2008 crisis was supportive for the financing and sustainability of debt. The same mechanisms are reinforced by quantitative easing measures of central banks, which can be paralleled with the phenomenon of monetary financing. In fact, this also fits into the MMT framework and implies a limited degree of central bank independence. The central bank's independence, which dates back several decades, has not been compromised in legal terms, however de facto we are witnessing significant changes. The role of the central bank has become wider and wider, and at the same time the toolbox of the central bank has expanded significantly, and the size of the central bank's balance sheet have risen to unprecedented heights. Monetary policy in the decades of 2010 and 2020 is expected to be based on unconventional measures, and a full return to conventional instruments is not expected to materialize, and the same is true of the process of monetary policy normalization. Although the central bank's targets are still built in line with inflation targets, changes appeared, such as the average inflation targeting in the US or, in theory, setting higher inflation targets. The importance of price stability is still important today. Quantitative easing and other unconventional measures have demonstrated that in the economic environment of the post-2008 crisis, inflationary pressures remain contained, regardless of the extent to which central bank balance sheets are inflated. Even if MMT says that its current activities do not pose a risk to inflation, some negative experiences from previous and recent years should be borne in mind when the weakening of central bank independence, coupled with irresponsible fiscal policies, has generated severe inflationary pressures (e.g. Turkey, Venezuela, etc.). It should also be

borne in mind that the combined presence of supply and demand side effects in the wake of the coronavirus crisis make future inflation trends uncertain and unpredictable.

The 2020 decade presents further significant global challenges. Climate change is one of the biggest problems to be solved, in which the central banks can and must play an active role. Climate risks can also have an impact on financial stability, and therefore on inflation. Increasing the emphasis on green finance is an important milestone on the road to sustainability. Another important dimension is the consideration of distributional effects in the execution of central bank activities. Each social group, based on their income situation, is affected to a different extent and in different directions by the monetary policy guidelines and measures. Their importance in the era of unconventional measures is particularly emphasized.

Technological developments, digitalization and automatization are taking on increasing proportions, which may also have an impact on inflation and natural rate of interest. Demographic change and the challenges posed by an aging society also have a significant impact on the development of natural interest rates. The persistent decline in the natural rate of interest also suggests that interest rates close to zero are expected to remain with us for a longer period of time. The persistently lower level of natural interest rates has also been an important factor in the use of negative nominal interest rates. In the euro area, negative nominal interest rates served as a complement to other unconventional measures, due to inflation targets and a recovery in the real economy. The Danish and Swiss examples were closely linked to developments in the euro area and their spill-over effects. In the United States, the likelihood of using negative nominal interest rates remains low, especially given the inflationary pressures in the post-crisis period. In fact, an important factor here is that the rapid and intensive US crisis management has enabled a faster recovery process compared to the euro area, which has allowed the normalization of monetary policy to begin (until the corona virus crisis erupts). The different risk perceptions and intensities of the action in the area are emphasized. The initial weaknesses of EMU also contributed to the divergence of the crisis on the European continent.

The existence of negative interest rates already indicates the creation of a new era. With regard to current developments, it is important to stress that the fears expressed earlier have not been substantiated. The lack of growth in the demand for cash has been due to the fact that there have been no really deep negative interest rates so far. In many cases, the pass-through of negative interest rates to deposit rates did not take place. Thus, this did not encourage customers with relatively smaller deposit holdings to withdraw their savings from banks. However, the limited

pass-through has other important side effects. These are i) profitability ii) risk taking iii) monetary transmission iv) the effectiveness of the application of negative interest rates. It did not significantly impair profitability because there were alternative options. An important question is how other interest rates, and thus asset prices, exchange rates, react. In the case of Denmark and Switzerland, we have seen positive developments in this area. However, temporary effects can also generate opposite processes. It is illustrated by the example of Switzerland where some lending rates have started to rise temporarily following the application of negative interest rates. If banks are unable to pass on the additional costs of negative interest rates to depositors, they may raise lending rates to keep interest margins unchanged, which will have contractionary and counterproductive effects. These risks have also not materialized so far, but long-term side effects continue to carry this potential risk. However, the positive examples are reinforced by the fact that a significant proportion of mortgage loans in Denmark are already lent at negative interest rates.

Another important side effect of negative and near-zero interest rates is the risk of overheating in the stock market and the risk of financial bubbles. In parallel with the disappearance of risk-free returns, investors and savers turned to riskier assets, triggering record asset price increases. However, as long as the state of the economy (and the level of inflation) requires a low interest rate environment, these trends are expected to continue. Caution (including the launch of a gradual rate hike cycle) will therefore be paramount in central bank activity in the coming years.

Taken together, the above phenomena confirm that a new era in monetary policy has begun to unfold, putting the economic policy of the coming years and the whole of economic thinking in a new context. As many of the contexts work differently than in previous periods, it is particularly important to have the fullest possible understanding of the current environment and conditions, and to apply a cautious, prudent approach to decisions.

## **5. List of publications**

1. Czeczeli, V., Kolozsi, P. P., Kutasi, G., Marton, Á. (2020). A Covid-19 járvány rövid távú gazdasági hatásainak klaszterelmzése. In: Koltay, András; Török, Bernát (szerk.) Járvány sújtotta társadalom : A koronavírus a társadalomtudományok szemüvegén keresztül. Budapest, Magyarország : Ludovika Egyetemi Kiadó (2021) 594 p. pp. 275-296. , 22 p.
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## **6. Curriculum Vitae**

Vivien Czeczeli began her PhD studies in 2017 in the Economics research area at the Doctoral School of Public Administration Sciences at the University of Public Service.

She obtained her bachelor's and master's degrees at the Faculty of Economics at the University of Pannonia in 2016 with a BA in International Business Economics and in 2017 with an MA in International Economy and Business. Her research activity began with her participation in the Scientific Student Circle Conferences, which also formed the basis of his first publication in a category B journal.

Since the autumn of 2018, she has been working as an assistant teacher at the Department of Economics and International Economics at the University of Public Service. Her educational range covers many sub-areas of economics, including: Macroeconomics, International Economics, Microeconomics, Public Economics, Mathematical Analysis, Mathematical Statistics.

From January 2020, she works as a junior researcher at the Economy and Competitiveness Research Institute of the University of Public.

She has publications in a number of certified journals (including the Public Finance Quarterly, European Mirror, Köz-Gazdaság, Közgazdasági Szemle). In addition to the above, her writings can be read on other platforms (Makronom, Portfolio, Index). She has participated in several domestic and international conferences.

From 2017 to 2019 she participated in Ludovika Priority Research Workshop of KÖFOP project. In 2019, she was a student at the PADE PhD Scholarship Support Program.