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## **Кваліфікаційна робота**

освітній ступінь - бакалавр

on the topic: «**COORDINATION OF FISCAL AND MONETARY POLICY IN  
TIMES OF SIGNIFICANT AND LONG-LASTING SHOCKS**»

на тему: «**ВЗАЄМОЗВ'ЯЗОК ФІСКАЛЬНОЇ ТА МОНЕТАРНОЇ ПОЛІТИКИ В  
ПЕРІОДИ ЗНАЧНИХ І ДОВГОТРИВАЛИХ ШОКІВ**»

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Комарова Анастасія Євгеніївна

Керівник: Фарина О.І.  
кандидат економічних наук, ст. викладач

Рецензент \_\_\_\_\_  
(прізвище та ініціали)

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## Table of contents

<b><i>INTRODUCTION.....</i></b>	<b>3</b>
<b><i>CHAPTER 1. THEORETICAL FOUNDATIONS OF POLICY COORDINATION AND BUSINESS CYCLES .....</i></b>	<b>5</b>
1.1. Theoretical background on the usage of monetary and fiscal policy .....	5
1.2. Cycles of business activity. Characteristics of economic recession and long-lasting economic shocks .....	12
1.3. Principles and practical examples of the policy mix and its coordination .....	16
<b><i>CHAPTER 2. MONETARY-FISCAL MEASURES TO OVERCOME RECESSION DURING RECENT ECONOMIC CRISES.....</i></b>	<b>20</b>
2.1. The role and instruments of fiscal and monetary policy in the anti-cyclical regulation of the economy.....	20
2.2. Features of the policy mix in Ukraine and foreign countries during the financial and economic crises caused by the Covid-19 pandemic .....	27
2.3. Coordination of the fiscal and monetary policy during the war in Ukraine .....	30
<b><i>CHAPTER 3. THEORETICAL AND METHODOLOGICAL APPROACHES TO DETERMINING THE NECESSITY OF MONETARY AND FISCAL POLICY COORDINATION .....</i></b>	<b>33</b>
3.1 Approaches to modelling and methodology description .....	33
3.2. Economic and mathematical modelling of the influence of fiscal policy instruments on the economy and results discussion .....	34
3.3. Ways of strengthening of the coordination of fiscal and monetary policy in the system of state regulation.....	42
<b><i>CONCLUSIONS .....</i></b>	<b>46</b>
<b><i>REFERENCES.....</i></b>	<b>48</b>

## INTRODUCTION

**Relevance of the topic.** Periods of significant economic instability bring the importance of attaining macroeconomic stability through the execution of both monetary and fiscal policies. The occurrence of economic crises, such as the Financial Crisis and the Covid-19 pandemic, have resulted in significant economic downturns, high unemployment levels, and a significant rise in budget debt. These crises have made policymakers worldwide to re-evaluate their strategies and methods for handling recessions.

Monetary policy is concerned with the regulation of the money supply and credit in the economy, while fiscal policy focuses on the regulation of taxes, government spending, and public debt. While monetary policy is mostly implemented by the country's central bank, fiscal policy is carried out by the government and parliament. When the economy is in a downturn, it is crucial to ensure that these policies are coordinated properly to reduce any negative impacts. Proper coordination can help stabilize the economy, promote growth, and prevent any long-term damage. However, inadequate, or absent coordination may worsen the economic situation and prolong the recession.

**Aim.** The thesis aims to investigate the necessity of coordinating monetary and fiscal policies as an effective tool for easing economic shocks, specifically focusing on the use of economic modelling. Through empirical analysis and theoretical assessments, this study aims to provide evidence that effective coordination between these policies can aid the economy in recovering from recessions. To achieve this goal, the following tasks were performed:

- To define the theoretical foundations of monetary and fiscal policy instruments
- To give the definition and provide characteristics for economic recession and long-lasting economic shocks.

- To conduct a comprehensive literature review of the research on policy mix, examine the different coordination models and their applicability to different economies.
- Create an economic model that demonstrates the impact of fiscal policies on price stability and proves the crucial need for cooperation between central banks and governments.
- To make conclusions after the analysis and provide policy recommendations for policymakers on how to best coordinate both policies to mitigate the negative consequences of recessions.

**Object.** The object is the economy during recessions, specifically how monetary and fiscal policy can be coordinated to mitigate the negative impacts of economic downturns and promote economic recovery.

**Subject.** The study focuses specifically on the use of fiscal and monetary instruments used in various countries including Ukraine, the USA, and Canada.

**Structure.** The thesis is structured into three main chapters. The Literature Review chapter summarizes the theoretical concepts of fiscal and monetary instruments, transmission mechanism, the definition of economic recession, policy coordination, and its importance in mitigating the adverse effects of crises. The final chapter of the thesis includes a detailed economic model analysis of the effects of fiscal policy instruments on the price level, including a description of the selected regressors for models, a presentation of the model's outputs, an evaluation of its adequacy, and logical conclusions.

**Keywords.** monetary policy, fiscal policy, coordination, economic modelling, recessions

# CHAPTER 1. THEORETICAL FOUNDATIONS OF POLICY COORDINATION AND BUSINESS CYCLES

## 1.1. Theoretical background on the usage of monetary and fiscal policy

Macroeconomic stability has always been crucial for a healthy and functioning economy. It is defined as such a condition of an economy where key macroeconomic indicators like inflation, unemployment, and economic growth are stable and can be predicted over time [34].

One of the most significant challenges in macroeconomic theory is determining the appropriate response of the government's financial policy to cycles of economic dynamics. This issue is particularly complex due to the government's need to choose the most appropriate fiscal and monetary policy instruments. Moreover, each market has unique characteristics that directly influence the effectiveness of the government's actions. As a result, devising a suitable policy response to economic fluctuations is an intricate task that requires careful consideration and evaluation [38].

Fiscal and monetary policy tools are not equally effective in all markets, and the government must take into account the unique features of each market. However, to study the coordination of monetary and fiscal policy and its implications for economic stability in times of recession, it is crucial to first develop a comprehensive theoretical understanding of each policy separately, including their respective instruments and mechanisms.

The **monetary policy** set by central banks is a crucial component of a country's economic policy, as it serves as the foundation for financial and credit stability [18]. By establishing a stable monetary policy, central banks enable sustainable socio-economic development for the entire country and its economy. This policy not only benefits the country as a whole but also has a positive impact on each individual subject within it, including the citizens of the region. Therefore, the role of central banks in monetary policy is critical in ensuring the stability and prosperity of a nation.

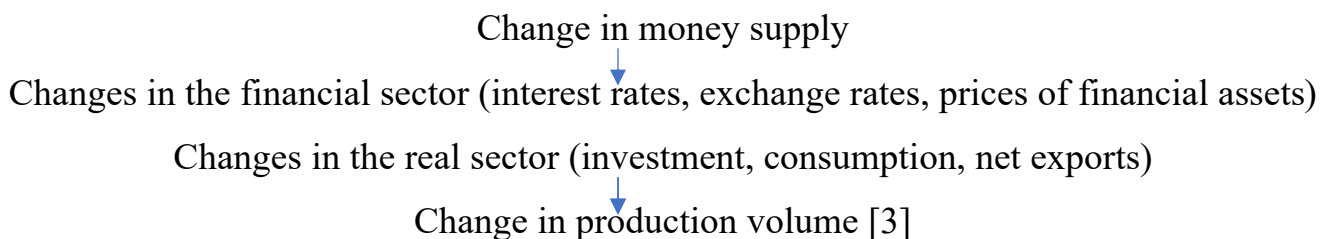
Many economists have devoted their works to the study of monetary policy, its tools and influence on establishing macroeconomic stability of the state. Jagdish Handa determines monetary economics as an economics that deals with the money supply, prices, interest rates, and their impact on the overall economy [19]. It can be also defined as a set of measures implemented by the state in the person of the central bank in the sphere of monetary and financial and credit sectors, aimed at achieving the defined strategic goals of the economic development of the country [1].

It concentrates on the analysis of financial markets, including the monetary and other financial markets, and the determination of the interest rate. The way in which these factors affect the behavior of economic units is another focal point of monetary economics. The relationship between money, inflation, and economic growth is the main are the main objectives.

Central bank's key interest rate is the main policy instrument to achieve the desired level of inflation [18]. It is possible because of its further effect on the aggregate demand and the process of transmitting a signal from a key rate to other rates and in the end on investment and consumption decisions and savings.

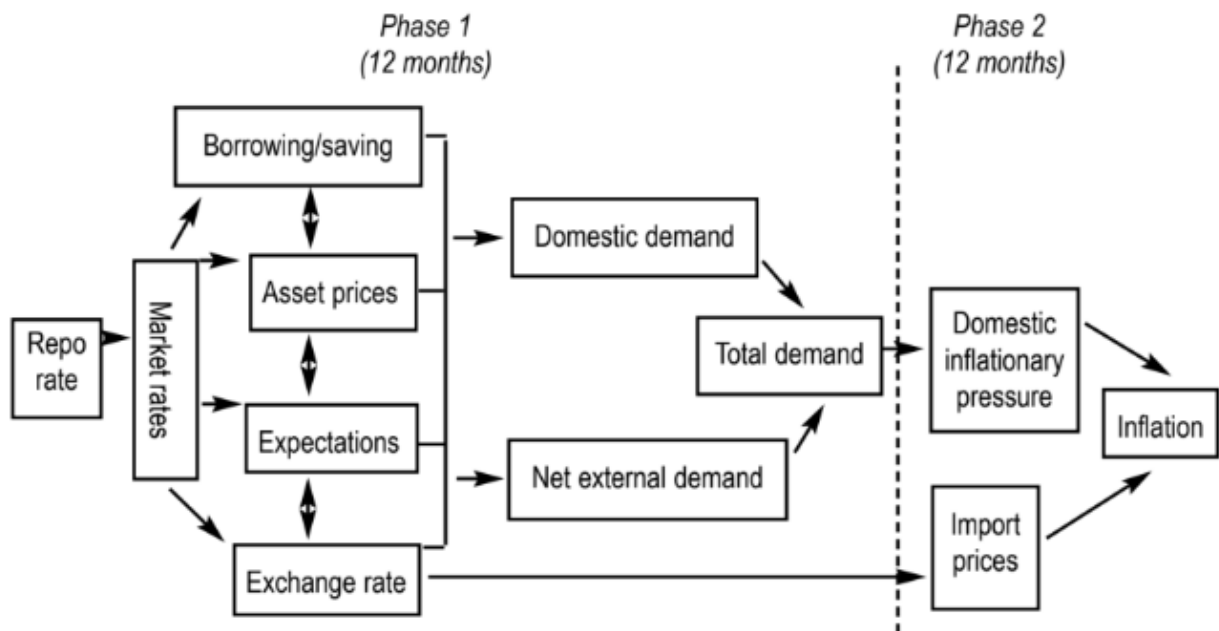
For the first time, the concept of the transmission mechanism was formulated by J. M. Keynes: he called it the system of variables that are those channels through which economic activity is affected by the supply of money and interest rate [23]. J. Taylor defines the transmission mechanism as a process, through which changes in monetary policy will be translated into changes in income and inflation [37].

The transmission mechanism can be schematically represented as follows:



The scheme means that an increase in the nominal money supply lowers the interest rate, which, in turn, stimulates the growth of investment and aggregate expenditure, and ultimately the volume of production. Another channel tells us that when domestic interest rates fall, the demand for the national currency decreases, which leads to a decrease in the nominal and real exchange rates of the national currency, and therefore to an increase in net exports and aggregate demand.

The broader scheme of the transmission mechanism is presented by Keith Bain in her book “Monetary Economics: Policy and its Theoretical Basis” (Figure 1).



**Figure 1.1.** The transmission mechanism of monetary policy

*Source: [4]*

This scheme shows how the central banks are capable of affecting a private sector and households' behaviour through the change of the key policy rates. Keith Bain divides it in two phases assuming that the change of the official interest rate needs 2 years, so its full effect is fully realized [4].

Consumption decisions besides current income are also determined by expected future income and the ability to borrow money. Therefore, monetary policy takes it into account when trying to influence the consumption and gross domestic product. When central

bank raises interest rates people are more likely to save more and invest less [4]. Due to the change in the central bank's discount rate, commercial banks change the rates on deposits and loans for the population, the volume of savings and investments changes accordingly, and as a result wages and price levels will change. When domestic interest rates decrease, the exchange rate channel leads to a decrease in demand for the national currency, resulting in a decline in the nominal and real exchange rates of the national currency. This, in turn, leads to an increase in net exports and aggregate demand. [3]. The primary method employed by central banks to impact the money supply is through their open market operations. This approach involves the purchase and sale of government-issued securities in the open stock market by the regulatory body. The underlying principle is to manage the amount of money available in circulation [30].

One more channel is a credit channel: one of the main instruments is short-term lending by the central bank to commercial banks. The most popular short-term loans are tender refinancing loans, overnight loans, and direct repo operations. This channel is closely related to the interest channel. When the volume of refinancing loans increases, the money supply increases, and interest rates decrease [20].

Monetary policy with the instruments listed above and the transmission mechanism has a significant impact on the development of the national economy and its support during crises, the results of its implementation are reflected in macroeconomic dynamics due to changes in the business behavior of economic entities.

Besides monetary policy, **fiscal policy** of the state is one more main tool of macroeconomic regulation, that is capable of influence economy so that its scope and the power cannot be overestimated.

K. R. McConnell and S. L. Brew explain that fiscal policy involves the deliberate management of government spending and tax income with the aim of achieving complete employment, stable prices, and economic expansion [30]. Fiscal policy refers to the actions taken by the government to impact the economy, including taxation and control over the amount of government spending, to maintain appropriate levels of employment, curb the

negative effects of cyclical changes, and prevent or limit inflation [6]. At the same time, tax policy is a set of state measures in the field of building a tax system and mobilizing taxes to the budget.

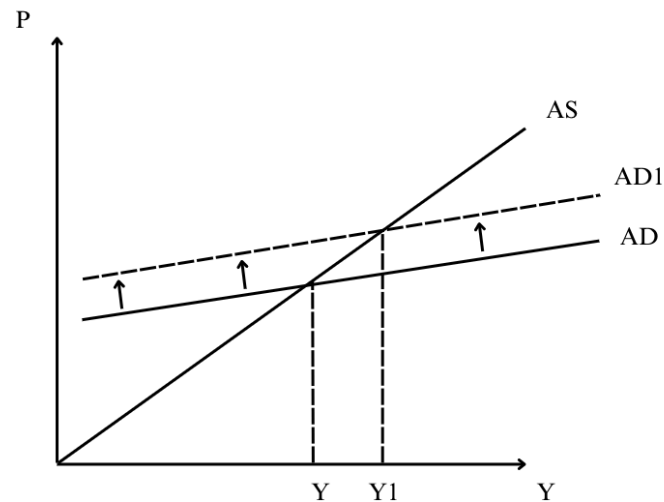
The effectiveness of fiscal policy in achieving its goals is a matter of continuing debate among economists. Supporters believe that fiscal policy can be a potent instrument for stabilizing the economy, particularly during recessions or crises. There are other economists who have advocated for the use of fiscal policy as an effective tool to stabilize the economy during times of recession or crisis. For instance, Keynes suggested that during times of economic decline, government spending can be used to boost the overall demand [23] and Krugman who has advocated for increasing of government spending to stimulate the economy during periods of low economic activity [24]. However, others argue that several factors constrain the effectiveness of fiscal policy, such as delays in implementation, political constraints, and the possibility of unforeseen outcomes, according to Alesina and Ardagna [2].

Barro and Gordon categorize fiscal policy into two types: discretionary fiscal policy and automatic stabilizers. Discretionary fiscal policy involves intentional modifications in government spending or taxation to achieve economic objectives, whereas automatic stabilizers refer to mechanisms that adjust government expenditures and revenues automatically in response to changes in economic conditions [5]. Depending on which phase of the economic cycle the country's economy is in, discretionary fiscal policy is divided into stimulating and restrictive.

Stimulative fiscal policy is a fiscal policy that involves increasing government spending and reducing taxes in order to expand aggregate demand in the economy during a cyclical downturn [18].

Using AS-AD Model, Figure 1.2 shows us the situation when AS is bigger than AD which means that consumers can afford buying less than producers offer. In this case for the government, it is necessary to increase the aggregate demand from AD to AD1. With an

increase in demand, there will also be an increase in the equilibrium volume of production  $Y$  to the potential volume of production  $Y_1$ .

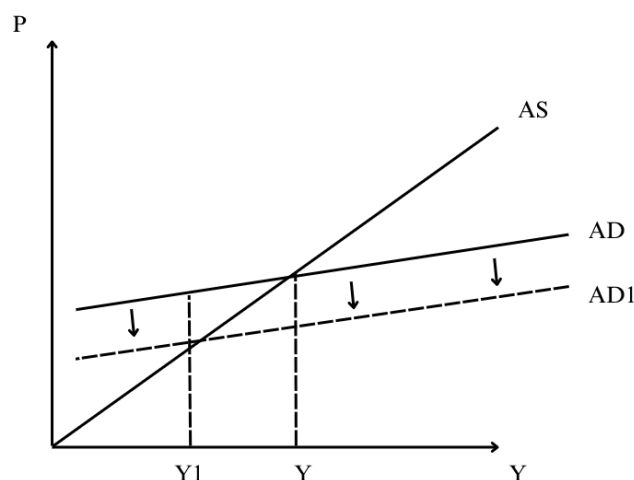


**Figure 1.2.** Application of an expansionary fiscal policy

*Source: visualized by author*

So, expansionary fiscal policy refers to the approach of boosting aggregate demand (AD), which can be achieved through an increase in government spending and a reduction in taxes. By decreasing taxes, individuals will have more disposable income, which will encourage higher consumption. That is why, during the crisis, the state conducts a stimulating budget policy, which increases aggregate demand by increasing public expenditures and reducing taxes.

Another scenario occurs when aggregate demand surpasses aggregate supply. In this situation, the government may implement a contractionary fiscal policy that involves decreasing government spending and raising taxes to stabilize the economy during a cyclical upswing, which leads to inflationary pressure due to excessive aggregate demand [24]. Figure 1.3 shows us a situation where buyers can buy more products than sellers produce. In this case, the government reduces aggregate demand by cutting government spending and raising taxes, which in turn reduce consumption. With a decrease in demand, there will be a decrease in the equilibrium production volume  $Y$  to the potential production volume  $Y_1$ .



**Figure 1.3.** Application of a contractionary fiscal policy

*Source: visualized by author*

In addition to traditional fiscal policy tools, there is also an automatic fiscal policy - a policy of built-in stabilizers - mechanisms that allow reducing cyclical fluctuations in the economy without changing the tax legislation. Such stabilizers include a progressive tax system, transfer payments, and unemployment benefits during economic downturns [24]. In crisis periods, automatic stabilizers allow to stimulate aggregate demand. Variations in these figures caused by cyclic swings in overall income result in an upsurge in tax earnings during times of GDP expansion and a reduction in tax revenues during periods of economic downturn.

The main characteristics of the effects of monetary and fiscal policy instruments on economic indicators are given in table. 1.1.

*Table 1.1*

### **Impact of monetary and fiscal policy instruments on economic indicators**

Monetary policy	
$\uparrow M, \downarrow r$ Operations on the open market - purchase of securities $\uparrow I, \uparrow C, \uparrow$ inflation	$\downarrow M, \uparrow r$ Operations on the open market – selling of securities $\downarrow I, \downarrow C, \downarrow$ inflation
$\downarrow M, \uparrow r$ Increase in the discount rate	$\uparrow M, \downarrow r$ Reduction of the discount rate

↓ I, ↓ C, ↓ inflation, ↓ Exchange rate	↑ I, ↑ C, ↑ inflation, ↑ Exchange rate
Fiscal policy	
↓ GI, ↑ D Reduction of tax rates ↑ C, ↑ GDP, ↑ inflation, ↑ debt	↑ GI, ↓ D Increase in tax rates ↓ C, ↓ GDP, ↓ inflation, ↓ debt
↑ GS, ↑ D Increase in government spending ↑ C, ↑ GDP, ↑ debt	↓ GS, ↓ D Reduction of government spending ↓ C, ↓ GDP, ↓ debt

*Source: composed by the author based on [30]*

Where M is the amount of money in circulation; r –interest rates on loans from commercial banks; GI – government income; GS – government spending; D - level of government budget deficit; I – investments, C – consumption.

Thus, to create the effective fiscal policy, it is crucial to choose a combination of fiscal tools that enable the generation of the required revenue for the budget without triggering an uncontrollable rise in the proportion of national income represented by public debt.

## **1.2. Cycles of business activity. Characteristics of economic recession and long-lasting economic shocks**

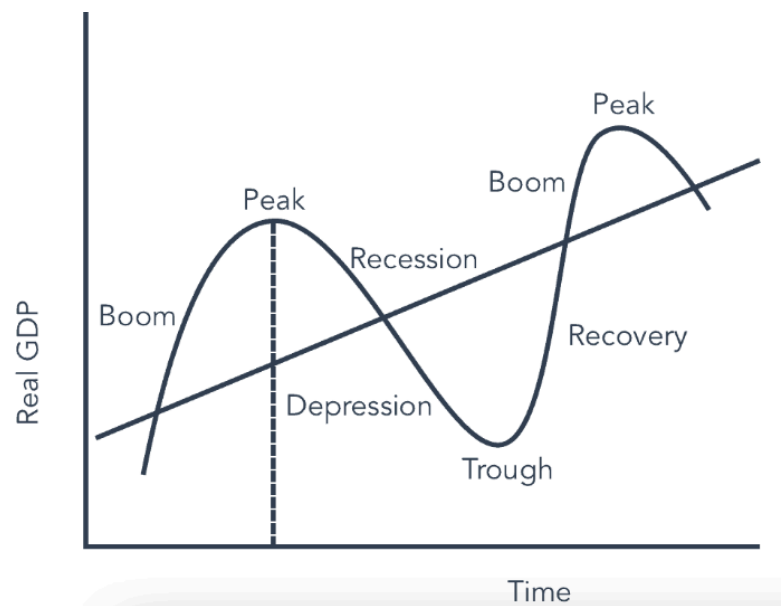
The development of the economy in the world is uneven, it has periods of growth and decline, positive and negative trends. This cyclical nature of the development of the capitalist economic system and its fluctuations between recession and boom restrains economic growth. Governments of all states try to find tools that stabilize those cycles, often using the mix of monetary and fiscal policy instruments. That is why for this study it is

important to define what the cycles of business activities are and what are those economic shocks that require such a government's regulation.

The classic definition of the economic cycle was developed by American scientists A. Burns and W. Mitchell. They see it as a type of fluctuations in the aggregate economic activity of a nation; the cycle consists of an upswing stage, which is evident in various economic activities and is succeeded by a recessionary period affecting the entire economy, characterized by a decline in production that is later followed by a recovery leading to the upswing phase of the succeeding cycle. This shift between cycle phases is recurrent but not necessarily predictable in terms of timing [9].

So, an economic crisis refers to a stage in the economic cycle where there is a significant disturbance in the normal functioning of the economy, leading to a reduction in production, an underutilization of production capacities, a surge in unemployment, and a general imbalance in the economy's productive proportions.

In general, economists distinguish 3 phases in the business cycle that are presented in the Fig.1.4. The above figure illustrates a steady growth line depicted as a straight line in the middle, with the business cycle fluctuating around it.



**Figure 1.4** Business Cycle Phases

*Source: [9]*

1. The initial phase of the business cycle is expansion, which is characterized by a surge in various positive economic indicators: income, employment, supply and demand, consumption confidence. The expansion phase endures as long as the economic situation remains conducive to growth.

2. Following the expansion stage, the economy hits a *peak* - second phase of the business cycle. It is the economy's highest level of growth, and economic indicators stop increasing further. Prices reach their maximum point, and the economic output reaches the maximum level because full employment is ensured.

3. The phase that comes after the peak stage is called the *recession*. During this phase, there is a rapid and consistent decline in the demand for goods and services. Producers are not immediately aware of the decrease in demand and continue to produce, leading to an oversupply in the market. Recession periods are typically identified by elevated unemployment rates, negative economic growth, and low sales caused by reduced consumer demand, stagnant or decreased income levels, and decreased real output.

4. If a recession intensifies the economy might enter a stage that is called depression. During this phase, economic activity continues to decline further. Moreover, there is an increase in unemployment, a significant reduction in production, a decline in trade and investment.

5. When the economy hits a bottom point and supply and demand fall before ultimately beginning to recover, it reaches the trough of the business cycle. It is the lowest point of the economy. But this the low point of the cycle allows individuals and businesses to restructure their finances and prepare for a recovery.

6. Following the trough, the economy enters the *recovery* stage. In this phase, the volume of production is restored to the level that preceded the decline phase, after which it continues to grow until it exceeds the peak phase of the previous cycle. Recovery phase denotes the start of a better economic situation, it signifies the economy's return to a favorable state, characterized by growth and increased economic activity.

Focusing on recessions, they typically happen when there is a broad decrease in spending, which is usually caused by events like a financial crisis, supply shocks, or a major man-made or natural disaster such as a pandemic. In response, governments often implement expansionary macroeconomic measures like increasing the money supply, lowering interest rates, or boosting government spending while reducing taxes. That is called the combination of fiscal and monetary policy, which this works is focused on. These actions are aimed at mitigating the negative impact of the recession and stimulating economic growth.

Each recession is unique in its own way, there are common characteristics that are often observed during such economic downturns:

- recessions typically endure for approximately one year and can have considerable economic costs, for example a decline of approximately 2 percent in GDP, or 5 percent in more severe cases.

- industrial production and investment tend to experience larger declines compared to GDP.

- sharp declines in trade, both imports and exports, disruptions of the supply chains.

- The level of unemployment typically rises as well as the financial market instability [12].

An example of the latest event that led to a global economic recession is the COVID-19 pandemic. The global economy went through a period of economic downturn for a year, which included reduced consumer activity, as well as the implementation of COVID-19 lockdowns and precautionary measures in early 2020. This led to a crisis in the world economy, with all developed economies entering into a state of recession within half of the year [41]. Amidst the recession, a lot of countries faced a sudden surge in unemployment level. Moreover, the situation was aggravated by the response to Russia's invasion of Ukraine and its debt default in the year 2022. The pandemic has been identified as the primary catalyst that triggered the recession, impacting nearly every significant sector of the economy. This unforeseen situation played a pivotal role in the stock market crash and was the cause of stringent limitations imposed on social liberties and mobility. The spread of the

virus was not confined to a single sector, rather it affected numerous industries including healthcare, hospitality, aviation, and many others. Additionally, the pandemic disrupted supply chains and affected the global trade, resulting in further economic setbacks. Furthermore, the pandemic also led to the closure of many businesses and loss of jobs, causing immense financial stress on individuals and the economy [36]. An economic expert Jim Cramer stated that the actions taken to address the recession caused by the COVID-19 pandemic had resulted in an unprecedented transfer of wealth to the wealthiest individuals [13].

Therefore, in today's world, cyclicity of the economy and the correct response to recessions that might occur is extremely relevant. In order to ensure economic growth in the country, the tools of anti-cyclical resolution should be used, in particular, the combination of the effects of monetary and fiscal policy.

### **1.3. Principles and practical examples of the policy mix and its coordination**

The economy is currently unstable with unpredictable changes in inflation, slowed economic growth, decreased living standards, and shifts in global economic relations. Based on international experience, using monetary tools to combat inflation and fiscal tools to boost overall demand and supply has been proven to be effective in stimulating the economy.

The appropriate reaction of the government's financial policy to cycles of economic dynamics is one of the most important problems of macroeconomic theory. This problem is complicated and hard to address, as the government is faced with the choice of the range of specific instruments of fiscal and monetary policy, different markets have special characteristics that directly affect the effectiveness of government actions [38].

As was stated before, fiscal policy has the main responsibility of attaining full employment and economic growth, while monetary policy is primarily focused on

controlling inflation [33]. But despite appearing to be distinct and influencing separate facets of the economy, they work together to shape macroeconomic conditions and subsequently influence each other in various significant ways. When affecting the financial stability both policies have effects on inflation. P.Yeshchenko stated that it is essential to view monetary and fiscal policies as interconnected and interdependent. The implementation of these policies should consider not only their direct regulatory implications but also the potential outcomes of any alterations in the monetary regulation sphere. A comprehensive approach that takes into account the effects of both policies in tandem is necessary for optimal results [40]. Maintaining tax stability while increasing budget expenditures can lead to a surge in demand for funds in the money market, driving up interest rates. This can be a significant element of monetary policy. On the other hand, a decrease in the discount rate, which is part of the monetary policy, can elevate the value of government loan bonds. The resulting increase in demand for these bonds can expand the government's ability to issue new loans, thereby facilitating an increase in budgetary expenditures. In essence, these measures are closely intertwined and can have far-reaching implications for the economy.

In order to successfully achieve the aims of monetary and fiscal policies, it is not sufficient to rely solely on the implementation of one's own tools. The actions of other decision-making centers must also be taken into account. For instance, if the government fails to consider the goals of the central bank, the effectiveness of monetary policy instruments may be compromised. This can make it challenging for the central bank to control inflation levels and ultimately result in unstable and unpredictable inflation rates that hinder the achievement of fiscal policy objectives. Hence, coordination between the two policies is crucial for attaining macroeconomic stability.

The intersection of fiscal and monetary policies occurs at the management of budget deficits and public debt policy. The acceptable level of the budget deficit is the crucial factor that unites these policies [42]. It serves as a crucial parameter for integrating fiscal and monetary policies, regulating the government's actions, and enabling the central bank's monetary decisions to influence public finances' stability. Thus, the budget deficit's role in

shaping the economy's stability makes it an essential component of the relationship between fiscal and monetary policies.

The coordination of fiscal and monetary policy can lead to either expansionary or restrictive actions by the Central Bank and the government, and the resulting scenarios can vary based on the policy choices made: [29]

1. *Fiscal and monetary expansion.* When investment and consumption levels are stimulated simultaneously, it results in a faster growth of gross domestic product, but it also causes high inflation rates. This method of regulation is associated with a relatively low initial cost of servicing public debt, but it leads to a rapid increase in debt over time. In other words, boosting both investment and consumption can have short-term benefits for economic growth, but it may come at the cost of higher inflation and mounting public debt in the long run.
2. *Fiscal expansion and monetary restriction.* Aggregate demand is intensively stimulated, and therefore the pressure on the price level in the market increases. The level of inflation becomes higher, and, at the same time, the GDP grows. Under monetary restrictions, high interest rates on the market imply inefficient expenditures on public debt service (high interest payable foreign creditors).
3. *Monetary expansion and fiscal restriction.* The effect is opposite to the previous scenario. Investments and production are stimulated, and low interest rates are set, making it less expensive to service the public debt.
4. *Monetary and fiscal restriction.* This scenario is accompanied by a controlled containment of the growth of inflation and the budget deficit, and therefore of the public debt, GDP is growing slowly [14].

Monetary and fiscal policies have a diverse range of measures aimed at either expanding or restricting the economy, depending on the government or central bank's objectives. Different combinations of these policies can yield various outcomes, including stabilizing the macro environment or creating imbalances in economic activity indicators. So, for the regulators it is important to recognize the connection

between the tax, budgetary, and monetary spheres, and for the government to coordinate its monetary and fiscal decisions to achieve optimal results, stabilize economy and overcome crises.

## CHAPTER 2. MONETARY-FISCAL MEASURES TO OVERCOME RECESSION DURING RECENT ECONOMIC CRISES

### 2.1. The role and instruments of fiscal and monetary policy in the anti-cyclical regulation of the economy

The economy is a multifaceted entity that undergoes changes over time, which may arise due to different reasons, such as variations in supply and demand, technological advancements, natural calamities, political instability, and so forth. The major concern for policymakers is to maintain equilibrium in the economy and establish consistent economic development. In this regard, fiscal and monetary policies serve as the primary instruments that governments utilize to regulate the economy.

So, let's consider in detail the practical application of both policies and the principles of their operation in different economies.

To begin with, both policies' objective is to affect inflation. To demonstrate the impact of both policies on the economy and in this case exactly on the inflation, the AD-AS model of aggregate demand and supply shows how the price level and the volume of demand and supply in the economy are related [25]

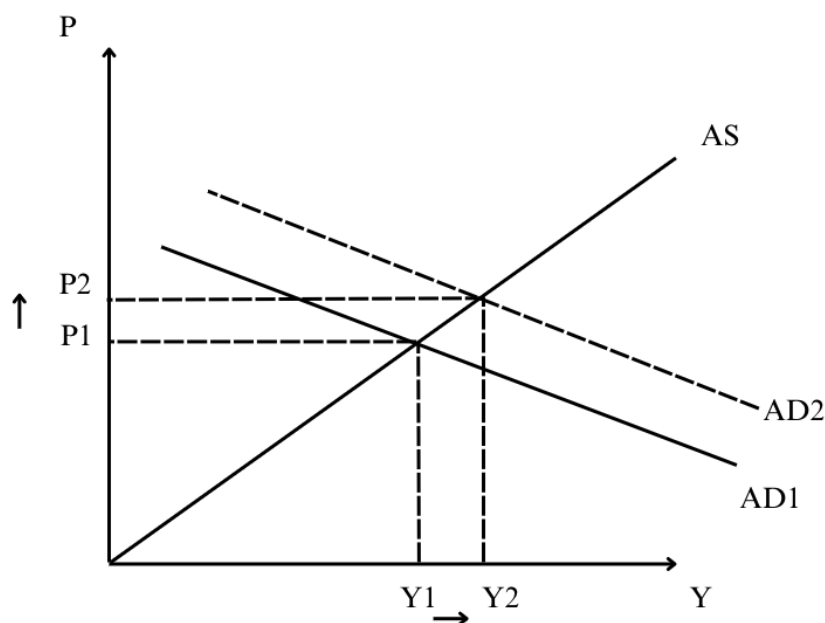
The aggregate demand equation is determined by the formula:

$$Y = C(Y-T) + I(r) + G + NX(e) \quad (2.1)$$

Where Y is national income; C – consumption that depends on the disposable income of individuals which is calculated as income minus taxes; I – investments that depend on the set interest rate (the higher the interest is the lower the investments are); and G – government spending.

Figure 2.1. demonstrates how government can influence the price level in the economy in terms of the anticyclical regulation using such instrument as its spending and taxes. So, it can spend budget money more while decreasing tax rate, which will move the AD curve to the right from AD1 to AD2 as the consumption level will increase. The

equilibrium output will move from  $Y_1$  to  $Y_2$  and at the same time the price level will go up from  $P_1$  to  $P_2$ .



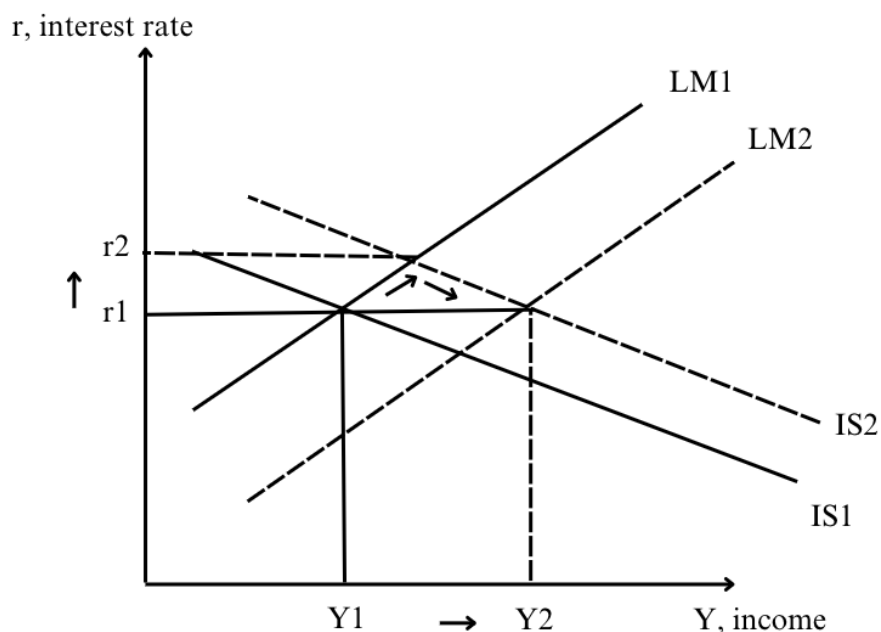
**Figure 2.1.** Impact of fiscal expansion on the price level

*Source: visualized by author*

This case shows us that price stability is not just monetary policy's main goal, but it can also be significantly influenced by the fiscal policy, and, therefore government and Central bank should work together to achieve the best results for the economy during the recession. So, while it is the central bank's duty to target the inflation, the aim cannot be achieved without the consideration of fiscal effects as well.

Both monetary and fiscal policy can affect not only price level but also interest rate [25]. IS-LM model presented in the Fig. 2.2 illustrates the monetary-fiscal effect on the interest rate. This figure can show us different scenarios of both policies coordination. For example, the expansionary fiscal policy that is accompanied by the tax cut or/and increase of government spendings, will shift the investment-spending curve IS to the right from  $IS_1$  to  $IS_2$ . It will change the equilibrium level of output. To compensate the excess demand for money the interest rate will increase too. It happens when the monetary policy is neutral, and the money supply doesn't change. But there is another scenario which also includes the

expansionary monetary policy that shifts the LM curve or money supply curve to the right to LM2. In this case the interest level gets back to its initial level  $r_1$  as is shown in the figure. It means that when the government and central bank act together and have the same goal – to increase a total output to  $Y_2$  – they are able to keep the interest rate on its desirable low level.

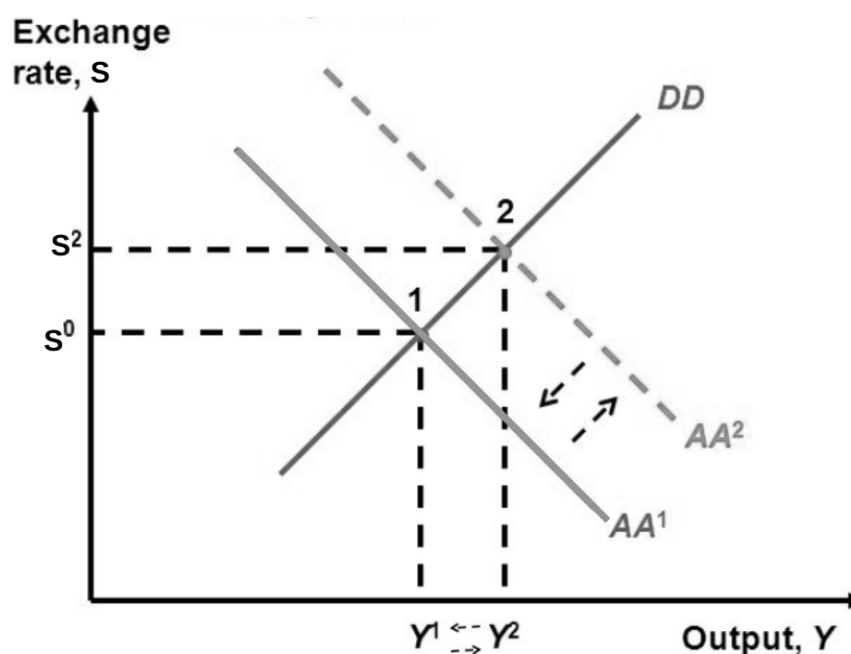


**Figure 2.2.** Coordination of Monetary and Fiscal policy

*Source: visualized by author*

Although the general principles of the policy mix have been presented, it is important to examine how monetary and fiscal policies can operate in economies that have varying exchange rate regimes. Under the fixed exchange rate system (as illustrated in Figure 2.3), the central bank sets the exchange rate at  $S_0$ . If the aim is to boost output from the initial level of  $Y_1$ , the central bank may opt to increase the money supply by purchasing domestic assets. This results in the  $AA_1$  curve shifting to the right, creating  $AA_2$ . The outcome of this policy is the setting of a new equilibrium point (2), where the exchange rate is now at  $S_2$ . In essence, this policy leads to the depreciation of the domestic currency. While this does

increase output from  $Y_1$  to  $Y_2$ , the central bank must still fix the exchange rate and prevent the depreciation. Therefore, it will sell foreign assets to obtain domestic currency, shifting the money supply curve back to its initial level, and resulting in  $AA_2$  going back to  $AA_1$ . Consequently, the equilibrium stays the same (1), with output remaining at  $Y_1$ . This highlights why temporary monetary policy is ineffective in increasing output under a credible fixed exchange rate regime.

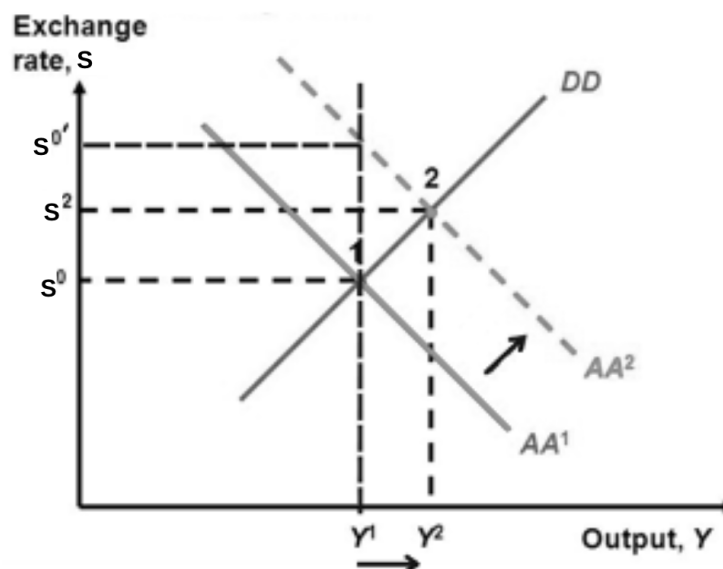


**Figure 2.3** Monetary policy under the fixed exchange rate

*Source: visualized by author*

But when the exchange rate floats the CB can use monetary policy to raise the output.

On the Figure 2 we see that due to the expansionary monetary policy the  $AA^1$  curve shifts upward to  $AA^2$ . Under the floating exchange rate, the new equilibrium (2) with the new exchange rate  $S^2$  and increased output  $Y^2$  is what the CB can allow. The excess supply of domestic money weakens the currency but at the same time effectively increases the output.



**Figure 2.4.** Expansionary monetary policy under floating exchange rate

*Source: visualized by author*

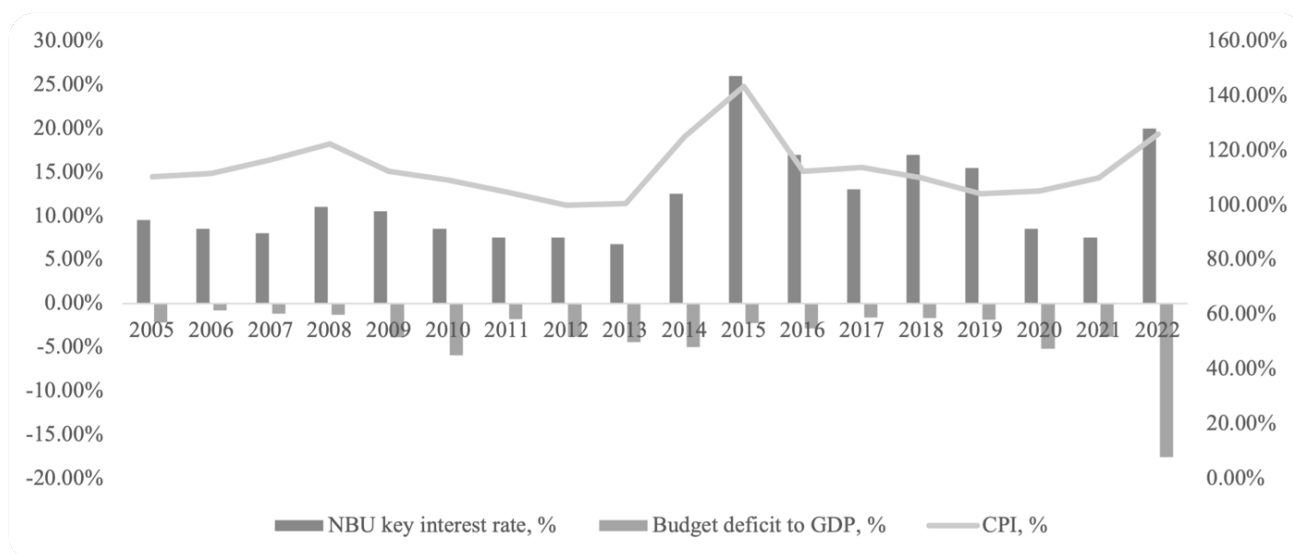
It means that when a country has a fixed exchange rate it doesn't have an ability to influence the output level using the monetary policy tools, it is always ineffective and central bank always must return the money supply curve to the original level not to let the domestic currency depreciate.

So, a conclusion can be made that when a small country adopts a fixed exchange rate regime, its ability to use fiscal policy to impact the overall demand of its economy becomes especially significant, while its capacity to employ monetary policy becomes wholly ineffective. This means that the government's ability to control public spending and taxation can have a considerable impact on the country's economic activity, while the central bank's manipulation of interest rates and money supply becomes virtually insignificant. Therefore, in such a scenario, fiscal policy becomes the primary tool for economic management and anticyclical regulation.

For a deeper understanding, it can be analyzed how both policies interacted on a real practical example of Ukraine.

Figure 2.5 demonstrates different periods in Ukrainian economy and different scenarios of coordination of monetary and fiscal policy accordingly. The first period to identify is 2005-2007 when central bank lowered the interest rate (stimulating monetary

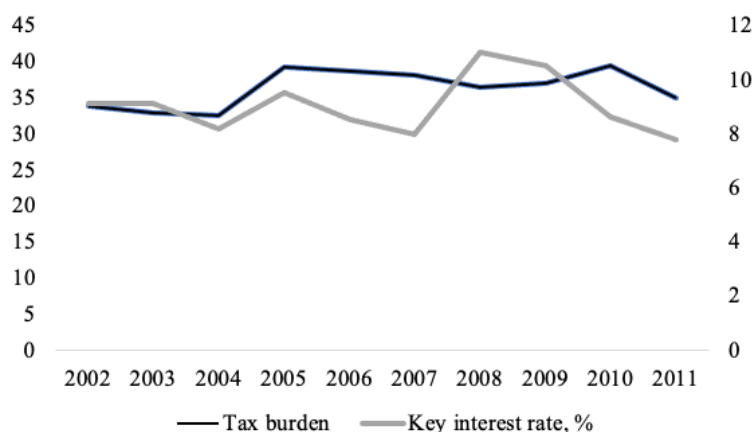
policy) while government reduced its spendings. Such combination of moderately stimulating monetary policy and restrictive fiscal policy resulted in the reduction of budget deficit during these years which means that both regulators coordinated their actions effectively.



**Figure 2.5.** Changes of the main monetary and fiscal policy indicators in Ukraine during 2005–2022

*Source: composed by author based on [31]*

The following period that is worth analyzing is the global financial crisis that occurred between 2008 and 2009.. NBU had to implement the restrictive policy, rising the interest rate to try to stabilize the economy. But these actions were not that effective, and inflation continued to rise. This happened because the expansionary fiscal policy took place – budget deficit was growing because government decreased the tax burden which means lower budget income. Therefore, regulators couldn't meet their objectives during that period and their actions could have been more coordinated. This effect can be demonstrated on the Fig. 2.6.



**Figure 2.6.** Historical dynamics of the tax burden and accounting rate in Ukraine

*Source: composed by author based on [31]*

In the period of 2010-2013 budget income gradually normalized, however, increased government spendings also returned, that is why the budget deficit was still quite big. Central bank during these years started to lower interest rate, but market interest rates were still high due to the significant risks of the period. Government and central bank acted in coordination, which allowed to control the price level. However, due to a number of factors, even this fact could not ensure rapid economic growth.

The difficult political conditions of the next period of 2014-2015 brought many challenges for the economy, and the NBU set the goal of restraining the growth of the price level and maintaining overall financial stability. It was in 2015 that the central bank switched to inflation targeting, which made its activities more effective. At the same time, revenues to the budget decreased, which made it difficult to fulfill the goals of the fiscal policy and, accordingly, its coordination with the monetary policy.

With the gradual normalization of the economy in 2016-2017, the central bank began to ease monetary policy, lowering discount rates. The fiscal policy was restrictive resulting in raising tax rates and decreasing budget spending. Such actions of both regulators helped to reduce the budget deficit and keep the inflation level relatively stable.

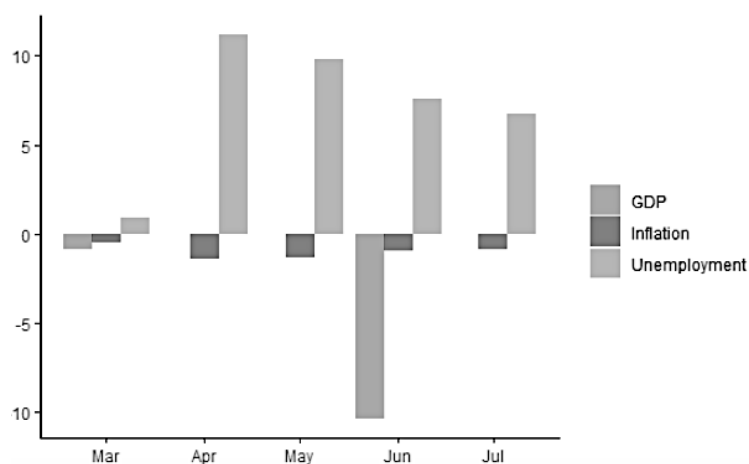
During 2018-2019, Ukraine's monetary and fiscal policies continued to focus on stabilizing the economy. The policies were coordinated, with the NBU and the government working together to achieve their respective objectives. Lowering interest rates together with fiscal measures helped to make a positive progress in controlling the inflation and budget deficit.

In the period from 2020 to 2021, Ukraine's fiscal and monetary policies were directed towards reducing the negative economic effects of the COVID-19 pandemic. The interest rate was reduced from 11% in January 2020 to a historic low of 6% in December 2020, and government provided financial support to businesses affected by the pandemic and increased healthcare spendings. Despite a considerable increase in the budget deficit, the coordination of regulators was quite effective.

## **2.2. Features of the policy mix in Ukraine and foreign countries during the financial and economic crises caused by the Covid-19 pandemic**

The year 2020 brought a crisis to the world, which was caused by the severe spread of the COVID-19 virus. It became a great and unique economic shock for the whole world. In response, governments around the world had to implement a range of policy measures to ease the economic shock consequences caused by the pandemic.

For example, the first half of 2020 saw a significant decline in the real Gross Domestic Product in the United States, with a decrease of over 10% as shown in Figure 2.7. The implementation of some restrictions in following months had a notable impact on unemployment rates, which rose by 11.2 percentage points in comparing to Feb 2020 [17].



**Figure 2.7.** % Change in US macro variables in comparison to Feb 2020  
*Source: [21]*

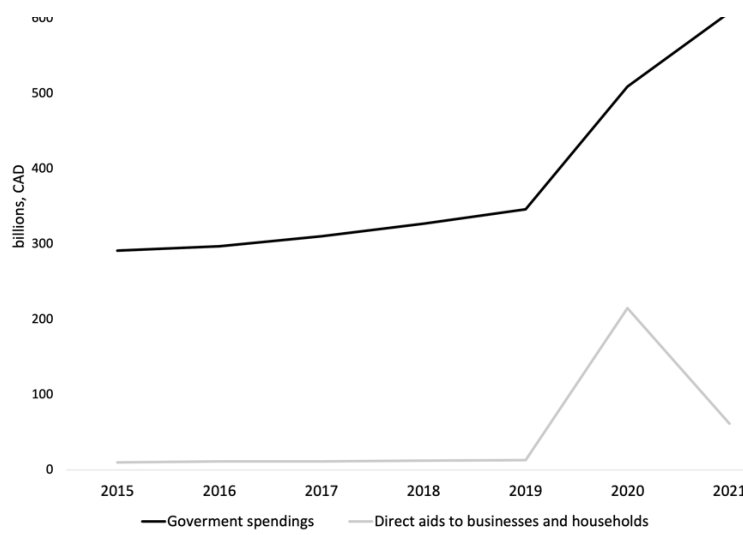
The losses could have been even bigger, but the coordinated actions of central bank and government helped to limit the severe effects of the pandemic. So, in the USA the Federal Reserve System and the government offered a set of unique measures to mitigate the effects of the crises.

On the monetary policy side, the Federal Reserve implemented such measures to support the economy as lowering interest rates to near-zero, implementing quantitative easing programs to buy government bonds and establishing emergency lending programs to support small businesses and local governments. On the fiscal policy side, the U.S. government implemented such programs that aimed to help households to overcome the crises. These programs included CARES or Coronavirus Relief Act as well as the American Rescue Plan Act, which guaranteed support to individuals and businesses affected by Covid-19. These programs included direct payments to households, unemployment benefits, and funding for small businesses and healthcare providers [16].

Jagjit S. Chadha et al. in their paper series by the European Central Bank conducted the research measuring how the policy mix helped the USA avoid a lot of consequences that the pandemic could bring to the country. Their model shows that the FED's intervention played a crucial role here. the absence of the policy response to the economic downturn would have resulted in a more severe impact on output. The decline could have been over 10%, real wages would have decreased by over 15%, and unemployment could have risen

by more than 20%. The impact on wages could have been even worse, around 20% lower, compared to the effects of quantitative easing. The policy mix used during the period was more expansionary in terms of monetary policy, as the Federal Reserve implemented measures to increase the money supply and provide liquidity to financial market [21].

Another example of policy coordination during the crisis is Canada. Its fiscal measures are considered to be expansionary and can be seen in Fig 2.8.



**Figure 2.8.** Fiscal policy in Canada during 2015-2021

*Source: composed by author based on [32]*

In response to the crisis, the Canadian government made significant increases to government spending and provided financial assistance and payments to individuals in 2020 and 2021 in order to support both the economy and individuals.

The monetary policy of Canada during that time was also expansionary and was followed by lowering the policy rate and buying government bonds. The coordination between policies was critical in enhancing the effectiveness of both regulators. The Bank of Canada's monetary policy provided the liquidity to maintain functioning financial markets, and the fiscal policy gave support to individuals and businesses.

The pandemic had also a significant impact on the Ukrainian economy, leading to a slowdown of economic activity and a lower standard of living for many households. In

Ukraine, a combination of both monetary and fiscal measures have been implemented as a policy mix to mitigate consequences of the Covid-19 pandemic.

Talking about *monetary measures* the National Bank of Ukraine has executed various actions to provide liquidity to the banking sector and support the functioning of financial markets through such measures: reducing the policy rate, increasing liquidity provision via repo operations, and loosening regulatory requirements for banks. On the *fiscal front*, the Ukrainian government has implemented multiple measures aimed at providing support to businesses and households. These measures involved wage subsidies, tax relief, loan guarantees, and direct cash transfers specifically for vulnerable groups.

However, even despite these measures, the Ukrainian economy has been significantly affected by the pandemic with a 4% contraction in 2020. The policy mix in Ukraine has encountered challenges, such as limited fiscal space, weak institutions, and political instability.

In conclusion, the global crisis of 2020 caused by the COVID-19 pandemic had significant economic and social impacts on Ukraine. However, through powerful monetary and fiscal incentives, the authorities were able to support vulnerable segments of society and businesses, while also ensuring the stability of the banking system.

The Covid-19 pandemic is a unique lesson for economies around the globe about how to respond to future crises using both monetary and fiscal instruments in coordination.

### **2.3 Coordination of the fiscal and monetary policy during the war in Ukraine**

The Russian invasion in Ukraine has had severe economic consequences for the nation, including rising inflation, currency depreciation, and a decrease in economic production. As a result, it has been crucial to coordinate both fiscal and monetary policies to reduce these impacts and stabilize the economy.

Monetary policy, which is overseen by the central bank, is responsible for regulating the money supply and interest rates to achieve economic goals such as sustained economic growth and price stability. In contrast, fiscal policy entails the government's use of spending and taxation to accomplish comparable objectives.

Since the beginning of the full-scale war, the National Bank of Ukraine employed various monetary policies to address the economic challenges the country faced. NBU focused its efforts on restoring calm among the people, promoting trust in the banking system, and maintaining stability in the financial sector. During this time, the NBU made key decisions to ensure the smooth functioning of the banking system, control the depreciation of the national currency, and prevent capital flow from the country. These measures involved increasing interest rates to tackle inflation, fixing the exchange rate, and providing liquidity support to banks to maintain the stability of the financial system.

At the same time, the Ukrainian government implemented fiscal measures to aid the economy, including expanding social spending to support vulnerable groups, providing financial aid to businesses affected by the conflict, and introducing structural reforms to enhance the business climate and attract foreign investment.

In Ukraine, the war made it impossible to implement monetary policy through inflation targeting, although the NBU remained committed to this regime. But due to economic uncertainty, the regulator was forced to introduce some administrative restrictions, in particular on the foreign exchange market. The fixation of the exchange rate at the level of 36.6 hryvnias/dollar became one of the most important tools, an "anchor" for the economy when the traditional tool - the discount rate - could not have the desired effect.

As for the discount rate, since the beginning of the war, its level has increased from 10% to 25% in order to restrain the general increase in prices, and it is planned to maintain it at the level of 25% until at least 2024. A high discount rate currently plays a supporting role in ensuring exchange rate stability, which is needed to ensure price stability. Therefore, the NBU keeps the discount rate at this level and uses additional tools, such as mandatory

reserve standards, to stimulate banks to raise interest rates more actively on hryvnia deposits and, accordingly, increase the attractiveness of instruments in the national currency [28].

Fiscal policy is even more powerful tool today in the regulation of the economy. Before the war there were fiscal rules such as a debt limit, budget deficit restrictions, and government loan guarantees. However, because of the war these rules are not in the effect today, and the actual values of the relevant indicators began to exceed the thresholds. For example, the state debt amounted to about 85% of GDP, and the state budget deficit was 19.1% of GDP. Also, the Ukrainian government introduced a tax reform. These are the ways how fiscal policy had to adapt in Ukraine to prevent the deep recession.

In summary, coordination between monetary and fiscal policies during the Ukrainian conflict was vital in achieving economic stability and supporting the country's recovery. The NBU and the government collaborated to address the economic difficulties, with the central bank taking action to control inflation and maintain financial stability, while the government provided fiscal support to the economy. As a result, their joint efforts helped stabilize the economic situation in Ukraine during the challenging conflict period. However, it remains to be seen how much longer the effects of the conflict will impact the economy and how these policies will need to continue to evolve.

## **CHAPTER 3. THEORETICAL AND METHODOLOGICAL APPROACHES TO DETERMINING THE NECESSITY OF MONETARY AND FISCAL POLICY COORDINATION**

### **3.1 Approaches to modelling and methodology description**

The primary goal of this thesis is to investigate why the coordination between monetary and fiscal policies is necessary for achieving macroeconomic stability, sustainable economic growth, and reducing inflation. Empirical studies on the effectiveness of policy coordination have used various econometric techniques, including vector autoregression VAR, structural VAR, and dynamic stochastic general equilibrium models. These studies have provided mixed results, with some studies showing that policy coordination is effective in promoting macroeconomic stability and reducing inflation [14].

In this thesis, the econometric modelling will be used, specifically regression analysis in Eviews, to investigate the extent to which fiscal policy influences the CPI. The CPI is an important measure of inflation and is often used by policymakers to set monetary policy targets. Understanding how fiscal policy affects the CPI is critical for determining the effectiveness of policy coordination in achieving price stability.

Estimating the effects of fiscal policy is particularly relevant problem today, especially in the conditions of a financial and economic crisis, when monetary methods have less influence on the economy, as, for example, it happens in Ukraine during the war, when the effectiveness of the discount rate and inflation targeting mechanism has decreased, and, therefore, other tools had to be used [8, 22].

A number of economists have concluded that coordination of both policies is necessary, and focusing only on the potential of monetary policy in countercyclical regulation is not the right approach. One of the conclusions of economists is that the use of one policy is ineffective without the real support of the other, because adjusting the money

supply in the economy without the intervention of government regulation and deficit replenishment can ultimately lead to a liquidity deficit [35].

Pervin Dadashova dedicated her study to the coordination of policies, in which presented a model of the relationship between monetary and fiscal policies through the channel of the exchange rate, in which she confirmed that although the NBU is responsible for the price level and stability of the national currency, achieving this goal cannot be achieved without effective management of the public debt, which is the government's task [14].

Artem Vdovychenko measured how fiscal policy can be an additional to monetary instrument to affect GDP and inflation. As per his model, the growth rate of consumer prices is significantly and positively affected by both budget expenditures and taxes. However, the impact of budget expenditures on the growth rate is considerably greater than the impact of taxes, but still there is a positive correlation [39]

In this work, the impact of fiscal instruments as a necessary additional factor on the level of consumer prices will be evaluated using regression analysis. This approach will be useful in showing the necessity of the coordinated actions of both regulators as the regression analysis will help to identify the direction and magnitude of the relationship between variables. Specifically, it can help determine whether fiscal policy has a positive or negative impact on the CPI, how strong the relationships are, and provide the quantitative impact of fiscal policy on the CPI.

### **3.2. Economic and mathematical modelling of the influence of fiscal policy instruments on the economy and results discussion**

In times of economic downturns, policymakers and central banks commonly employ anticyclical regulation measures to promote economic activity and alleviate the effects of the recession. Maintaining a low CPI during recessions is crucial because it

preserves the purchasing power of consumers, promotes savings and investment, and creates a steady economic environment for expansion. The CPI is a measure of inflation that calculates the average price changes of goods and services that households typically purchase. If the CPI is high, it means prices are increasing quickly, and if it is low, prices are stable. Policymakers can reduce the impact of recessions and promote economic recovery by ensuring that inflation stays low and stable [7].

While the central banks use monetary policy to affect the price level, which includes adjusting interest rates and the money supply, the government has its impact as well which is not that obvious at first sight. But fiscal instruments can make a contribution to inflation as well, which is why both regulators should act in coordination to achieve the best results in anticyclical regulation and maintain a low price level.

Therefore, to study the impact of fiscal policy on the price level and to prove the need for coordination of monetary and fiscal policies, an econometric model of the dependence of this factor on individual state regulations was developed.

In modelling Canadian fiscal policy was chosen for study as the Canadian government has a history of active fiscal policy, including the implementation of stimulus packages during recessions.

For the study, official statistics of the Canadian Statistical Office were taken in the form of quarterly data from 2006, from the 1st quarter to the 3rd quarter of 2022 - the period or number of observations is  $T = 71$ . The model was implemented in the students version of EViews.

To build a feasible econometric model, it is first necessary to establish logical relationships. So, to test the dependencies, the following null hypotheses were formulated:

- 1) the consumer price index is directly dependent on government expenditures.

When the government spends more money, it affects the productivity in the economy leading to the higher demand for materials and labor, which can push prices up which leads to a higher CPI.

- 2) the consumer price index is inversely dependent on government subsidies for producers. When businesses receive subsidies, they can produce goods and services with reduced expenses, which can then be reflected in lower prices for consumers.
- 3) the consumer price index is directly dependent on the volume of taxes on production government sets. When businesses have to pay more taxes on their production, they have less money available to spend on things like labor, materials, and equipment. This can lead to higher production costs and ultimately higher prices for consumers.

So, the general model can be described by the equation:

$$\text{CPI} = \beta_0 + \beta_1 * \text{GOV\_EXP} - \beta_2 * \text{SUBSID} + \beta_3 * \text{TAX\_PROD} \quad (3.1)$$

Where CPI is a dependent variable, the Consumer Price Index in Canada is a measure of the average change in prices of goods and services that consumers purchase over time, measured in index points.

GOV\_EXP represents general government final spendings during a period, measured in billions of CAD.

SUBSID – subsidies to producers given by the government in a period, measured in millions of CAD.

TAX\_PROD - Taxes on production and products, seasonally adjusted at annual rates, that were received by the Canadian budget during the period, measured in millions of CAD.

First, the influence of independent variables on the dependent variable was analyzed using a statistical package Eviews12SV. Figure 3.1 demonstrates the obtained results:

Dependent Variable: CPI  
 Method: Least Squares  
 Date: 04/23/23 Time: 21:28  
 Sample: 1 71  
 Included observations: 71

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	66.39546	1.167582	56.86579	0.0000
GOV_EXP	0.000175	1.90E-05	9.222544	0.0000
SUBSID	-0.000123	1.55E-05	-7.905245	0.0000
TAX_PROD	0.000114	1.42E-05	8.070135	0.0000
R-squared	0.978437	Mean dependent var	124.5197	
Adjusted R-squared	0.977472	S.D. dependent var	11.47819	
S.E. of regression	1.722808	Akaike info criterion	3.980477	
Sum squared resid	198.8606	Schwarz criterion	4.107952	
Log likelihood	-137.3069	Hannan-Quinn criter.	4.031170	
F-statistic	1013.403	Durbin-Watson stat	1.596840	
Prob(F-statistic)	0.000000			

**Figure 3.1** - Evaluation of the relationship of macro factors to CPI

*Source: composed by the author based on own calculations*

The examination of how the independent variables affect the dependent variable indicates the model's suitability and its high level of explanatory power. The coefficient of determination R squared is 97.84% - this is how much the change in the dependent variable depends on the change in the independent variables.

The p-value of all independent variables is less than 0.05, and the t-criterion is greater than 2 modulo, which shows the adequacy of the model. This suggests that the data are correctly selected and account for the impact of spending, taxes, and subsidies on the CPI. Therefore, these data can be used for further research.

The Durbin-Watson test indicates that there is no first-order autocorrelation. For this model with 71 observations and 3 independent variables, the value limits for the criterion are 1.525 - 1.703. In this model, the value of the Durbin-Watson criterion is 1.59, which falls

into the required range and confirms the previous statement about the absence of first-order autocorrelation.

Having estimated the parameters, it is necessary to perform an economic interpretation of each of the factors and compare them with the initial hypotheses.

- 1) Government Spending does have a direct effect on the consumer price index, as stated in the null hypothesis. The change in the consumer price index is not significant, but nevertheless, with a 1% increase in government spending, the CPI increases by 0.017%. t-Statistic has the biggest value in this case which means the strongest relationship among all independent variables.
- 2) A positive change in subsidies spent by the state to support producers by 1% reduces the CPI by 0.012%. As in the previous statement, the change is not large, but the dependence still exists.
- 3) A 1% increase in tax revenues from taxes on production has a positive effect on the CPI, increasing its level by 0.011%, as stated before.

To estimate the covariances of the regression coefficients in the model a Coefficient Covariance Matrix was built (Fig.3.2). A positive covariance indicates that the two coefficients move together in the same direction, while a negative covariance indicates the movement in opposite directions. In this case, low values of covariances mean that the variables are relatively independent of one another. It makes it easier to estimate the effects of individual variables on the outcome variable, as the effects of one variable are less likely to be impacted by the effects of other variables.

Coefficient Covariance Matrix					
	C	GOV_EXP	SUBSID	TAX_PROD	
C	1.363247	-8.30E-06	9.09E-06	4.20E-07	
GOV_E...	-8.30E-06	3.60E-10	-2.34E-10	-2.50E-10	
SUBSID	9.09E-06	-2.34E-10	2.41E-10	1.36E-10	
TAX_P...	4.20E-07	-2.50E-10	1.36E-10	2.00E-10	

**Figure 3.2** – Coefficient Covariance Matrix

*Source: composed by the author based on own calculations*

To confirm these results and check for the presence of autocorrelation in the residuals of the model the Lagrange Multiplier (LM) test was performed. If there is autocorrelation in the residuals of a regression model, it can impact the values of the regression coefficients, causing them to be inaccurate and less reliable. Additionally, the statistical tests used to determine the significance of the coefficients may also be impacted, leading to less trustworthy results.

Therefore, it's important to check for autocorrelation using the LM test in EViews to ensure the accuracy of the regression analysis. The results of the test are demonstrated in Fig.3.3. The p-value for the residuals is greater than the significance level of 0,05, therefore the null hypothesis that the model is free from the autocorrelation can be accepted.

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	2.191095	Prob. F(2,65)	0.1200
Obs*R-squared	4.484372	Prob. Chi-Square(2)	0.1062

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 04/23/23 Time: 21:29

Sample: 1 71

Included observations: 71

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.057844	1.163949	0.049696	0.9605
GOV_EXP	4.62E-06	2.07E-05	0.222613	0.8245
SUBSID	-2.15E-06	1.68E-05	-0.127848	0.8987
TAX_PROD	-4.07E-06	1.53E-05	-0.266112	0.7910
RESID(-1)	0.218069	0.124316	1.754154	0.0841
RESID(-2)	-0.184236	0.141006	-1.306590	0.1960

**Figure 3.3** – Results of the Breusch-Godfrey Correlation LM Test

*Source: composed by the author based on own calculations*

The next step was to check the model for the heteroscedasticity. For this purpose, the White Test was performed. To interpret the results of the test that are illustrated in Fig.3.4, we consider the test statistic and check if the p-value is higher or lower than the significance level, to make a conclusion of rejecting or accepting the null hypothesis of the presence of homoscedasticity.

So, checking the regression model for heteroscedasticity demonstrated the fact that the model is homoscedastic since the probability test value is significantly higher than 0.05.

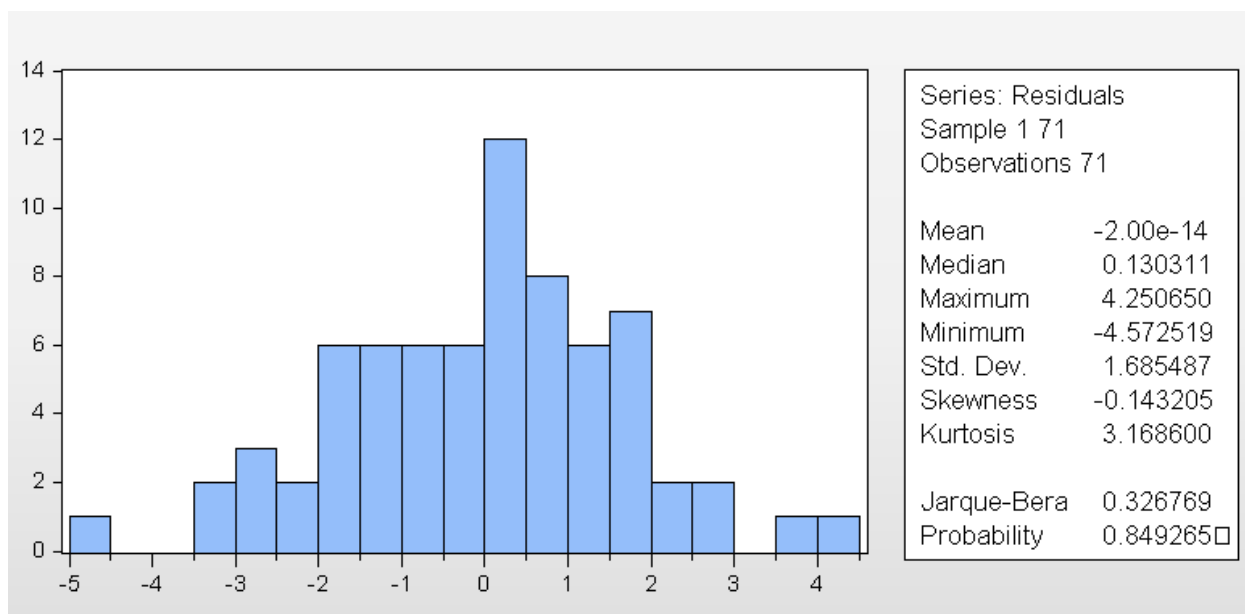
Heteroskedasticity Test: White				
Null hypothesis: Homoskedasticity				
F-statistic	1.998284	Prob. F(9,61)	0.0548	
Obs*R-squared	16.16649	Prob. Chi-Square(9)	0.0635	
Scaled explained SS	15.60983	Prob. Chi-Square(9)	0.0755	
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 04/23/23 Time: 19:45				
Sample: 1 71				
Included observations: 71				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	16.89819	15.29339	1.104934	0.2735
GOV_EXP^2	-1.40E-09	3.61E-09	-0.387073	0.7000
GOV_EXP*SUBSID	8.68E-09	5.98E-09	1.452135	0.1516
GOV_EXP*TAX_INC	6.81E-10	4.80E-09	0.141845	0.8877
GOV_EXP	0.000157	0.000339	0.463493	0.6447
SUBSID^2	-4.18E-09	2.77E-09	-1.511822	0.1357
SUBSID*TAX_INC	-8.91E-10	3.92E-09	-0.227157	0.8211
SUBSID	-0.001650	0.000811	-2.033627	0.0463
TAX_INC^2	1.40E-10	1.67E-09	0.083779	0.9335
TAX_INC	-0.000109	0.000249	-0.438324	0.6627
R-squared	0.227697	Mean dependent var	2.800853	
Adjusted R-squared	0.113751	S.D. dependent var	4.153940	
S.E. of regression	3.910552	Akaike info criterion	5.695119	
Sum squared resid	932.8377	Schwarz criterion	6.013806	
Log likelihood	-192.1767	Hannan-Quinn criter.	5.821850	
F-statistic	1.998284	Durbin-Watson stat	2.026669	
Prob(F-statistic)	0.054782			

**Figure 3.4** – Results of the Heteroskedasticity Test

*Source: composed by the author based on own calculations*

The last step to check the quality of the model was the Jarque-Bera test for the normal distribution of residuals, the results of which are shown in Fig. 3.5. The p-value should be

bigger than the significance level of 0,05 to accept the null hypothesis, and in this model the probability is 84,94% which indicates a normal distribution of residuals.



**Figure 3.5** - Results of the normal distribution of residuals test

*Source: composed by the author based on own calculations*

It can be concluded that according to the conducted research and conducted tests, the model is adequate and reliable, there is no autocorrelation and multicollinearity, the model is homoscedastic, there is a normal distribution of residuals, the regression equation has a high explanatory power since all factors are influential. Therefore, fiscal policy, namely government spending, subsidies to producers, and the tax burden on producers do have an impact on the consumer price index.

The null hypothesis about the impact of some fiscal policy instruments on the price level in the state can be confirmed, which allows us to conclude that the actions of the government are as important in countercyclical regulation and impact on the price level as the actions of the central bank, which proves the thesis of the study about the need to coordinate actions of both regulators.

In order to measure the coordination of monetary and fiscal policy and its effectiveness in different economic periods, this model can be used in future research. One

of the ways can be to study periods of recessions, and apply this model to periods of soft monetary policy and hard monetary policy by the central bank, in order to investigate which scenarios of restriction or expansion of both policies are most effective, and how these two policies should be coordinated during recessions.

### **3.3. Ways of strengthening of the coordination of fiscal and monetary policy in the system of state regulation**

As it was stated in the previous chapters, fiscal and monetary policy are important tools during economic crises as they can be used to manage inflation, unemployment level, and overall economic development and recovery.

The uncoordination of fiscal and monetary policies can have serious consequences for the country's economy, as they are both important components of the economic system that interact. Although these policies have different goals and instruments, they are connected and their failure to work in synergy can lead to negative consequences for the economy. Based on the theoretical and empirical analyzes carried out in the previous subsections, it is possible to identify the main problems of the absence of coordination.

For example, when a country has a budget deficit, the fiscal regulator may often not impose the necessary constraints so that higher inflation reduces the debt burden. However, this does not correspond to the policy of the monetary regulator regarding the low level of prices. This causes a conflict between the two policies, which may lead to lower output, high inflation, and high public debt in the future [26]. This means that the Central Bank cannot fully control inflation without the support of the fiscal regulator.

When fiscal and monetary policies are not coordinated, they may lead to conflicting policy objectives, causing policy uncertainty and hindering the efficacy of both policies. For example, if the central bank implements a restrictive monetary policy to curb inflation, while the government increases spending, it may result in conflicting objectives. As a result, the

central bank may face difficulties in achieving its inflation targets, leading to increased inflation expectations, and reducing the credibility of the central bank.

If both policies move in different directions and regulators have not agreed what are the main goals for the economy at the present it can hurt the economy and make the recession even worse. For example when monetary policy is expansionary, it can lead to an increase in aggregate demand, which in turn can lead to inflation. At the same time, if fiscal policy is contractionary, it can lead to a decrease in aggregate demand, which can have a negative impact on output and employment. This overall effect can be defined as stagflation, which is a factor of an even deeper economic downturn, but absolutely not a tool to overcome recessions.

**Table 3.1** Ways to strengthen monetary and fiscal coordination

<b>Ways to strengthen coordination</b>	<b>Description</b>
Clear communication between regulators	Both the government and central bank should inform each other and be transparent in their policies and plans.
Developing a standardized framework	Creating a set of regulations that might outline the roles and responsibilities of each regulator in fiscal and monetary policy coordination.
Setting a long-term strategy	Considering the economic challenges, the country might face and setting the clear and realistic mutual goals

Ensuring flexibility and adaptability	The coordination during recessions should be flexible and adaptable to economic conditions
Setting of complementary policy actions	Policy actions during recessions should be implemented according to each other – stimulation/restriction

*Source:* composed by author based on [14,26]

In most countries of the world, central banks regularly analyze the macroeconomic situation in the country and publish reports on financial stability or inflation reports in official public resources. Banks have their own research teams that carry out detailed economic analyses. The analytical base used by the bank, analysis of the current situation, and economic forecasts for future periods are clearly visible in the published reports. This all explains the actions of central banks, and their incentives to implement a soft or hard monetary policy and determines the economic goals that the regulator seeks to achieve in the long term, using its traditional and non-traditional tools. At the same time, monitoring and such a detailed analysis of state actions that have one or another economic impact is not common among government regulators. Therefore, the government of each country, in order to ensure economic stability and improve the coordination of its actions with central banks, should also be obliged to conduct analytical studies, including with the help of economic and mathematical modelling, for transparent reporting of its actions and goals for the future.

To guarantee effective coordination, both regulators – central banks and governments, should create a system of regular and clear communication and announce transparently their goals and objectives. Central banks should take into consideration that they are not the only institution that can influence price level or unemployment during recessions, and in calm periods as well. Governments' fiscal policy with its ability to adjust government spendings, subsidies, and taxes has the ability to influence main macroeconomic indicators as well.

Coordination is important in all times but during recessions that issue becomes even more critical and relevant. Often central bank sets expansionary monetary policy (lowers interest rates and increases money supply) and the government sets its expansionary fiscal policy by increasing spendings and lowering the tax rate. This coordinated approach helps to come to the same goals and restore the economy during recessions.

## CONCLUSIONS

This work provided definitions for monetary and fiscal policy, its tools, and its effects on the economy, and determined that the coordination of both policies is crucial for the functioning of the economy. While monetary policy is primarily responsible for containing inflation, fiscal policy has the potential to strengthen the economy in the long term through investments in critical areas like infrastructure, education, and healthcare. This can help promote economic growth and prosperity in the long run.

In the first chapter literature review on the theoretical background of both policies' instruments, policy mix and business cycles of the economy was provided. Monetary policy influences the economy through the central bank's key interest rate, money supply and currency interventions. These are the main policy instruments to achieve the desired level of inflation. The impact is possible because of its further effect on the aggregate demand and the process of transmitting a signal from a key rate to other rates and in the end on investment and consumption decisions and savings that can be defined as the transmission mechanism. At the same time fiscal policy is about the government's actions that include taxation and control over the amount of government spending to maintain appropriate levels of employment, curb the negative effects of cyclical changes, and prevent inflation. Also, there was presented a definition of business cycles and explained what a recession is and what the characteristics of long-lasting and significant economic downturns are. As the actions of the Central Bank and the government can be expansionary and restrictive, therefore, depending on the chosen policy, the following scenarios of fiscal and monetary policy coordination were distinguished: fiscal and monetary expansion, fiscal expansion and monetary restriction, monetary expansion, and fiscal restriction, monetary and fiscal restriction. The best combination of the policies depends on the economic model of the country and its special economic conditions.

In the second chapter the AS-AD model helped to examine how both policies work in different economies when they are effective and why should work in coordination. The

cases presented on the figures proved that price stability is not just monetary policy's main goal, but it can also be significantly influenced by fiscal policy, and, therefore government and central bank should work together to achieve the best results for the economy during the recession. Also, the monetary and fiscal policy was considered in terms of different exchange rates set by governments. When a country has a fixed exchange rate it doesn't have the ability to influence the output level using monetary policy tools, it is always ineffective, and the central bank always must return the money supply curve to the original level not to let the domestic currency depreciate. The chapter also presents the main features of the policy mix in Ukraine and foreign countries during the financial and economic crises caused by the Covid-19 pandemic and demonstrates how the balanced implementation of both policies helped USA and Ukraine mitigate and limit the negative effects of the pandemic.

The third chapter of the work includes the economic modelling of the influence of the fiscal policy on the price level, as the influence of the monetary policy is obvious the model proved that not only do Central banks can influence inflation, but they should also consider the actions the government plans to implement and work in coordination. The model showed that the CPI depends of such factors, determined by a fiscal regulator, as the amount of government spending, the level of taxation on producers and provided subsidies. Price level is one of the main objectives in the anticyclical regulation during recessions that is why it is important to consider actions of both regulators that can influence CPI.

Accordingly, such recommendations as clear communication between central banks and fiscal regulations, developing a standardized and transparent framework for the coordination, setting a long-term strategy for the economy that both regulators are aware and agree on, and ensuring flexibility and adaptability that is crucial during crises, can be made.

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