CHARLES UNIVERSITY

FACULTY OF SOCIAL SCIENCES

Institute of Economic Studies

THE IMPACT OF MONETARY POLICY ON THE ECONOMIC GROWTH OF THE CZECH REPUBLIC

Master's thesis

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Study program: Economics and Finance

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Year of defense: 2023

Declaration of Authorship

The author hereby declares that she compiled this thesis independently, using only the listed resources and literature, and the thesis has not been used to obtain any other academic title.

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Prague, July, 2023

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Abstract

This study deals with the impact of monetary policy on the economic growth of the Czech Republic. The subject of this thesis is the examination of monetary policy of the Czech Republic in the period 2001-2022. The main focus of the thesis is based on investigating the potential impact of monetary policy on the economic growth in this country. Quarterly data for the Czech Republic economy for the 2001Q1-2022Q3 period was used in the study. Whether the monetary policy is effective in the Czech Republic has been examined using VAR analysis. According to the results obtained, the effectiveness of monetary policy instruments in the Czech Republic varies periodically. According to the findings, an increase in real GDP was observed after COVID-19. This indicates that monetary policy instruments generally have a positive effect on the economic growth of the country.

Abstrakt

Tato studie se zabývá vlivem měnové politiky na ekonomický růst České republiky. Předmětem této práce je zkoumání měnové politiky České republiky v období 2001-2022. Hlavní těžiště této práce je založeno na zkoumání potenciálního vlivu měnové politiky na ekonomický růst v této zemi. Ve studii byla použita čtvrtletní data za ekonomiku České republiky za období 2001Q1-2022Q3. Zda je měnová politika v České republice účinná, bylo zkoumáno pomocí VAR analýzy. Podle získaných výsledků se účinnost nástrojů měnové politiky v ČR periodicky mění. Podle zjištění byl po COVID-19 pozorován nárůst reálného HDP. To naznačuje, že nástroje měnové politiky mají obecně pozitivní vliv na ekonomický růst země.

Acknowledgments

The author is grateful especially to the supervisor doc. Mgr. Tomáš Holub Ph.D. for his comments and guidance. During the whole thesis process, supervisor was giving valuable pieces of advice to make the thesis successful.

Bibliographic Record

The Impact of Monetary Policy on The Economic Growth of the Czech Republic. Master's thesis. Charles University, Faculty of Social Sciences, Institute of Economic Studies, Prague. 2023, pages 69. Advisor: doc. Mgr. Tomáš Holub Ph.D.

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Acronyms

CB   Central Bank

CNB   Czech National Bank

CZK   Czech Koruna

ADL   Autoregressive Distributed Lag

GDP   Gross domestic product

Master's Thesis Proposal

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Proposed Topic:

> The Impact of Monetary Policy on the Economic Growth of the Czech Republic.

Motivation:

> Implementing a proper monetary policy in order to keep stable prices and moderate interest rates, has always been the main goal of all the policymakers in the world. Monetary policy is considered to be the most significant macroeconomic policy which directly affects the overall health of the economy measured by the economic growth. Thus, nowadays all the countries in the world are trying to boost their economic growth, as the higher economic growth means higher output, higher employment and consequently, high standards of living.
>
> It is a well-known fact that throughout the history, different countries implemented either conventional or unconventional monetary policy tools in order to achieve their goals, but in the end, it happened so that many of them had to give up particular tools and switch to other ones. When it comes to the Czech Republic, the country had fixed exchange rate regime until 1997, and only in 1998 it switched to inflation targeting **(Horvath, Borys, 2008).**
>
> Observing such an importance of proper implementation of monetary policy tools and regimes for all the economies in the world, especially the measures, implemented by central banks after the covid shock, motivated me to conduct an empirical analysis and analyze the main effects of the monetary policy tools and regimes, implemented in the Czech Republic, on country's economic growth up until today. To add, I chose exactly the Czech Republic due to the lack of modern empirical researches, which took into account the most recent data after covid shock.

Hypotheses:

> 1. **Hypothesis #1:** The monetary policy measures implemented after the covid shock have a positive impact on the economy of the country.
> 2. **Hypothesis #2**: Inflation targeting regime positively affects the economic growth of the country.

3. **Hypothesis #3:** Current monetary policy regime and implemented tools are the most suitable ones for the Czech Republic in order to ensure price stability, high employment rates as well as high long-term economic growth.

Methodology:

First of all, I am planning to collect the data on major central bank macroeconomic variables from reliable sources as IMF, CNB, ECB and others. Secondly, in order to analyze the effect of monetary policy on the economic growth of the Czech Republic, I will use factor augmented vector autoregression model and will do the empirical analysis in a statistical software called STATA. As my data will be time-series, VAR model would be very suitable in predicting multiple time-series variables with their lags using one model.

Expected Contribution:

I will contribute to the most recent studies and especially to the study, called "**What We Know About Monetary Policy Transmission in the Czech Republic: Collection of Empirical Results**", and will do the research using the most recent data and thus, will be able to analyze the impact of monetary policy on the economic growth up until 2021, including the measures after the covid shock. Taking into account the lack of recent studies regarding this topic particularly for the Czech Republic, I will also focus on the most recent studies, which analyzed the monetary policy transmission channels and their effect on the economy of countries in the Euro zone.

In the research, conducted by **Horvath and Borys (2008)**, the authors found out that monetary tightening, implemented by the CNB, led to decrease in output as well as prices, however, it led to the appreciation of the currency, as it was expected. The authors also point out that it is very significant to use the real-time data while analyzing the influence of the monetary policy, thus, I will try to use the most recent available data in order to precisely estimate and deliver the reliable results.

For instance, **Allard and Munoz(2008)** discuss about the challenges which the country faced while implementing a monetary policy after the demand-driven inflation. Based on this research, I would analyze the challenges which the country faced for the recent years, including the covid period. Overall, how the monetary policy transmission channels worked before and during the covid shock.

Outline:

    I.   General introduction to monetary policy regimes and instruments, describing the importance of monetary policy for the economic growth of the countries.

    II.   Description of monetary policy of the Czech Republic i.e the instruments and regimes implemented.

    III.   Literature Review

    IV.   Inflation targeting/its advantages and disadvantages, effects on actual inflation volatility

V. Inflation targeting and economic growth
VI. Testing of hypotheses
VII. Summary of empirical results and discussion of the main results
VIII. Main conclusions derived from the empirical research.

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1. INTRODUCTION

With its accession to the European Union, the Czech Republic has committed to adopting the common euro currency and taking steps towards integration into the European Monetary Union (EMU). The gateway to the eurozone has been opened for the Czech Republic only by meeting all the nominal convergence criteria. These criteria, called the Maastricht criteria, include price stability, convergence of long-term interest rates, exchange rate stability, public budget deficit and public debt.

Creating conditions for maintaining national price stability is the most important goal of monetary policy. However, these policies often promote price stability only as a means of meeting these obligations. On the other hand, price balance is a necessary but not sufficient condition for long-term economic growth, which measures the overall health of an economy, as evidenced by the global experience of overcoming the global financial and economic crises and their consequences. Therefore, pursuing a stable monetary policy is considered to be an important aspect of economic management.

The central bank focuses its monetary policy on achieving long-term economic growth and high employment, but only if this does not jeopardize its primary objective, price stability. The independence and transparency of the central bank is a prerequisite for implementing a monetary policy that leads to price stability.

The main subject of this thesis is the examination of the monetary policy of the Czech Republic in the period 2001-2022 to compare before and after covid shock period differences on the economic growth of the country. The thesis will focus on investigating the potential impact of monetary policy, implemented by the Czech National Bank Board, on the economic growth in this country.

1.1. CONCEPTUAL FRAMEWORK

1.2. General introduction to monetary policy

The term "monetary policy" refers to a group of tactics developed to attain fundamental objectives by affecting the quantity, price, and expectations of businesses and consumers. In other words, monetary policy describes the choices made to influence the cost and availability of money. A series of connected actions taken by the Central Bank to control aggregate demand through a deliberate influence on the level of credit and money circulation is also known as monetary policy. The state's monetary policy is intended for short-term durations and is carried out via indirect means, and the Central Bank plays a significant role and holds a monopoly position in both of these areas. The main objectives of monetary policy are (Khan, 2003):

- regulation of economic growth rates;
- mitigation of cyclical fluctuations in the market of goods, capital, and labor;
- containment of inflation;
- achieving a balanced balance of payments.

By issuing and lending to the economy, banks play a useful and necessary role in the development of the country. Monetary instruments serve the economic turnover, and they can be compared with vehicles. The latter makes it possible to deliver goods, industrial and agricultural products to the place of their processing or consumption; similarly, monetary instruments ensure the circulation of various goods, their transfer from one owner to another, facilitating their processing or consumption (Gilchrist, Leahy, 2002). However, the excessive or uncontrolled issue of money can lead to dangerous and even destructive consequences. When bank lending exceeds a certain limit, it no longer stimulates production, but generates excess purchasing power, the consequence of which is a rise in prices. Therefore, control of monetary policy actions requires detailed analysis.

The primary purpose of monetary policy is to assist the economy in reaching a level of the generation that is described by price stability and complete employment on a national level. The goal of monetary policy is to alter the money supply in order to stabilize prices, employment, and overall output (stable growth) (Chung, 2007). The issuance of cash used to be central banks' primary responsibility, but this role has since shifted to the background. Nevertheless, we shouldn't forget that cash is still the basis for the entire

remaining money supply, so central banks' cash-issuing activities should be no less rational and balanced than other activities.

The Central Bank affects the lending activities of banks by implementing monetary policy. Along with this, it creates regulations that increase or decrease lending to the economy, ensuring the steady progress of the regional economy, strengthening the circulation of money, and balancing local economic times. Thus, the effect on credit enables the achievement of more profound strategic goals for the growth of the entire economy (Friedman, 1995). For instance, it is challenging for businesses to conduct business transactions, make local investments, etc. because of a shortage of available funds. However, an excessive money supply has disadvantages as well, including the devaluation of currency and a consequent decline in living standards and the nation's financial status. As a result, the first scenario calls for monetary policy to be focused on increasing bank lending operations, while the second scenario calls for its reduction and a shift to a "expensive pricing" policy (restriction).

CNB implements its monetary policy in inflation-targeting mode. Inflation is often understood as the repeated increase in most prices in a given economy. In practice, inflation in the consumer price domain is measured as an increase in the so-called consumer price index.

Disinflation can be achieved at a greatly reduced rate of sacrifice if people apply the reduction in inflation to their own inflation expectations. Another important element is operational and interim targets. Because, after using monetary policy tools, we can expect the reflection of the said effect on inflation between 12-18 months. Therefore, it is important to use these tools in advance.

We can consider cost shocks, which cannot be fully predicted and subsequently push inflation up, as a fragile point of inflation targeting. It is then important to decide whether to impose a monetary policy restriction, as it causes a reduction in domestic production. In such a situation, the economy could be hit by a recession.

Cost or supply inflation results from decrease in aggregate supply. Unlike demand-side inflation, we cannot well predict a cost or supply shock here. The level of prices rose by 15.8% year on year in December 2022. Consumer prices increased 14.4% year on year in December, after adjusting for the main effect of changes to indirect taxes. During the entire period of 2022, inflation has been 15.1%. The negative deviation from the December forecast was also due to the development of largely adjusted prices, similar to

the previous two months. It reflected the fall in electricity prices in October due to the statistical projection of the contribution to the savings tariff, which was not explicitly taken into account in the CNB's forecast. The December slowdown in the increase in fuel prices was more evident than the forecast expected in the autumn. Core inflation also eased a little more than expected. On the other hand, the rise in food prices was significantly faster at the end of last year. The primary effects of changes in indirect taxes developed in line with estimates.

December annual inflation would have been 3.5 percent higher if price developments had not been affected by the statistical projection of government measures to help high energy prices, namely the abolition of the savings tariff and tax cut approved by the end of 2022. The rise in food prices has also slowed somewhat, but continues to be rapid. This is related to the continued high level of prices of agricultural commodities and domestic agricultural producers, reflecting rising energy costs and other economic effects of the war conflict in Ukraine.

According to estimates, capping electricity and gas prices from the beginning of this year, following the energy savings tariff, will somewhat reduce the increase in regulated prices. Other components of inflation will be moderate. In the second half of the year, inflation will fall to single digits. Behind this will be the labor market, which will also be affected by the alleviation of cost pressures, the cooling of external economic growth and domestic demand, and the tight monetary policy. In the monetary policy horizon, which is the first half of 2024 in the autumn forecast, inflation will fall close to the CNB's 2% target.

1.2.1. Definition of monetary policy

A component of a governmental economic policy aiming at enhancing citizen welfare is monetary policy (Benigno, 2004). Its top objective is to maintain low inflation and price stability. A series of related actions performed by the Central Bank to control aggregate demand through a planned influence on the state of credit and money circulation is known as monetary policy. The state's monetary policy is intended for short-term durations and

is carried out via indirect means, and the Central Bank plays a significant role and holds a monopoly position in both of these areas. The economy cannot run smoothly without the central bank pursuing the proper monetary policy. (Leith, Wren·Lewis, 2000). The government's ability to formulate monetary policy effectively determines the state's economic trajectory. As the economy is being reformed, new issues with money circulation are continually emerging. For instance, many businesses engage in bartering with other businesses when there is not enough money in circulation. The payment of wages is delayed when there is not enough money in circulation.

For this reason, the essential goal of the state's monetary policy is influencing the patterns and amount of economic growth to ensure it is sustainable of output, macroeconomic indices such as employment, inflation, investment activity, and others. It is viewed as a set of economic policies to control the circulation of money. The ultimate goal of the monetary policy pursued by the Central Bank and state institutions is to organize the stability of monetary circulation, ensuring the achievement of sustainable growth in national production, characterized by sweaty employment and the absence of inflation. Monetary policy consists in regulating the money supply: during an economic downturn, by increasing the money supply to encourage spending, and during economic growth accompanied by inflation, by limiting the money supply to limit spending. The state frequently use monetary tools to regulate the economy. (Bernanke, Mihov, 1998) Credit regulation functions as a type of weapon of state involvement in the economy, while on the one hand these measures are a fundamental component of the entire complex of economic policy.

Monetary policies are divided into 2 places, depending on their purpose (Dixit, Lambertini, 2003).

- A monetary expansionary strategy
- A monetary contraction strategy

The first type of monetary policy aims to increase the quantity of money that is readily available in the economy by lowering interest rates, requiring central banks to purchase government assets, and lowering the amount of reserves that banks are required to maintain. Unemployment goes down as a result of a growth policy, as does consumer and business activity. According to Policy (2011), the primary goal of expansionary monetary policy is to encourage economic expansion. However, it also leads to substantial inflation.

On the contrary, the primary goal of contractionary monetary policy is to reduce the amount of money in circulation. The sale of government bonds, an increase in interest rates, and an increase in bank reserve requirements are all options for achieving the desired outcomes.

2.2.1 Regimes and Instruments of Monetary Policy

The choice and use of instruments for the implementation of monetary policy is exact, first of all, by the set of tasks that the central bank has to solve at a given phase of economic improvement. The use of a certain combination of tools varies depending on the priorities and direction of the state's overall economic policy, the degree of openness of the economy, existing traditions, and specific tasks. Generally, it is possible to collect the tools of monetary policy under 2 headings (Bernanke, 2020):

- Direct monetary policy
- Indirect monetary policy

First and foremost, direct methods are administrative ones that are carried out in response to directives from the central bank regarding the amount of money in circulation and the current price in the financial market. By adjusting the discount rate, the central bank can alter interest rates. For instance, banks' borrowing costs will rise when a central bank raises the discount rate (Akitoby, Stratmann, 2008). The interest rate that banks charge their customers will then rise. Consequently, the economy's borrowing costs will rise and the money supply will decrease.

Credit ceilings are typically used to calculate total credit growth to government and economic channels within set inflation targets. Loans granted by central banks may be subject to some restrictions for various commercial bank economic activities.

It aims to encourage and direct credit to these sectors by keeping credit limits high in sectors. The credit ceiling limit can also be applied at the bank level. These limits are determined in accordance with existing loans, borrowers, banks' capital and bank deposits (Flood, Isard, 1989).

The liquidity application, which regulates the liquidity and equity structure of banks, is an important tool. Therefore, the financing costs of banks increase. Otherwise, the financing costs of banks will decrease. The liquidity practice is a direct tool that leaves

no room for banks to move (including all liabilities) and an indirect tool that leaves room to avoid banks (including some liabilities).

When it comes to the use of indirect methods, this method does not lead to disruption of the market economy system, as it affects the motivation of the behavior of economic agents with market methods. The effectiveness of these methods directly depends on the degree of development of the money market. Unlike direct action methods, the results of their use are less predictable, moreover, the characteristic is a significant time delay. A commercial bank's minimum reserve requirement is frequently set by central banks. By altering the amount that is required, the central bank has an effect on the amount of money in the economy. According to Wyplosz (1991), a decrease in the money supply would occur if monetary authorities increased the reserve requirement. As a result, commercial banks would have less cash available to lend to their customers. The reserves cannot be used to finance new business investments or loans by commercial banks. Because commercial banks are not eligible for it, they receive reserve interest from central banks.

To add, the central bank can buy or sell government-issued securities to change the amount of money in circulation. For instance, central banks are able to buy government bonds. As a result, banks have more money to lend, which afterward boosts the overall amount of money in the economy. Banks buy banknotes from customers at a crazy discount, and when they sell these notes to central banks, they are discounted again. An increase in this index causes a contraction in credit, and a decrease causes an expansion in credit. Changes in rediscount rates cause changes in market interest rates. Since the price of the loan is the interest rate, it affects the market interest rates and loan supply and demand in connection with the change in the rediscount rates.

There are several important monetary policy regimes. For example, foreign exchange targeting regime or "exchange rate targeting, a regime in which the monetary authorities are willing to sell or buy foreign currency in order to maintain the national currency at a predetermined level or within predetermined limits." (Gertler, Karadi, 2011).

Another regime, which sets quantitative targets for inflation, the achievement of which in the medium term is an institutional obligation of the monetary authorities, is called inflation targeting. This regime is distinguished by the transparency of the monetary policymaking process, which raises the Central Bank's level of accountability by educating the public about the key decisions made and their justifications. This implies

that the state's financial institutions are properly positioned with respect to one another and that they are assigned the duty of preserving price stability. Targeting inflation is done in stages described below.

Figure 1. Inflation targeting stages

Source: https://corporatefinanceinstitute.com/resources/economics/inflation-targeting/
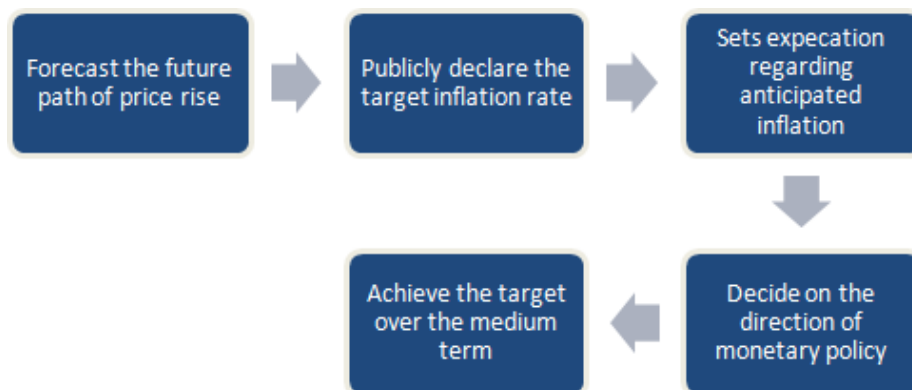
Besides, there is another important regime, which is called monetary targeting. Monetary targeting is closely related to inflation targeting, which involves setting as a target the growth of indicators (absolute or relative) of the money supply. However, monetary targeting policy is used most often by developing countries and countries with economies in transition, while monetary and inflation targeting is used mainly by developed countries and is not always effective for countries with economies in transition.

1.2.2. Importance of Monetary Policy for the Economic Growth

In times of crisis, central banks face various dilemmas regarding policy implementation. The first of these dilemmas is that increasing inflation rates in goods markets during crisis periods raise inflation expectations, while the negative effects arising from asset-backed securities spread to the real sector. In such an environment, central banks should both follow anti-inflationary policies in terms of price stability and re-establish confidence in financial markets in order to protect the real sector (BIS, 2009). However, while it is necessary to increase interest rates in order to reduce inflation, interest rates should be reduced in order to accelerate the flow of credit in financial markets. This dilemma causes

delays in the intervention of central banks to the crisis. Another dilemma is the reverse movement of inflation and growth rates during crisis periods. If growth rates are decreasing while inflation rates are increasing, it is not clear in which direction interest rates should be moved in such a situation. Indecision on this issue is one of the factors that led to the deepening of the crisis (Tokucu, 2010).

When there is a negative shock in the economy and therefore cyclical fluctuation, price increases cannot be prevented without taking into account the recession. Therefore, a choice must be made between growth and price stability in the long run. In any case, according to the price stability thesis, price stability gains importance because there is a harmony between growth and full employment and price stability in the long run. In addition, since even a mild inflation that can be accepted may turn into rapid price increases in the future, this may require concessions from the increase in production. In any case, according to the growth thesis, since the main goal is growth, every obstacle in front of it should be removed. Since rapid growth will increase total supply, it will also decrease prices over time. Thus, while the economy will get rid of the recession and growth will accelerate, price stability will be ensured in the future. While absolute price stability causes the danger of stopping economic growth by slowing down the functioning of the economy, the price of rapid growth is paid by inflation (Koyuncu, 2009).

Noting the price fluctuations, it is significant to mention supply- and demand-side shocks, that cause economic volatility and are widely acknowledged by New Keynesian theorists. However, many economists are more interested in how the economy will react to these shocks than the issues that make the effects of the shocks worse. According to New Keynesian analysis, government involvement with some form of restrained discretion is preferred because the adjustment process in market economies is so slow, particularly after significant shocks with long-lasting impacts. In their models, (Clarida,2000) showed that monetary policy has effects on real variables due to nominal price rigidities in the short run. Due to this, the correlation between production and inflation is shown to be positive in the short run, but the correlation between ex-ante interest rates and output is negative. It was underlined that after 1980, the monetary policy implemented within this framework changed to become more proactive. However, by basing their analyses on microeconomic principles, New Keynesian theorists have moved closer to their rivals in New Classical Economics. The New Neo-Classical Synthesis is the name given to this compromise, which tries to explain cyclical oscillations and develop the best possible

policies. (Goodfriend, 2002). The approach is known as the "New Consensus" in post-Keynesian economics, which has critiques of this synthesis and alternative policy recommendations.

Goodfriend and King (1997) cite the following in their analysis: the demand for macroeconomic models that incorporate intertemporal optimization and expensive price adjustment; the widespread application of the Rational Expectations Hypothesis; and the significance of imperfect competition. The money supply has no place in the model. Because the New Consensus partially converges with Post-Keynesian Economics at this point and accepts money as internal. He disagrees with the notion that aggregate demand, which is a component of the Post Keynesian framework, may ultimately be employed as a tool for policymaking. Stabilizing output stability around the potential production level and price stability around the goal inflation rate is the best course of action within the parameters of the New Accord. The equilibrium real interest rate, which can maintain the economy at its potential production level, is a new aim, according to Wray (2004). because the relationship between money and the general level of prices is reversible and money demand determines money supply. According to McCallum (2001), the trivialization of money in monetary policy practices in this way is defined as "moneyless monetary policy". According to Woodford (2003), the absence of monetary variables in this synthesis and the insignificance of money in the implementation process of monetary policy provide a suitable framework for Wicksell's monetary analysis. The most important feature of the monetary policy shaped within the framework of the New Consensus is that it rejects the Quantity Theory adopted by the Classical/Monetarist line and adopts the relations established by Wicksell between the general level of prices and the monetary and natural interest rate (Ozdemir, 2009).

By changing the nominal policy rate, the monetary authority indirectly changes the real interest rate. Because the expected inflation does not change immediately due to price rigidities in the economy. When the central bank changes the short-term interest rate, the interest rate applicable to short-term transactions between banks is also affected. Other long-term interest rates then change. All these changes are reflected in consumption and investment decisions with a certain delay. Thus, while the economy goes to long-term equilibrium, output gap, loan supply and demand and inflation change. Changes in policy rates spread over time (Ozatay, 2012). This process is based on a certain policy rule, and at this point, the rule-appreciation debate comes to the fore for the monetary policy that

directs the economy to the long-term balance. Because the rule of price stability can bring with it the instability of the real economy. Discretionary discretion gives policy makers flexibility in the face of unexpected situations such as shocks. However, there is one point on which contemporary monetary policy agrees: Compared to discretionary policies, policy rules have significant advantages in improving economic performance. When discretionary adjustable policies are implemented, it is impossible to prevent inflationary expectations (Guney, 2006).

1.3. Monetary Policy of the Czech Republic

In these terms, a significant role of the Czech National Bank in shaping the country's macroeconomic policy should be noted. In accordance with the Law of the Czech Republic No 6/1993 "On the Czech National Bank", the CNB must maintain price stability, as well as contribute to the overall economic policy of the government aimed at sustainable economic growth. Describing the features of the monetary policy of the CNB, it is important to note its commitment to the principles of inflation targeting and a floating exchange rate. Since January 2010, the CNB has set a point inflation target of 2% ± 1 percentage point. The main instruments of the CNB's interest rate policy are: the two-week REPO rate, the discount rate and the lombard rate.

The experience of the CNB in overcoming the consequences of the global financial crisis is interesting. In autumn 2008, the CNB introduced extraordinary REPO operations to provide liquidity to banks for a period of two weeks and three months (as of January 2011, three-month operations were canceled). The CNB redeemed its own bonds from banks before their maturity, in addition, the term for REPO operations was extended to six months, and the list of assets accepted as collateral for loans in the course of refinancing was expanded. At the same time, in the context of increased deflationary risk in November 2013, the CNB used the exchange rate as an additional instrument of influence as part of the inflation targeting strategy. In particular, the CNB intervened in the foreign exchange market, maintaining the national currency at the level of CZK 27 per euro and accumulating foreign currency at the same time (the international reserves of the CNB in April 2017 amounted to 70% of GDP). In April 2017, the CNB announced the end of the minimum exchange rate policy (Fisera, Kotlebova, 2020). In the following months, the crown gradually and steadily strengthened, reaching 25.5 CZK against the euro by the end

of 2017. It is important to note the significant role that the CNB for short, plays in determining the macroeconomic policy of the nation.

When describing the characteristics of the CNB's monetary policy, it is essential to note its adherence to inflation targeting and a floating exchange rate. The CNB has had a point inflation target of 2% less than one percentage point since January 2010. The CNB's main instruments for regulating interest rates are as follows: the discount rate, the Lombard rate, and the two-week REPO rate (Mihola, et al., 2020).

Figure 2: Inflation in the Czech Republic (annual consumer price inflation)

Since January 1998, the CNB has implemented its monetary policy in the inflation targeting regime. In simple terms, it undertakes to strive for inflation to move close to the announced inflation target under normal external economic conditions. This regime has several advantages compared to other monetary policy regimes (for example, money supply targeting, exchange rate targeting). Above all, it is aimed directly at controlling inflation - a quantity that directly affects the decision-making and behavior of most of us in the area of consumption, investment and savings, however much we may not be aware of it. The central bank's commitment in the form of an inflation target is well understood by the public and anchors inflation expectations. Figure 1 shows the development of inflation targets since the beginning of inflation targeting in the Czech Republic.

Figure 3: Inflation targets of the CNB
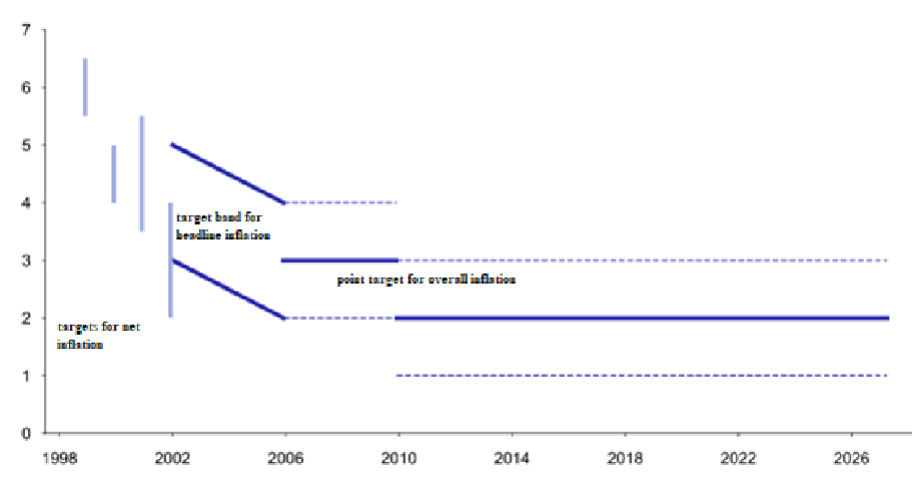
Source: https://www.cnb.cz/cs/o_cnb/menova-politika-ceske-narodni-banky/

Due to the delay between the monetary policy measure and its most significant impact on inflation, the CNB's monetary policy decision-making is guided not by the current situation, but by the forecast of future developments - in much the same way that in the morning before leaving the house we decide on our clothes first of all, not according to the current weather, but according to forecasts for the whole day. According to CNB estimates, changes in interest rates have the most significant impact on inflation in a period of roughly 12-18 months. Therefore, the CNB focuses on this horizon in its monetary policy deliberations, but of course it also considers developments before and after it.

The forecast for the development of inflation and the entire economy is based on the current situation and on past developments, but also on assumptions about the future development of some significant variables. The forecast is created using a sophisticated model of the functioning of the Czech economy, but at the same time it is significantly influenced by expert discussions and expert opinions of CNB economists (Táborský, 2020).

1.3.1.   Regimes and Instruments of Monetary Policy of the Czech Republic

The question for central banks becomes whether to choose only one goal or to try to achieve several goals at the same time. Central banks mostly favor the path of one goal. Above all, it is about maintaining the stability of the price. A stable price level is a very important economic quantity. In the case of fluctuations in the price level, there is an unfair distribution of money among economic entities, which causes people's social

insecurity. Another method of monetary policy is the determination of multiple goals, where, for example, exchange rate stability, balance of payments, economic growth or so-called full employment are added to maintaining the stability of the domestic currency. It is necessary to realize the difficulty of combining these goals into a collective whole (Mihola,, 2020). Above all, from a short-term point of view, combining two or more goals is very challenging, because they interfere with each other. If the central bank chooses this type of policy, it risks failure to fulfill at least one goal in the short term, which would result in a decrease in trust in the given institution.

Monetary policy regimes differ in both goals and instruments. Each of the nominal anchors has its own set of monetary policy instruments. Let us characterize each of the DCT regimes with the help of a table.

Table 1. Characteristics of Monetary Policy Regimes of CNB

Characteristic	Inflation targeting	Money targeting	Exchange rate targeting
Final goal	Price stability	Price stability and balanced economic growth	Price stability and stable exchange rate
intermediate goal	None / about inflation forecast	Monetary Aggregate	Exchange rate
Operational goal	Money market interest rate	Monetary base/components of central bank balance sheet, net international reserves	Exchange rate or currency basket
Instruments of de gentle-credit policy	- open market operations - permanent instruments	- open market operations - standing instruments - reserve requirements	- foreign exchange interventions - refinancing operations - reserve requirements

The main task of monetary policy instruments is to stabilize the operational goal, which is the short-term interest rate. In case of deviation from the defined value, the central bank is obliged to use its tools to re-establish the defined values. The direct impact of the introduced measures will initially be felt by the banking system, which will then transfer the measures to the market. In the initial division, we will be mainly interested in the impact on the banking sector: (Yakubovskiy, S., Alekseievska, 2020)

Credit quotas - consist in the directive setting of credit limits. A distinction is made between relative and absolute credit quota.

Interest limits (interest ceilings) - the central bank can set commercial banks the maximum interest rates that they can demand from the loans they provide, or, conversely, the minimum interest rates from the deposits received.

Compulsory deposits - mostly related to central institutions or local self-government bodies.

The impact of indirect instruments will be felt by all banks, as the same conditions apply to them, and moreover banks have a choice whether to respond to these measures. Compared to direct instruments, there are no limits for decision-making, so they can only affect the business of banks. This results in an eventual reduction in the effectiveness of these measures.

Discount instruments - represent interest rates and other terms of loans that the central bank provides to commercial banks in domestic currency - this significantly affects the credit capacity of commercial banks.

Open market operations are about the purchase or sale of securities for increasing or decreasing the money supply in the economy. This increases or decreases their liquid reserves and at the same time their credit capacity.

Mandatory minimum reserves - are determined as a percentage of the total amount of primary deposits of commercial banks. Every change in reserves therefore affects the credit capacity of commercial banks, because the amount of funds that a given commercial bank can dispose of changes.

Foreign currency conversions and swaps - The central bank's purchase and sale of foreign currencies from commercial banks also affects the credit capacity of commercial banks.

Intervention in favor of (against) the exchange rate - with this instrument, the central bank most often influences the development of the state's trade balance and the rate of inflation.

Monetary policy instruments of the Czech National Bank (ČNB): (Miranda-Agrippino, Rey, 2020)

Free market operations: The main currency instrument is repo operations, which are carried out in the form of a tender (selection procedure). The CNB accepts excess liquidity from banks in exchange for agreed securities. After the expiry of the maturity period, the CNB, as the borrower, returns the loaned funds to the creditor bank plus a predetermined interest. The CNB will receive its securities back. These operations usually last for 14 days. Repo operations are carried out three times a week. The three-month repo tender is used as an additional currency instrument. It is based on the same process as the fortnightly tender. For this tender, the CNB uses the money market rate at the time of the tender announcement. In the event of unexpected events, the CNB uses fine-tuning tools. It is used especially in case of fluctuations in market liquidity when the stability of the development of interest rates is threatened. In practice, this tool is used only exceptionally.

Automatic facilities: The deposit facility allows banks to deposit their excess liquidity with the CNB overnight. If the bank requests the closing of the transaction by the Department of Crown and Foreign Exchange Interventions of the CNB no later than 15 minutes before the end of the accounting day, it acquires access to the deposit facility. The marginal lending facility enables banks with a framework repo agreement to borrow money overnight from the CNB. The minimum loan volume is CZK 10 million. This facility method is used by banks only exceptionally.

Supply repo operations: This instrument supports the functioning of the government bond market. Since January 2011, a delivery period with a maturity of two weeks has been established.

Foreign exchange interventions: These are purchases or sales of foreign currencies for the Czech crown. It is used to loosen or tighten monetary policy. Foreign exchange interventions are commonly used to target inflation. Between 2012 and 2017, the CNB intervened in the foreign exchange market in order to weaken the Czech koruna so as to keep the exchange rate against the euro close to the price level of 27 CZK/EUR. The intervention of the CNB will have a particular effect on the level of foreign exchange

reserves. While foreign exchange reserves increase in interventions for protection (2013-2017), foreign exchange reserves decrease in interventions in favor of protection (March 2022). The crown has been weakening sharply against both major currencies since February 21, 2022. (Franta, Holub, Saxa, 2022).

Even without the intervention of the Czech National Bank (CNB), the Czech crown remained relatively strong at around CZK 24.30 per euro in 2022. Since May 2022, the central bank has intervened or is ready to intervene quickly to support the stabilization of the hedged exchange rate. The appreciation of the hedge generally means that less kroner than before is needed to buy euros (Kohajda, 2022).

The central bank strengthens the crown and lowers inflation by selling foreign exchange reserves, i.e., foreign exchange reserves from which it buys the crown, thus making it more attractive to traders. Because the Czech currency is relatively strong, it makes it cheaper to import, especially energy traded in euros or dollars. A weak crown will make imported goods like oil or natural gas more expensive.

1.3.2. Importance of Monetary Policy for the Economic Growth of the Czech Republic

In the Czech Republic, the Czech National Bank acts as the central bank. According to the Constitution of the Czech Republic and the Czech National Bank Act, the main purpose of the CNB is to maintain price stability. The CNB achieves its main objective of price stability through changes in the underlying interest rate settings. To promote monetary policy objectives, the central bank uses a number of different instruments that affect both the functioning of individual commercial banks and overall, the entire economy. Monetary policy instruments are divided into direct and indirect. Monetary policy is the regulation of the amount of money in an economy to achieve certain macroeconomic goals. This is a monetary and credit policy. In the long run, monetary policy primarily pursues the following objectives: (Zubíková, Smolák, 2022).

- maintaining price level stability,
- ensuring the balance of payments in the balance sheet,
- ensuring planned economic growth,
- maintaining a tolerable level of unemployment.

Direct or directive means are rarely used in advanced economic systems, and their use testifies to the failure of indirect means. These are mostly the following tools:

In modern economies, indirect monetary policy tools are used much more often: (Cobham, Song, 2021).

- Discount instruments – these represent the interest rates and other loan terms the central bank provides to commercial banks in local currency – this significantly affects the lending capacity of commercial banks.

- Open market operations which involve sale or purchase of securities for decreasing or increasing the money supply of the economy.

- Mandatory minimum reserves - set as a percentage of the total amount of primary deposits of commercial banks. Therefore, each change in reserves affects the lending capacity of commercial banks as the volume of funds a particular commercial bank can dispose of from changes in its disposal.

- Conversion and exchange of foreign currencies - The purchase and sale of foreign currencies by the central bank from commercial banks also affects the lending capacity of commercial banks - these are the conversion or exchange of foreign currencies.

- Intervention in favor (to the loss) of the exchange rate - this tool is most often used by the central bank to influence the development of the state's trade balance and the rate of inflation.

In the short run, monetary policy regulates the amount of money in circulation and interest rates.

Currently, the Bank of Czech ensures the achievement of inflation targets, while influencing the price of money in the economy by changing interest rates. When carrying out operations with credit institutions, the regulator directly influences only short-term money market rates, seeking to bring them closer to the key interest rate. But, as mentioned earlier, the reduction of inflation is an essential, but not sufficient condition for the progressive development of the Czech economy. The Bank of Czech, when changing interest rates, must take into account the impact not only on inflation but also on economic activity, which in turn affects economic growth (Collingro, Frenkel, 2020).

1.4. Literature Review

Chichek (2005) in his study "The Monetary Transmission Mechanism in Czech" specifically investigated the various channels set in motion by and measuring the time lags between monetary policy shocks and their effect on real activity and prices. The findings of Chichek (2005) according to the empirical results are as follows. Following a tightening of monetary policy, real production begins to decline dramatically and this decrease is maximum after 2 quarters is required in order to achieve a decrease in prices. The aggregate demand components of imports and investment are the most sensitive to monetary effects. After two years, monetary forces via the conventional interest rate channel account for around 25% of the changes in real activity. The effectiveness of monetary policy on prices rises while its effectiveness on bank lending, currency rates, and asset prices declines.

Several papers studied the impact of monetary policy on the Czech Republic with the help of the VAR model. According to Arnostova and Hurnik (2005), there was an evidence of prize puzzle in the first two quarters after the Czech Republic implemented the inflation targeting regime. In my paper, I use a similar, slightly extended time horizon (after the adoption of inflation targeting).To add, in my paper, I include real GDP as opposed to an ex-post revised GDP used by Arnostova and Hurnik (2005). Contrary to Arnostova and Hurnik (2005), we did not find evidence for a price puzzle in the Czech Republic.

Next, there are a few papers analyzing and comparing the effect of the monetary policy in a various Central and Eastern European countries. Many studies find evidence of price and/or exchange rate puzzles for the Czech Republic.

Dyba (1999) mentions that economic growth has always been the main macroeconomic variable which measured the performance of any country's economy. Thus, the author mentions that the main reason of the recession in the Czech Republic in the 90's was very restrictive monetary policy which decreased the inflation at the same time increasing the unemployment and leading to underperformance of the Czech Economy at that time. Moreover, the article concludes that exchange rate policy of the Czech Republic appeared to be inefficient and worsened the effect of implemented monetary policy in the middle of the 1996's.

According to Blaes (2009) the most suitable and precise way to estimate the impact of monetary policy shocks on several macroeconomic variables factor augmented VAR. The author's analysis is based on analysis of monetary policy transmission with the help of both FAVAR and VAR models. As an extension to the analysis of Bernanke (2005), Blaes (2009) found out that contractionary monetary policy increases money growth in the short run, but decreases it in the medium and long run. Overall, the analysis in this article shows that both VAR and FAVAR models produce similar

results, although FAVAR is more precise.

Boivin and Giannoni (2006) analyzed the fact that monetary policy does not always achieve its target goals and often the impact on inflation is very weak. For this reason, they analyzed the effect of monetary policy for the USA and concluded that after 1980 monetary policy answered inflation expectations more and stabilized the economic performance of the country more than before 1980.

Creel and Levasseur (2005) with the help of VAR model analyzed the role of exchange rates, credit channels and interest rates for monetary policy transmission in Poland and the Czech Republic. The data in this analysis exhibits "price puzzle" which means that prices increase with increasing interest rates rather than decreasing due to the depreciation of exchange rates. Similar to price puzzle this event is called exchange rate puzzle. According to Creel and Levasseur (2005) interest rate and exchange rate channels were more significant for MPT in Poland rather in the Czech Republic.

Elbourne and Haan (2006) in their turns analyzed the effect of financial variables on monetary transmission in central and eastern European countries. As for other papers, the authors mention the importance of the VAR model in analysis of monetary policy. According to the conclusion of this study, countries which have weaker banks respond to monetary shocks more immediately rather than the countries with stronger banks. This conclusion of the paper will be very useful while analyzing the effect of interest rates on economic performance of the Czech Republic.

According to Erceg and Levin (2006) sector for durable goods is more sensitive towards interest rate than the one for non-durable goods. This implication is very important for analysis of sensitivity of these sectors towards monetary policy shocks. Based on the analysis of data with the help VAR model, the authors conclude that if the monetary policy in a country is implemented properly, there is no need to adjust it according to the sector of durable goods and non-durable ones.

Erchenbaum and Evans (1995) empirically analyze and prove the fact that there is a very significant correlation between the monetary policy and exchange rates. The study says that monetary policy tightening leads to appreciation both nominal and real exchange rates. This is one of the main reasons why my research will also have exchange rates variable in the model which will analyze the effect of monetary policy on the economic growth of the Czech Republic.

Anzuini and Levy (2007) also turned to the VAR approach and analyzed the effect of monetary policy on various macroeconomic variables in Poland, the Czech Republic and Hungary. The results showed that there is an obvious co-movement of variables across these countries. In this case it is true to say that any monetary shock in any of these countries could also influence the Czech Republic.

1.5. Inflation Targeting

The goal of government regulation of a market economy is to keep inflation at a minimum while maintaining full employment. Inflation has existed as an economic phenomenon for a very long time. The word "inflation" (from the Latin inflation-swelling) refers to the overstuffing of the money supply with paper notes relative to trade demands, their depreciation as a result of this, an increase in the cost of goods and services, and a decrease in the purchasing power of money. It is believed that it appeared, almost with the emergence of paper money, the functioning of which is inextricably linked (Hammond, 2012). The word initially used in North America during the Civil War (1861–1865) and described the process of an increase in the circulation of paper money. The phrase was used in England and France in the 19th century. The fundamental cause of inflation is the simultaneous emergence in all markets of an imbalance between total supply and total demand that favors the former (commodity, money, and resource markets). A complex socioeconomic phenomenon known as inflation is brought on by abnormally high rates of reproduction across a number of market economy sectors. In many nations around the world, inflation is one of the most serious issues facing modern economic progress. Modern inflation has a variety of characteristics that distinguish it from earlier inflation. For example, whereas past inflation was local in nature and covered a wider or smaller period, it had a periodic character. Now, however, it is ironic. Inflation

is primarily brought on by an excess of money supply flooding the money circulation channels in the absence of sufficient growth in the mass of goods. (Svensson, 2010).

The excess of demand over the supply of products may be to blame for the price increase. But a price increase like that, brought on by an imbalance between supply and demand on a specific commodity market, is not inflation. A long-term imbalance in most markets favoring demand causes inflation, which is an increase in the general level of prices in the nation. In other words, inflation is an imbalance between aggregate demand and aggregate supply, expressed in price increases, not associated with an increase in the quality of goods (Mishkin, Schmidt-Hebbel, 2001). For a modern market economy, inflation has become a very important concept, which plays a vital role for economy's health.

Figure 4. Types and forms of inflation
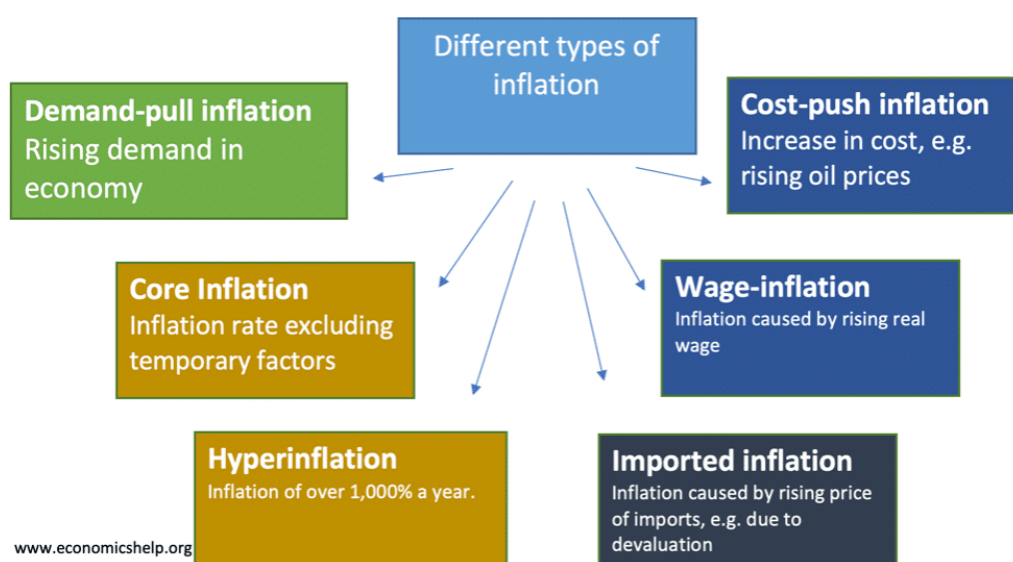
The classification criteria must be highlighted in order to classify inflation. The classification of inflation is based on a number of factors, including the rate of price increase, the balance of price growth, the predictability of inflation, and the extent of government intervention in market operations. Take a look at the figure's classification information.

Moderate inflation that creeps along at a rate of up to 10% annually is characterized by relatively slow rates of price growth. At this low inflation rate, transactions are conducted at nominal prices since the depreciation of the currency is so minimal. Savings are still profitable (interest income exceeds inflation), investment risks practically remain

constant, and the level of life declines marginally. In most established market economies, this form of inflation is typical and does not seem strange. In recent years, the European Community's member nations have experienced inflation rates averaging between three and five percent each year. (Mishkin, 2001).

There are several ideas about galloping inflation. Some believe that galloping inflation is limited to 10 to 100% per year (Ball, Sheridan, 2004). Others characterize it as an increase in prices up to 200% per year. This phenomenon, which manifests as a quick rise in prices, is typically brought on by abrupt changes in the amount of available money or by changes in pricing brought on by outside forces. Which leads to an excess of demand over supply. Money depreciates fairly quickly, so either hard currency is used as prices for transactions, or prices take into account the expected inflation rate at the time of payment. In other words, transactions (contracts) begin to be indexed. Double-digit growth rates are measured on a monthly basis. Such inflation has a detrimental effect on the economy, making savings unprofitable, long-term investments too hazardous, and lowering the population's standard of living dramatically. Anti-inflationary actions are necessary because this inflation is already harmful to the economy. It is common for nations with fragile economies or nations through economic change. Examples of countries with such high rates in the 1980s include numerous in Latin America, some in South Asia, and in the 1990s, former socialist nations. (Svensson, 1999).

Hyperinflation is characterized by a reduction in production, an increase in autonomy and naturalization, a transition to barter transactions, and an "escape" from money in order to turn them into goods. The formal criterion of hyperinflation was introduced by the American economist Kagan. He suggested that the month in which prices first increased by more than 50% was considered the beginning of hyperinflation. The end of hyperinflation is the month preceding the one in which prices increased by less than 50% and do not reach this level during the year. Such inflation has a devastating effect on the economy, destroying savings, the investment mechanism, and production as a whole. Prices are skyrocketing, the wage-price gap is getting catastrophic, even the wealthiest segments of society are losing their standard of living, and the biggest businesses are becoming unproductive and unprofitable. By converting "hot money" into material values, consumers are attempting to get rid of it. In addition to its detrimental effects on the economy, hyperinflation is risky since, often, it can only be curbed through non-economic means, such as severe price restrictions, the forced withdrawal of food from

producers, etc. In an environment of hyperinflation, running a profitable business is virtually impossible. (Svensson, 1997)

The central banks of the majority of industrialized and developing nations have adopted inflation targeting as their preferred monetary regime over the past three decades. It can be hypothesized that the central bank may want to smooth output at the expense of even higher inflation as inflation targeting does not require that this parameter be strictly equal to the objective at every point in time. However, such a course of action entails a serious risk because there is a chance that the acceleration of price growth brought on by the regulator's lax approach may eventually change inflation expectations, exacerbate the unwinding of the inflationary spiral, and destabilize monetary circulation. A decision in favor of a more conservative course of action would prevent such a turn of events.

The inflation target and the purpose of encouraging growth within the framework of inflation targeting therefore have the following relationship. First of all, because monetary authorities cannot sustain artificially high employment and economic growth rates through long term monetary stimulus measures, inflation targeting does not necessarily imply that they are directly involved in the promotion of economic growth.

With a fixed money supply on the part of the regulator, money demand shocks were translated into changes in interest rates since money demand is not stable (Mishkin, 2000). The central bank also makes use of the money market to carry out inflation targeting. However, it determines the interest rate at which it makes the necessary amount of resources accessible to the banking industry, rather than regulating the nominal size of the monetary base. Significant rate fluctuation in the money market is prevented with this tactic.

1.5.1. Advantages and Disadvantages

Inflation targeting can be interpreted as setting inflation targets, the achievement of which in the medium term is mandatory for the monetary authorities. It is suggested that this mode is a fairly simple procedure, which consists of the following steps. The country's central issuing bank projects the rate of inflation. These projected values are then compared to the inflation targets that must be fulfilled, and the discrepancy between the projected parameters and the target illustrates how monetary policy needs to be modified. Due to the public's awareness of the key decisions being taken, the regime is distinguished by the openness of the process of enacting monetary policy, which raises the level of

accountability of central banks. The regime's proper application also entails assigning responsibility for preserving price stability to financial institutions inside the state and aligning their relationships with one another.

Currently, the inflation targeting regime is acknowledged as one of the most successful in combating inflation. Its main characteristics are (Carare, Stone, 2006):

- a clear statement of the goal of the central bank, which allows you to achieve a given indicator of the inflation rate, either in the form of a single value or in the form of a range of values;
- the absence of other primary goals for the implementation of monetary policy;
- lack of priority for fiscal policy;
- independence of the Central Bank in the choice of instruments of monetary regulation;
- transparency and accountability of the central bank to the public.

The inflation targeting regime is unique in that it has a dual nature: on the one hand, the central bank is completely free to select the tools and processes for implementing monetary regulation, but on the other, it is constrained by a rigid process for establishing goals and societal obligations. If there is an increase in money demand, the inflation targeting regime will compensate for it, and the price level and money supply will return to a state of equilibrium. For a country to move towards inflation targeting, three fundamental conditions must be met (Freedman, Laxton, 2009):

- establishment of a certain balance in the local foreign exchange market, because the occurrence of an imbalance can lead to serious changes in exchange rates, which may require the introduction of a floating exchange rate;
- development of the transmission mechanism and financial markets, allowing the use of the interest rate mechanism as a real constraint on the monetary activity of the banking sector;
- determination of a set of mechanisms and tools for targeting itself.

The transmission mechanism is a set of elements of the real, financial, and monetary sectors of the economy, which determine the speed and nature of the impact of monetary policy instruments on the state of the real sector of the economy. At the same time, changes in the parameters of the monetary sector affect changes in the real sector of the economy, and they, in turn, affect changes in the indicators of the financial sector.

The transmission mechanism affects inflation through money supply aggregates, lending volumes, changes in the exchange rate, changes in interest rates in the money market, i.e. monetary factors. Using certain instruments of monetary policy, the monetary authorities can influence the liquidity of the banking sector and market interest rates, which makes it possible to control the prices of financial assets, and through them influence the economic situation. Consequently, the instruments of the transmission mechanism affect the economy through three channels: interest rate, credit, and price. Based on the materials published by the International Monetary Fund, three main inflation-targeting regimes can be distinguished. The following factors are used to differentiate between different inflation-targeting regimes: the level of trust in the local banking system; the openness of monetary policy; the sustainability of macroeconomic parameters; the development of financial and political institutions; and the adaptability of the financial and monetary system to changes in monetary policy instruments. (Carare, Stone, 2006).

Countries with a classic inflation-targeting regime include many Central European countries, South African countries, and others. The regimes applied in these countries are characterized by a high level of confidence in the monetary policy pursued by the monetary authorities and a high level of confidence in the banking system; high or medium flexibility of the economic system to change the impact of instruments; high or medium transparency of monetary policy, as well as the stability of monetary and political institutions. The Eastern European nations, the Czech Republic, and other post-Soviet nations have the initial (lowest) inflation-targeting regime. Compliance with the specified criteria in these countries is low, and the probability of economic shocks and fluctuations is high. At the same time, the documents of central banks define provisions that call for maintaining low and stable inflation and a stable price level as the main goal of monetary policy.

In addition to its advantages, the inflation targeting approach has certain application limitations. The degree of inflation often depends not only on the present monetary policy but also on the state's fiscal policy and how economic entities behave, thus the government must enact a stringent antimonopoly policy in addition to the inflation targeting regime.

Because the inflation targeting regime inexorably affects the change in production volumes, it is advised to adopt the targeting of production volumes, i.e., set production

limitations, within which the real volume of output may depart from the maximum value. (Mishkin, Posen, 1998).

A condition of the inflation targeting system is that economic entities have faith in the publicly announced benchmarks and targets for the expansion of the price index. If such trust exists and is supported by trustworthy economic forecasts, inflation targeting can become a real weapon for influencing public inflation expectations and behavior.

The inflation targeting system functions best in stable economies without significant structural or institutional changes and when the operation of monetary instruments of influence on the economy has already been figured out.

The experience of other countries demonstrates that the inflation targeting regime has helped market and transition economies manage inflation and foster incentives for economic growth. This has been made possible by the provision of the necessary circumstances. But in addition to monetary regulation, additional macroeconomic impact strategies that have proven successful in a number of nations should be implemented. Some examples of these strategies include the growth of the financial market and the financial instruments used, the formulation of a balanced fiscal policy, as well as an increase in the demand for money, and an increase in citizen saving activities. These issues should be taken into account by the Eurasian Economic Union countries that are converting to an inflation-targeting system.

1.5.2. Effects On Actual Inflation Volatility

The volatility of inflation can affect economic growth and other real indicators for two main reasons. First, high inflation volatility, like any other high uncertainty, can lead to non-optimal decisions of economic agents. Second, volatility can lead to pricing distortions, which in turn lead to inefficient resource allocation. A fairly large amount of empirical evidence has accumulated that inflation volatility has a negative impact on economic growth (Judson, Orphanides, 1998).

The construction of theoretical models of the impact on the economic growth of such a characteristic of inflation as its volatility is mainly approached from two fundamentally different angles. First, a New Keynesian general equilibrium model can be constructed, as was done. At the same time, inflation is introduced into the model through the consumer's problem - the household faces a limitation on prepayment in cash when

purchasing consumer goods. An increase in the rate of growth of the money supply reduces the effective return on labor, since the monetary unit earned in the current period cannot be spent until the next period due to the restriction on prepayment in cash. Thus, the effect of money on the real economy may arise because high inflation distorts the choice between work and leisure (Hossain, 2015).

Second, as a basic model, we can take the decision-making model used by the Central Bank (CB), which is based on the resulting equations of general equilibrium models. Within the framework of this approach, the function of expected total losses of the Central Bank is minimized, which depends, in particular, on the deviation of current inflation from the target one. With this approach, the impact of inflation volatility on economic growth arises, for example, if the Central Bank's loss function is asymmetric and exceeding the target is "worse" than the situation when current inflation is below the target level (Emara, 2012).

However, until now, the scientific literature has not considered a general equilibrium model that takes into account the volatility of inflation, in which inflation would be introduced by producers (modification of the firm's problem), which would allow us to analyze the non-optimality of the firm's decisions under conditions of high uncertainty generated by inflation volatility. Separately, we note that econometric studies recorded a different effect of inflation on growth in developed and developing countries, which has not yet been proposed a theoretical explanation.

1.5.3. Advantages and Disadvantages of Inflation Volatility

Rising rates have led to increased stress for institutions whose balance sheets are under pressure. At the same time, due to the volatility of interest rates and asset prices, the ability to easily and quickly sell some key asset classes at a given price has deteriorated. If the market were to experience a rapid and disorderly risk reassessment in the coming months, such a lack of liquidity in the market, along with pre-existing vulnerabilities, could exacerbate the situation (Hossain, 2015). Therefore,due to increased economic and monetary policy uncertainties, investors have recently grown more risk-averse, placing pressure on global markets.

institutions. Bond yields are rising, affecting a wide range of securities, regardless of credit rating, with the cost of borrowing for some states and firms already at its highest level in a decade or more.

To get inflation back on track and prevent confidence-eroding relaxation of inflation expectations, central banks must take prompt action. In order to keep investors' trust and prevent market volatility, it will be essential to communicate strategic decisions, a dedication to price stability, and the necessity for additional monetary policy tightening. Flexibility in exchange rates aids nations in adjusting to varying rates of monetary tightening. Foreign exchange intervention may be used when changes in exchange rates hinder the central bank's ability to transmit monetary policy and/or pose greater threats to financial stability. As described in the IMF's Holistic Policy Approach, such measures should be a part of a comprehensive strategy for addressing vulnerabilities. (Hnatkovska, 2004) .

Emerging and frontier market economies should reduce their exposure to debt concerns by cooperating with all creditors early on, as well as through multilateralism and international support. To prevent expensive defaults and protracted loss of market access, bilateral and private creditors in countries with critical debt levels should coordinate proactive restructuring. The G20 Common Framework for Debt Resolution should be applied where appropriate. The atmosphere for financial stability is unusually tough for policymakers. Despite the fact that no global systemic disasters have yet occurred, they should prevent additional vulnerability accumulation by modifying their chosen macroprudential instruments to handle any potential risk hotspots (Emara, 2012). Finding a balance between managing these possible hazards and preventing an uncontrollable tightening of financial conditions will be crucial in this very unpredictable situation.

1.6. Inflation targeting and economic growth

Attempts to establish a relationship between inflation and economic growth are numerous. Numerous Nobel laureates have contributed to this field of study, including James Tobin, Robert Lucas, and Robert Solow (Orphanides and Solow, 1990). (Tobin, 1965). However, no lasting connections have been made. For instance, it is established that inflation growth slows the growth of GDP and investment in the well-known article by Robert Barro, "Inflation and Economic Growth" (Barro, 1995), which uses statistical

data from many countries for the period 1960-1990. However, these effects are statistically significant. Only when nations with substantial inflation are included in the sample do the results appear.

Table 3. studies on how inflation affects economic expansion developed and developing countries

One of the key research areas in the literature on economics is the connection between

research		developed countries	developing countries
Sarel, 1995	IMF Working Paper №96	8%	
Ghosh, Phillips, 1998	IMF Staff Papers	3%	
Khan, Senhadji, 2001	IMF Staff Papers	1-3%	11-12%
Burdekin et al., 2004	Journal of Macroeconomics	3%	8%
Sepehri, Moshiri, 2004	International Review of Applied Economics	5%	15%
Espinoza, 2010	IMF Working Paper №10–76	1%	11%
Kremer, Bick, Nautz, 2013	Empirical Economics	3%	17%
Eggoh, Khan, 2014	Research in Economics	3%	10-12%
Картаев, Клачкова, 2015	Аудит и финансовый анализ	9%	
Ibarra, Trupkin, 2016	Economic Modelling	4%	19%

inflation and economic growth. This relationship, particularly relationship II, has a 65–70-year history. It has been a topic that is regularly discussed in literature and debates since World War II. II. The high inflation rates experienced following the World War II caused economists to give much more weight to this issue. Inflation was not perceived as a problem with the view that inflation, which emerged from the Keynesian policies implemented in developed and developing countries in this period, had a positive effect on growth. The Phillips Curve and the relationship between inflation and output, which were put forward by Keynesian economists, were used as an important macroeconomic policy tool until the stagflation process in the 1970s (Abel and Bernanke, 2005). In the 1960s, economists such as Tobin and Sidrauski argued that even in the long run, inflation would positively affect economic growth (Bruno and Easterly, 1996). The 4 reasons underlying this relationship can be listed as follows (Berber and Artan, 2004):

- An increase in inflation causes a decrease in wealth. Thus, individuals increase their savings and increasing savings increases growth by stimulating investments through the interest rate channel.

- Inflation accelerates growth by shifting the investment portfolio from the financial sector to the real sector, increasing capital intensity.

- Inflation causes individuals to increase their money demands; This causes an increase in the inflation tax. This income obtained by the government increases growth by using it as public expenditure or investment.

- Inflation, the fact that nominal wages do not increase faster than inflation, contract periods cannot be updated quickly, etc. For these reasons, while it decreases the real income of individuals with a low probability of saving, it increases growth by increasing the real income of individuals with a high probability of saving.

Since the debate about how inflation will affect growth is very old, there are many studies in the relevant literature. The studies in the local and foreign literature differ in terms of the method used. The first group of these studies are those that examine the relationship within the framework of regression analysis. Most of the studies in this context point out that inflation has a negative effect on growth. In his study, Friedman (1977) concluded that the increase in inflation uncertainty will impair the efficiency of the price mechanism and negatively affect production and growth as a result of the deterioration of resource allocation. Barro (1995) argued that a 1% increase in inflation reduces GDP per capita by 2% to 3% per year. In the long run, he estimated that a 10% increase in the inflation rate reduces GDP by 4% to 7% after 30 years.

Barro (1997) found that a 1% increase in inflation rates causes a 0.03% decrease in GDP. He found that this negative effect is more severe in countries where the inflation figure is higher than 20%.

With the VAR technique, Faria and Carneiro (2001) examined the relationship between inflation and economic growth in the Brazilian economy for the period 1980-2000. The results of the analysis obtained by the couple revealed that there is no relationship between inflation and growth in the long run, but that inflation affects economic growth negatively in the short run. For South Africa, Hodge (2006) analyzed the relationship between inflation and economic growth using data for the period 1950-2002. As a result of his results, Hodge reached the finding that inflation affects economic growth negatively in the long run. Yapraklı (2007), in his study covering the 1987:I-2007:I period, investigated the inflation-growth relationship in the Czech economy in terms of counteraction and causality. According to the results obtained from the analysis, Yapraklı claimed that there is a negative relationship between growth and inflation in the long run.

For the period 1970-2006, Taban (2008) investigated the relationship between inflation and economic growth in Czech with the ARDL bounds test approach. According to the findings of Taban, inflation has significant negative effects on growth in both the long and short run. Relatively less number of studies dealing with the relationship within the framework of regression analysis have found that inflation has a positive effect on economic growth. Mallik and Chowdhury (2001) found that there is a positive relationship between inflation and economic growth in Pakistan, Sri Lanka, India, and Bangladesh. However, it has been determined that inflation has a significant effect on economic growth. Yakışık (2007) investigated the relationship between inflation and economic growth for the economy of Kyrgyzstan with the data covering the period 1995-2005 and concluded that inflation has a positive effect on economic growth. According to Yakışık's analysis, increases in the inflation rate of around 11% increase growth by 1%.

2. DATA

In the third part of the study, the relationship between monetary policy and economic growth in the Czech Republic will be examined empirically. First, the data set and model will be defined in the study. Appropriate time series analysis will then be made. The stationarity of the variables will be examined, and the VAR model will be established. After performing the appropriate specification tests for the VAR model, impulse-response functions and variance decomposition analyses will be performed.

2.1. Data Set and Model

Quarterly data for the Czech Republic economy for the 2001Q1-2022Q3 periods were used in the study. Among the variables, only the Consumer Price Index variable is seasonally adjusted because it contains seasonal effects.

The variables described above, their definitions and the sources from which they were obtained are summarized in the table below.

Table 4. Variables Used in the Study

Variable Name	Database	Variable Name Abbreviation
Endogenous Variables		
Real Gross Domestic Product (constant 2015 US$)	Federal Reserve Bank	RGDP
Inter bank Rate (percent per Annum, quarterly)	Federal Reserve Bank	IRR
Long Term Bond Yields (percent quarterly)	Federal Reserve Bank	LTB
Consumer Price Index Total All Goods (Index 2010=100, quarterly)	Federal Reserve Bank	CPI
Exchange Rate (U.S. Dollars to One Euro quarterly)	Czech National Bank	ER
Exogenous Variables		
Inter bank Rate for Euro Area (percent per Annum, quarterly)	Federal Reserve Bank	EAIRR
Consumer Price Index Total All Goods for Euro Area (Index 2010=100, quarterly)	Federal Reserve Bank	EACPI
Real Gross Domestic Product for Euro Area (constant 2015 US$)	Federal Reserve Bank	EARGDP

2.2 Hypothesis

Hypothesis #1: The monetary policy measures implemented after the covid shock have a positive impact on the economy of the country.

Hypothesis #2: Inflation targeting regime positively affects the economic growth of the country.

Hypothesis #3: Current monetary policy regime and implemented tools are the most suitable ones for the Czech Republic in order to ensure price stability, high employment rates as well as high long-term economic growth.

3. METHODOLOGY

3.2. Methods

To investigate the interaction of variables, it is generally possible to use modern economic models. For these reasons, it has been selected to use the VAR model of Vector Autoregressive Models in this study: firstly, time series and autocorrelations variables are present in the models; secondly, a VAR model is well suited for solving Time Series and Autocorrelation problems. Moreover, the VAR model takes into account dynamic and causal relationships between economic variables, an advantage that classical regression models do not have, so that VAR is appropriate for policy analysis and macroeconomic planning (Kumar Paramanik, 2020).

For all variables a unit root test has been conducted to determine the constant condition of each variable in this study. It is, for the most variable types, both first and second differential terms that are generally stable; Ramanathan 1992).

The Dickey Fuller Augmented test is used to verify the existence of unit roots and determine the order in which variables are integrated. The following equations are used in the ADF test:

$$\Delta y_t = \alpha_0 + \alpha_1 t + \theta y_{t-1} + \sum_{i=1}^{m} w_i \Delta y_{t-i} + \varepsilon_t$$

Where, Δ is the difference operator, y is the series being tested, m is the number of lagged differences and ε is the error term.

A serial correlation and varying variance is dealt with in the Phillips Perron (1988) test.

$$\Delta y_t = \alpha + \beta t + \rho * y_{t-1} + u_t$$

4. EMPIRICAL RESULTS

In the study based on the 2001Q1-2022Q3 period in the Czech Republic economy, the relationship between monetary policy and economic growth was examined. The graphs of the level values of the variables are as follows.

Graph 1. Graphs of Level Values of Variables
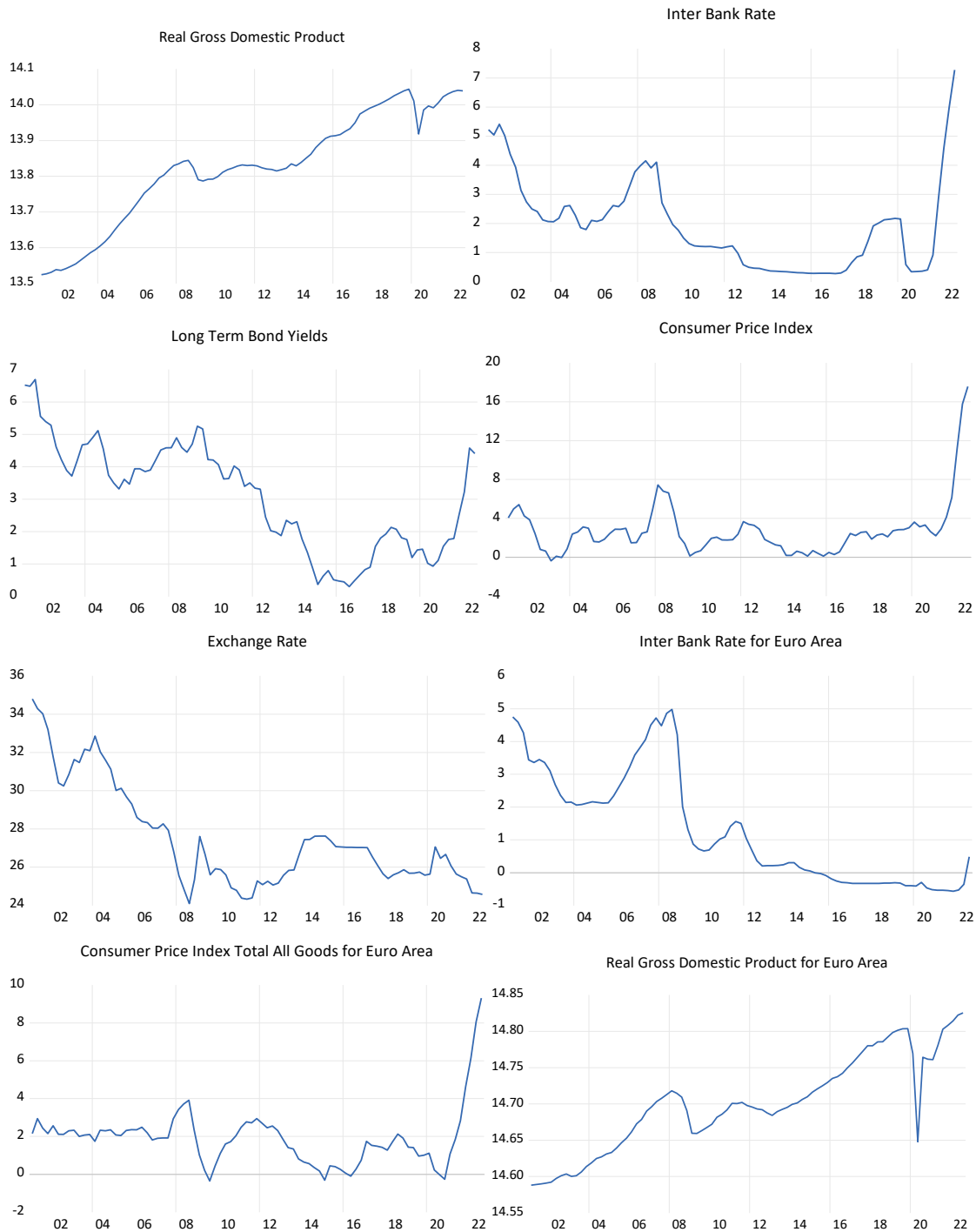
The graphs of the level values of the variables used in the model are shown above. According to the graphs of the level values of the variables, the variables contain unit

root. The stationarity of the variables was examined with the help of ADF and PP unit root tests and the results are summarized in the table below.

Table 5. ADF and PP Unit Root Test Results

| VARIABLES	ADF (constant)	ADF (Trend and constant)	PP (constant)	PP (Trend and constant)
LRGDP	-1.471874 [0.5431]	-1.741254 [0.7242]	-1.444650 [0.5567]	-1.869964 [0.6614]
IRR	-1.744040 [0.4057]	-0.679815 [0.9710]	-1.754773 [0.4004]	-0.229152 [0.9914]
LTB	-2.175985 [0.2165]	-1.232707 [0.8969]	-2.068475 [0.2578]	-0.783335 [0.9627]
CPI	0.098155 [0.9638]	0.073564 [0.9966]	0.115495 [0.9652]	0.107148 [0.9969]
ER	-2.742377 [0.0711]	-2.416298 [0.3687]	-2.664097 [0.0845]	-2.489429 [0.3326]
EAIRR	-2.369592 [0.1534]	-2.858630 [0.1812]	-2.071290 [0.2567]	-2.294945 [0.4319]
EACPI	-1411243 [0.5732]	-1.456578 [0.8368]	-1.481284 [0.5384]	-1.427302 [0.8460]
EARGDP	-1.212975 [0.6658]	-3.728315 [0.0256]	-1.032191 [0.7386]	-3.715997 [0.0265]
critical value %1	-3.509281	-4.068290	-3.508326	-4.068290
critical value %5	-2.895924	-3.462912	-2.895512	-3.462912
critical value %10	-2.584952	-3.157836	-2.584952	-3.157836
Note: Critical values for ADF and PP were obtained by MacKinnon (1996). Values in [ ] indicate probability values.				

Table 5 shows the results of the ADF and PP unit root tests for the level values of the variables. According to the results, it is seen that all variables exhibit a non-stationary structure in general. That is, all variables in the model contain a unit root at the level values. Graphical analysis and unit root tests were performed by taking the first differences of the variables.

Graph 2. Graphs of First Differences of Variables
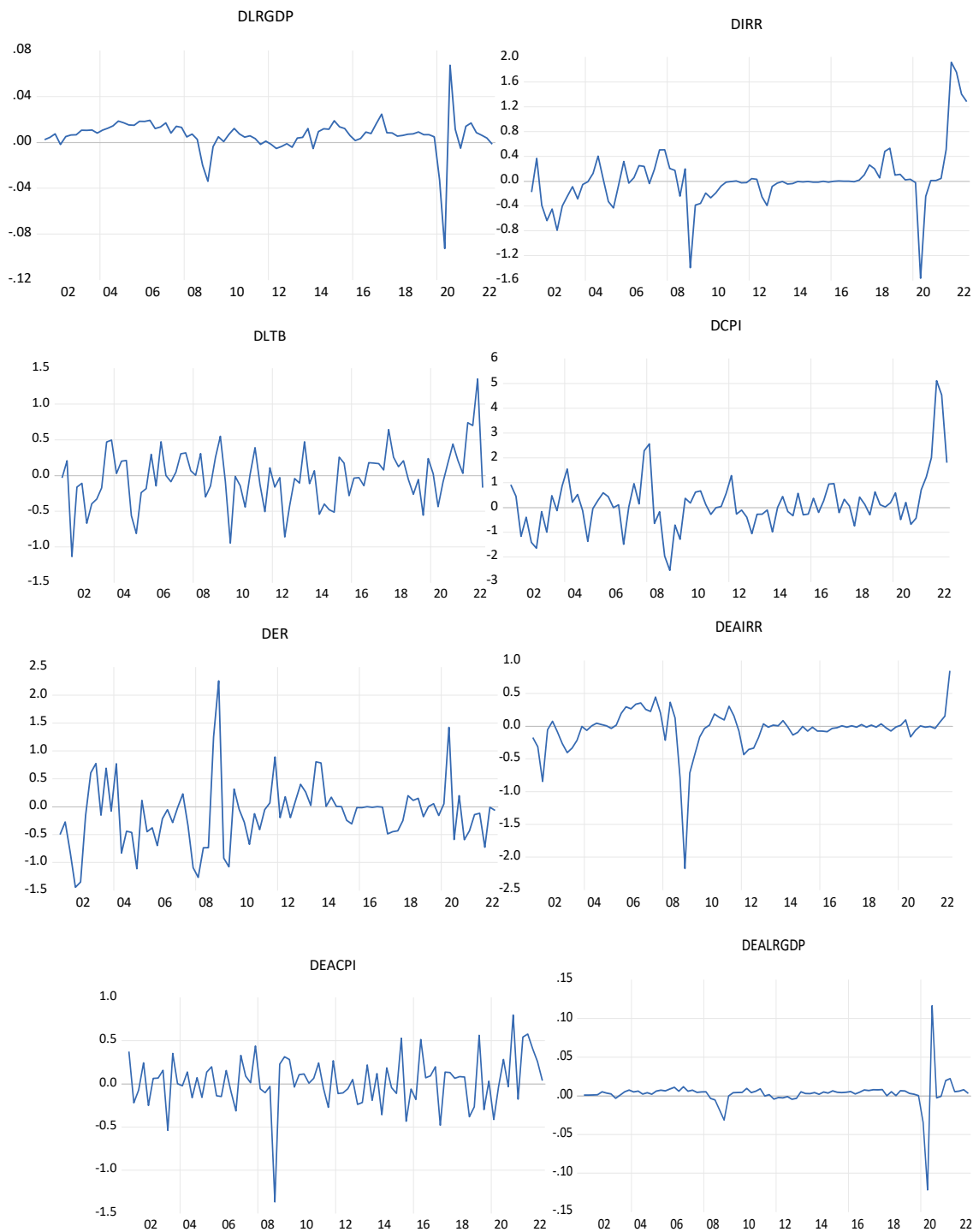
When the graphs given above are examined, it is seen that the variables become stationary when the first difference is taken. ADF and PP unit root tests were performed for the first differences of the variables. The results obtained are summarized in the table below.

Table 6. ADF and PP Unit Root Test Results for First Differences of Variables

VARIABLES	ADF (constant)	ADF (Trend and constant)	PP (constant)	PP (Trend and constant)
DLRGDP	-8.318535 [0.0000]	-8.372082 [0.0000]	-8.319431 [0.0000]	-8.352780 [0.0000]
DIRR	-3.806029 [0.0041]	-4.721514 [0.0014]	-3.724196 [0.0053]	-4.250608 [0.0059]
DLTB	-6.758980 [0.0000]	-7.070617 [0.0000]	-6.749680 [0.0000]	-7.070663 [0.0000]
DCPI	-5.820423 [0.0000]	-6.246709 [0.0000]	-4.632990 [0.0003]	-4.983863 [0.0005]
DER	-6.914932 [0.0000]	-6.982593 [0.0000]	-6.732244 [0.0000]	-6.752393 [0.0000]
DEAIRR	-4.293427 [0.0009]	-4.383246 [0.0039]	-4.212338 [0.0011]	-4.324502 [0.0047]
DEACPI	-10.85717 [0.0001]	-11.10330 [0.0000]	-10.81840 [0.0001]	-11.09765 [0.0000]
DEARGDP	-11.70109 [0.0001]	-11.63226 [0.0000]	-11.75560 [0.0001]	-11.68547 [0.0000]
critical value %1	-3.509281	-4.069631	-3.509281	-4.069631
critical value %5	-2.895924	-3.463547	-2.895924	-3.463547
critical value %10	-2.585172	-3.158207	-2.585172	-3.158207
Note: Critical values for ADF and PP were obtained by MacKinnon (1996). Values in [ ] indicate probability values.				

The unit root test results for the first differences of the variables are summarized in the table above. According to the test results obtained, when the first difference is taken, all the variables become stationary. In other words, the variables whose differences are taken are free from the unit root.

After examining the stationarity of the variables in the econometric model created in the study, VAR analysis can be performed. First, information criteria will be used to

determine the appropriate VAR model for the variables. The table shown below contains the information criteria obtained to determine the appropriate VAR model.

Table 7. VAR Model Latency Determination Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	253.0248	NA	3.26e-13	-6.049995	-5.813506	-5.955113
1	**398.5203**	**258.6586**	**4.39e-14***	**-8.062228**	**-5.933829***	**-7.208287***
2	457.8799	93.80291	5.14e-14	-7.947652	-3.927342	-6.334651
3	525.2659	93.17567*	5.30e-14	-8.031256	-2.119036	-5.659196
4	589.1569	75.72267	6.73e-14	-8.028565	-0.224434	-4.897446
5	664.7483	74.65821	7.70e-14	-8.314773*	1.381268	-4.424595

In the table above, the information criteria showing the appropriate lag length for the VAR model are given. According to the results, the appropriate lag length for the variables in the model is 1 lag. In other words, the VAR(1) model will be used in the study.

After the VAR(1) model is established, specification tests for the model must be performed. If no problem is detected in the model as a result of specification tests, finally, impulse-response functions and variance decomposition tests should be performed for the model. Below is the unit circle plot analysis for stability condition, LM test for autocorrelation, and White test results and explanations for varying variance, respectively.

Graph 3. Unit Circle Plot for Model VAR(1)

Inverse Roots of AR Characteristic Polynomial

54
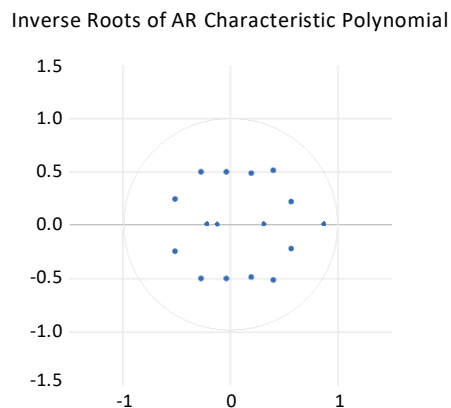
In the graph above, it is examined whether the characteristic roots of the VAR(1) model satisfy the stability condition. According to the test results, the characteristic roots of the model are located inside the unit circle. That is, the characteristic roots of the model satisfy the stability condition.

Table 8. Autocorrelation LM Test

Lag	LRE*stat	df	Prob.	Rao F-stat	df	Prob.
1	45.37009	25	0.0076	1.893332	(25, 254.1)	0.0077
2	43.65394	25	0.0119	1.815676	(25, 254.1)	0.0120
3	26.68998	25	0.3715	1.074455	(25, 254.1)	0.3725
4	34.25517	25	0.1026	1.399167	(25, 254.1)	0.1032
5	27.56722	25	0.3282	1.111636	(25, 254.1)	0.3291
6	25.01840	25	0.4613	1.003947	(25, 254.1)	0.4623

The LM autocorrelation test results for the VAR(1) model are summarized in the table above. When the autocorrelation test results are examined, it is seen that there is an autocorrelation problem only in the first delay. Since the VAR(1) model is chosen, it is important that there is no autocorrelation problem after the first delay. There is no autocorrelation problem at the 1% significance level in the second lag. Since there is no autocorrelation problem in the model, that is, there is no relationship between the error terms, the results to be obtained are at a reliable level.

Table 9. White Variance Test

Chi-sq	df	Probability
1255.520	1152	0.0575

In Table 6, the state of variance for the VAR(1) model was analyzed using the White test. The probability value obtained is 0.0575. Since the probability value is greater than 0.05, the H0 basic hypothesis, which states that there is no varying variance in the model, cannot be rejected. In other words, there is no heteroscedasticity problem in the VAR(1) model.

If the specification test results made so far are examined, it is seen that since the characteristic roots of the VAR(1) model are in the unit circle, the VAR(1) model

provides the stability condition, according to the LM autocorrelation test result, there is no autocorrelation problem at the %1 significant level, and there is no heteroscedasticity problem in the model according to the White heteroscedasticity test result.

Graph 4. Impulse-Response Graphs
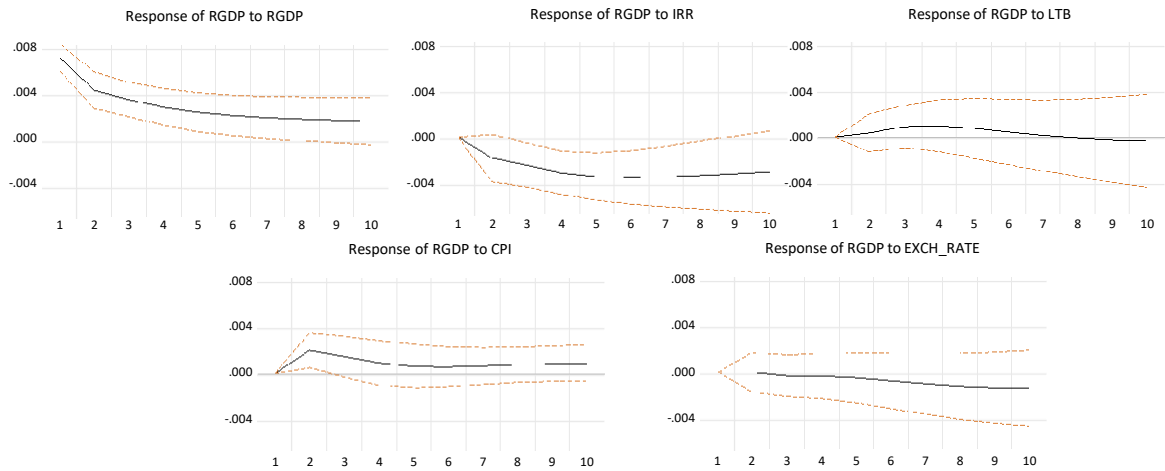
Above are the action-response graphs made for the VAR model. Real GDP responds to a reduced shock to it. These responses decrease until the tenth period and then approach zero. Real GDP reacts negatively to the shock to the interbank interest rate. For detailed information, the results of variance decomposition analysis should be examined.

Graph 5. Historical Decomposition
Historical Decomposition using Generalized Weights
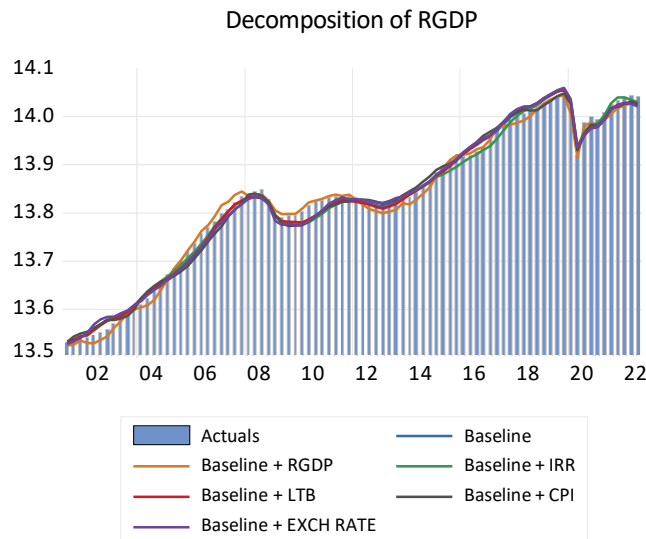
The line shown in dark blue in the periodic variance decomposition graph represents RGDP. Other lines in the chart show monetary policy instruments (LTB, EXCH RATE,

IRR, CPI). Rectangles in the graph represent the actual values of the series (Actuals), the straight line represents the forecast line (Baseline) of the series, and the thick line represents the estimated values and the sum of the shocks of other variables. During the entire period covered in the study, shocks in growth and shocks in other monetary policy instruments positively affected economic growth. In general, it is seen that the total shocks in growth are positive (as the rectangles are mostly above the forecast line). It is seen that monetary policy instruments are effective in providing economic growth.

In the appendices, Graph 7 shows the periodic variance decomposition between inflation and RGDP. Since the inflation realized between 2007Q4-2014Q4 and 2019Q4-2021Q4 is above the expected inflation and the inflation targeting cannot be achieved, real growth is adversely affected. This finding supports that the inflation targeting regime has a positive effect on economic growth.

Attached Graph 8 shows the periodic variance decomposition results for IRR, LTB and EXCH RATE. According to the periodic variance decomposition results for the IRR, the interbank interest rate (representing the market rate) negatively affects economic growth in periods when the expected interest rate is higher. Economic growth increases in periods when the interbank interest rate is below the expected interest rate. Since the interbank interest rate in the COVID-19 period is higher than the expected interest rate, economic growth is adversely affected. Monetary policy seems to be ineffective in this period.

Another test to examine the interaction between the variables in the VAR(1) model is variance decomposition. In variance decomposition, it is examined from which variables the change in the variable originates. The variance decomposition results for the VAR(1) model are summarized below.

Table 10. Variance Decomposition Analysis Results for RGDP Coefficient

Period	S.E.	LRGDP	IRR	LTB	CPI	Exchange Rate
1	0.00721	100.000	0.0000	0.0000	0.0000	0.0000
2	0.00885	90.4222	4.2228	0.1511	5.2019	0.0018
3	0.0100	83.3559	9.3204	0.9580	6.2501	0.1155
4	0.0109	76.450	15.8072	1.6036	5.9445	0.1945
5	0.0117	70.3433	22.1032	1.8019	5.4123	0.3391
6	0.01252	65.2432	27.39470	1.7183	4.9912	0.65175
7	0.0131	61.0247	31.4968	1.5594	4.7412	1.1777
8	0.01380	57.5259	34.5440	1.4282	4.6420	1.8597
9	0.0143	54.6329	36.7898	1.3469	4.6460	2.5841
10	0.01486	52.2579	38.4783	1.3065	4.7029	3.2543

In the table above, the results of the variance decomposition analysis for the RGDP variable are summarized. Monetary policy instruments explain approximately 48% of economic growth. Among these instruments, the variable with the highest explanatory power is the interbank interest rate (38.48%). Inflation (4.7%) takes the second place. In the third place is the exchange rate variable with an explanatory power of 3.3%. The fact that this ratio is low ensures that the negative effects of exchange rate shocks on economic growth are limited. The Long-Term Bond Yields variable explains 1.3% of the RGDP.

5. MAIN CONCLUSIONS DERIVED FROM THE EMPIRICAL RESEARCH

There are many variables and policies that affect economic growth. Among economic policies, the effectiveness of monetary policy on economic growth may differ according to economic thought approaches. In order for the Czech Republic's economy to achieve sustainable economic growth, economic policies in general and monetary policy in particular play a major role. In this context, monetary policy should be managed in a way that will positively affect economic growth. The main purpose of this study is to examine the effect of monetary policy on economic growth for the Czech Republic economy and to help the monetary policy design for the Czech Republic economy to support economic growth. In the study based on the 2001Q1-2022Q3 period in the Czech Republic economy, the relationship between monetary policy and economic growth was examined.

Knowing which monetary policy is more effective is very critical in terms of guiding macro variables. In this sense, the policies applied, and the policy tools used in times with different conjunctures may produce different results.

According to the findings obtained in the study, whether monetary policy instruments are effective in the Czech Republic differs periodically. According to the findings, an increase was observed in real GDP after the COVID-19 process. This shows that monetary policy instruments have a positive effect on economic growth in general.

6. CONCLUSION

The modern financial and economic crisis prompted most developed nations' central banks to begin lowering interest rates to encourage economic expansion. However, when interest rates were close to zero, central banks had limited options for utilizing them to further boost economic activity. The severity of the crisis and its repercussions prompted developed nation central banks to begin purchasing public and private debt, also known as "quantitative relaxations." Through the credit channel of the monetary policy transmission mechanism, the primary objective of quantitative easing is to promote economic expansion. However, banks don't lend the right amount to businesses, so inflation doesn't rise as a result of an increase in the money supply in circulation. However, inflation can rise in a different situation. The majority of the money from the central bank stays in the economy's financial sector, which raises the price of financial assets, including grain, metals, and other resource commodities traded on stock exchanges are sold. Production costs and inflation may rise as a result of this price increase. As a result, it is possible that subsequent rounds of quantitative easing result in an increase in stock prices, resulting in cost inflation and a decrease in aggregate demand rather than a stimulation of it. As a result, the study came to the conclusion that central bank anti-crisis measures are inconsistent with the theoretical foundation of modern monetary policy.

The Czech economy may encounter difficulties (insufficient internal and external financing) in meeting the necessary financing resources to maintain its high growth potential. The growth process has a fragile structure when we look at the effects of the financial crises. The connection between economic expansion and monetary policy (monetary expansion or contraction) is significant from this perspective.

The relationship between monetary policy and economic growth was examined in the study that was based on the economy of the Czech Republic from 2001 Q1 to 2022 Q3. The effects of seasonality on the variables were looked at in the first stage of the study. The investigation revealed that only the EACPI and EAIRR variables had a seasonal effect. Seasonal adjustments are made to these two variables. Additionally, the natural logarithms of the data set's RGDP and EARGDP variables were calculated.

The results of the first stage's ADF and PP unit root tests indicate that all variables have a unit root at the level values. That is, all variables have non-stationary structures at the level values. Unit root tests were used to examine the initial variables' differences. The

variables are free of the unit root at the first differences, as demonstrated by the results of the ADF and PP unit root tests. That is, at their first difference, the variables exhibit a stationary structure.

The appropriate lag length for the variable-based VAR model was selected following the unit root tests. A lag is the appropriate lag length for the variables, as determined by the information criteria that were obtained. In other words, the study favors the VAR(1) model.

Specification tests were performed for the VAR(1) model. According to the results obtained, the characteristic roots of the VAR(1) model are stable. At the same time, there is no autocorrelation and varying variance problem in the model.

When the action-response graphics obtained in line with the VAR(1) model are examined, it is seen that all graphics are statistically significant. In other words, there is a significant reciprocal relationship between these variables.

Finally, according to the results of the variance decomposition analysis, the total change in the variance of the RGDP variable in the tenth period is not explained by itself but also by other variables in the model. In other words, monetary policy instruments have a significant effect on economic growth in the Czech Republic. For this reason, it is appropriate to use monetary policy to ensure stable economic growth in the Czech Republic. When we look at the results, the effects of monetary policy tools on economic growth are higher until the COVID-19 pandemic process. In the recession period of the economy during the pandemic process, monetary policy instruments are not sufficiently effective on economic growth in the Czech Republic. However, considering that this situation is on a global scale, it can be said that the Czech Republic economy, like all other economies, will be able to achieve a stable increase in economic growth by applying monetary policy after overcoming the pandemic process.

When we look at the validity of the hypotheses I have established in the study, it is seen that the first hypothesis could not be fully determined in our study. In the study, it is seen that the pandemic process cannot be fully analyzed because the analysis method that will only cover the pandemic process in the time series analysis is not suitable. However, in general terms, monetary policy could not achieve the desired effect during the pandemic process.

According to other hypotheses discussed, the inflation targeting regime in the Czech Republic had a positive effect on economic growth. In other words, the inflation-targeting regime provided a real, not nominal, increase in economic growth. At the same time, the current monetary policy regime and the instruments applied are most suitable for the Czech Republic to ensure price stability, high employment, and long-term high economic growth.

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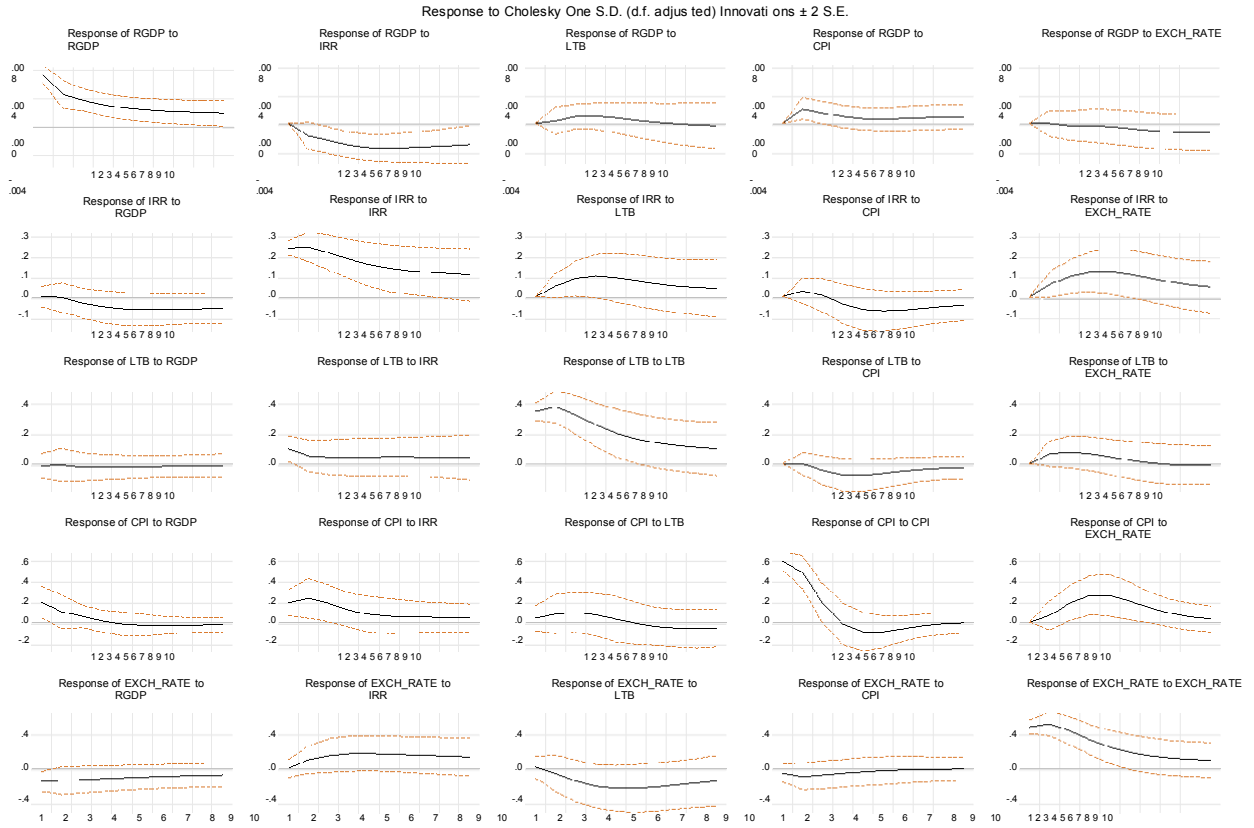
APPENDIX

Graph 6. Impulse-Response Graphs

Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.

Table 11. Variance Decomposition Analysis Results for IRR

Period	S.E.	RGDP	IRR	LTB	CPI	Exchange Rate
1	0.24074	5.32E-05	99.99995	0.00000	0.00000	0.00000
2	0.35442	0.01427	94.3380	2.2334	0.66345	2.75082
3	0.43750	0.54941	86.4500	5.6236	0.44989	6.926955
4	0.50398	1.37377	78.6321	8.1876	0.84754	10.9577
5	0.55735	2.27561	72.4361	9.4887	1.95221	13.8472
6	0.59837	3.12789	68.4064	9.9658	3.07680	15.4230
7	0.62899	3.88262	66.1258	10.063	3.88298	16.0450
8	0.65211	4.52869	64.9434	10.024	4.37482	16.1290
9	0.67027	5.07085	64.3495	9.9527	4.65911	15.9677
10	0.68519	5.52198	64.0366	9.8904	4.82834	15.7226

Table 12. Variance Decomposition Analysis Results for LTB

Period	S.E.	LRGDP	IRR	LTB	CPI	Exchange Rate
1	0.3572	0.16975	7.31099	92.519	0.00000	0.00000
2	0.5236	0.11313	4.40012	93.932	0.00023	1.55447
3	0.6215	0.22301	3.60769	93.025	0.49983	2.64437
4	0.6809	0.31010	3.41112	91.552	1.58396	3.14246
5	0.7173	0.38348	3.44895	90.419	2.52924	3.21864
6	0.7403	0.44197	3.60662	89.748	3.09405	3.10852
7	0.7561	0.48687	3.81593	89.342	3.37066	2.98360
8	0.7679	0.52181	4.03371	89.049	3.49778	2.89764
9	0.7774	0.55042	4.23740	88.808	3.56161	2.84183
10	0.7854	0.57538	4.41913	88.604	3.60221	2.79887

Table 13. Variance Decomposition Analysis Results for CPI

Period	S.E.	LRGDP	IRR	LTB	CPI	Exchange Rate
1	0.6492	8.80328	8.41136	0.3590	82.4263	0.00000
2	0.8525	6.48472	12.0603	1.0498	79.8705	0.53447
3	0.9161	5.98520	14.3687	1.9518	73.1889	4.50519
4	0.9620	5.43839	14.4745	2.3038	66.3969	11.3862
5	1.0033	5.03138	13.8655	2.1997	61.9226	16.9806
6	1.0300	4.85933	13.4567	2.1025	59.5747	20.0067
7	1.0438	4.82904	13.3279	2.2125	58.3821	21.2482
8	1.0509	4.84922	13.3431	2.4848	57.7009	21.6218
9	1.0553	4.87826	13.4050	2.8020	57.2438	21.6708
10	1.0584	4.90543	13.4745	3.0816	56.9082	21.6301

Table 14. Variance Decomposition Analysis Results for Exchange Rate

Period	S.E.	LRGDP	IRR	LTB	CPI	Exchange Rate
1	0.5091	9.50961	0.00848	0.0468	1.51849	88.9165
2	0.7545	8.22654	1.65057	0.7496	2.45229	86.9209
3	0.9093	7.94348	3.64472	3.3775	2.50865	82.5255
4	1.0138	7.95539	5.57273	7.1246	2.38723	76.9600
5	1.0896	8.02840	7.20722	10.914	2.23377	71.6165
6	1.1470	8.12233	8.52231	14.105	2.09026	67.1595
7	1.1913	8.22885	9.58282	16.521	1.97185	63.6948
8	1.2257	8.34344	10.4583	18.235	1.88027	61.0820
9	1.2529	8.46118	11.2000	19.401	1.81171	59.1254
10	1.2745	8.57752	11.8410	20.169	1.76141	57.6510