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MONETARY AND FISCAL POLICIES INTERACTION IN DEVELOPING COUNTRIES' ECONOMY: EVIDENCE FROM UKRAINE

Annotation. The work examines the relationship between fiscal and monetary policy instruments in Ukraine in the period of 2010-2017yy. Empirical results have shown that the development of the state's economy depends on the interconnection of fiscal monetary policies. Such deterministic connection implies the presence of additive and combined types of models in the economic analysis of fiscal and monetary policies, the calculation of which will allow to check the following alternative hypotheses:

- if the government introduces fiscal and monetary policies for expansion (monetary expansion / fiscal expansion (ME / FE)), GDP and employment will increase, but there is a risk of inflation;
- if the government introduces fiscal restrictions / monetary expansion (ME / FR), then the GDP growth rate will slow down, inflation will decrease and employment increase;
- if the government introduces a fiscal expansion / monetary restriction (FE / MR), it will lead to GDP growth, a decrease in unemployment, but an increase in inflationary expectations;
- if the government introduces fiscal restrictions / monetary restrictions (MR / FR), we will see a slight increase in GDP, lowering unemployment at a low inflation rate.

It was established that the simultaneous achievement of fiscal and monetary policy indicators in Ukraine was impossible. This is due to the fact that these indicators turned out to be incompatible with the result, which resulted in the use of multi-directional tools for regulating fiscal and monetary markets. The revealed contradictions in the interaction of instruments made it impossible to achieve the positive result – growth / stabilization of economic indicators.

The study will be useful to executives, academics and practitioners in order to choose the methods of applying fiscal and monetary policy instruments to stimulate economic development.

Keywords: fiscal policy, monetary policy; policy objectives; policy coordination for stabilization.

JEL Classification E61, E63, E66

Formulas: 0; fig.: 3; tabl.: 3; bibl.: 12.

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ВЗАЄМОДІЯ МОНЕТАРНОЇ ТА ФІСКАЛЬНОЇ ПОЛІТИК КРАЇН, ЩО РОЗВИВАЮТЬСЯ: ДОСВІД УКРАЇНИ

Анотація. У статті розглядається взаємозв'язок між інструментами фіскальної та монетарної політики в Україні у період 2010–2017 років. Емпіричні результати показали, що розвиток економіки держави залежить від взаємозв'язку фіскальної монетарної політик. Такий детермінований зв'язок передбачає наявність адитивних та комбінованих типів моделей в економічному аналізі фіскальної та монетарної політик, розрахунок яких дозволить перевірити наступні альтернативні гіпотези:

- якщо уряд запроваджуватиме політику щодо реалізації фіскальної та грошової політики щодо експансії (монетарна експансія / фіскальна експансія (ME/FE)), то зростатиме рівень ВВП та зайнятості, однак існує ризик зростання інфляції;

- якщо уряд запровадить фіскальні обмеження/монетарне розширення (ME/FR), то спостерігатимуться сповільнення темпів зростання ВВП, зниження інфляція та підвищення зайнятості;

- якщо уряд запроваджуватиме фіскальну експансію/монетарне обмеження (FE/MR), це призведе до зростання ВВП, зменшення рівня безробіття, але підвищення інфляційних очікувань;

- якщо уряд запровадить політики фіскального обмеження/монетарного обмеження (MR/FR), то спостерігатимемо незначне збільшення ВВП, зниження рівня безробіття при низькому рівні інфляції.

Встановлено, що одночасне досягнення індикаторів фіскальної та монетарної політик в Україні було неможливим. Це зумовлено тим, що зазначені показники виявлялися несумісними щодо досягнення внаслідок чого застосовувався різноспрямований інструментарій для регулювання бюджетно-податкового та грошово-кредитного ринків. Виявлені суперечності взаємодії інструментів унеможливили ефективність досягнення позитивного результату – зростання/стабілізації економічних показників.

Дослідження буде корисним керівникам, науковцям та практикам з тим, щоб обирати методи застосування інструментів фіскальної та монетарної політики з метою стимулювання економічного розвитку.

Ключові слова: фіскальна політика, монетарна політика, цілі політики, координація політики.

Формул: 0; рис.: 3; табл.: 3; бібл.: 12.

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ВЗАИМОДЕЙСТВИЕ МОНЕТАРНОЙ И ФИСКАЛЬНОЙ ПОЛИТИКИ РАЗВИВАЮЩИХСЯ СТРАН: ОПЫТ УКРАИНЫ

Аннотация. В работе рассматривается взаимосвязь между инструментами фискальной и монетарной политики в Украине в период 201–2017 годов. Эмпирические результаты показали, что развитие экономики государства зависит от связи денежных и фискальных переменных. После распределения выборки между показателями фискальной и монетарной политики развития экономики государства обнаружено, что использование инструментов данных политик в Украине не привело к стабилизации основных макроэкономических показателей. Исследование поможет руководителям, ученым и практикам выбирать способы применения инструментов фискальной и монетарной политики с целью стимулирования экономического развития.

Ключевые слова: фискальная политика, монетарная политика, цели политики, координация.

Формул.: 0; рис.: 3; табл.: 3; библи.: 12.

Introduction. The macroeconomic equilibrium, which is the balance between aggregate demand and the aggregate supply of the state's economy, is reflected in the following macroeconomic indicators: real GDP; price level; money supply; discount rate; unemployment rate; reserve norm; tax receipts, etc. In the conditions of a long distortion of the balance between aggregate demand and supply, the main indicators do not reflect the growth trend.

This situation is precise for the recent years of the Ukrainian economy: although in 2017, Ukraine's nominal GDP grew by 20.2%: from \$93.3 billion to \$112.2 billion (World Economic Outlook Database, 2018, while real GDP grew by 14.5% (from \$78.5 billion to \$89.9 billion). Growth was achieved by the expense of a slight devaluation (4.8%) per year in a positive balance of payments (\$2.6 billion) and 112.9% inflation. Such indicators testify to the fact that the subsequent growth of the state economy requires more thorough coordination of the instruments used in fiscal and monetary policies.

Research analysis. Economic scientific literature shows that the explanation for the interaction of fiscal and monetary policies in general is based on an analysis of these policies. There are a number of scientists who are investigating fiscal and monetary policies (Wagner A. [1], Dosi G., Fagiolo G., Napoletano M., Roventini A., Treibich T. [2], Davig Tr, Leeper Eric M. [3], Auerbach Alan J., Gorodnichenko Yu [4]), but in general, the number of scientific papers on mechanisms of the agreement on the use of fiscal and monetary policy tools and their impact on the state economy is insignificant.

In addition, existing economic literature that explores the relationship between fiscal and monetary policies focuses on examples of developed economies, while these issues for emerging economies remain unresolved.

The research aims to promote the study of the interaction impact between fiscal and monetary policies, as the instruments of their implementation affect the achievement of the macroeconomic indicators of Ukraine for the period of 2010—2017.

Research results. The research aims to promote the study of the interaction impact between fiscal and monetary policies, as the instruments of their implementation affect the achievement of the main economic indicators of Ukraine for the period of 2010—2017.

This is done on the ground that the volatility of the achievement of macroeconomic variables makes the complex process of planning the harmonization of fiscal and monetary policies. The volatility of both fiscal and monetary policy instruments use influences of the achievement of the main economic indicators of Ukraine's economic development.

The question is, what kind of interaction between the two types of fiscal and monetary policy does exist and how their implementation affects the macroeconomic indicators of Ukraine's development? If so, which instruments will regulate the implementation of monetary policy? In addition, knowing the nature and types of fiscal and monetary policies, the study intends to further on their coherence in achieving the key indicators of the growth of Ukraine's economy.

This paper is organized as follows: in the first section, we present the literature review and, therefore, the hypotheses for our study. In the second section, we present the sample and the firms' data. In the third section, we validate our hypotheses empirically. Finally, we present our conclusions.

Fiscal and monetary instruments have different nature and degree of influence on indicators of financial stabilization.

As Agnello L., Sousa R. [5] noted that fiscal policy is implemented through government measures to form the state budget. The main instruments of this policy are government expenditures and taxes, which are a necessary link in economic relations in society and an important lever of the state economic impact on social production.

Monetary policy instruments are distinguished by object of influence (money supply and demand for money), by degree of influence (direct and indirect), by parameters (quantitative and qualitative) and by terms of influence (short-term and long-term). Direct monetary policy instruments are monetary emission; lending limits; direct regulation of the interest rate, and indirect — the discount rate; norm of mandatory reserves; operations on the open market of securities and others. In countries with market economies, indirect tools are actively being used, while in emerging economies, reserve norm is the main tool.

Consequently, monetary policy is realized through a combination of means and forms of state influence on the supply of money. The structure of the money supply is disclosed through monetary aggregates, which differ in degree of liquidity and allow identifying the necessary regulatory instruments.

In order to ensure financial stability and sustainable economic growth, a conceptual rethinking of the directions of interaction between fiscal and monetary components that have different, and in some cases, the opposite effect on economic processes, is needed. The effectiveness of fiscal policy will be highly enhanced if it is combined with the implementation of the relevant monetary policy. Monetary policy measures are exactly what directly affect on the consistency of the supply and demand for money, the discount rate, the exchange rate, while the fiscal policy is responsible for balancing budget indicators. The aggregate of all instruments used to reach the goals of regulators affects inflation, aggregate demand, production, balance of payments, and the level of internal and external debt. Existing literature (see, for example, Sawyer N. [6]; Corsetti G., Dedola L., Jarociński M., Maćkowiak B., Schmidt S. [7]).

As already noted, an analysis of the use of fiscal and monetary policy instruments to determine the impact on key macroeconomic indicators of Ukraine should be investigated by studying the effectiveness of their implementation and studying the interaction between these two policies.

In the next section, we will briefly consider fiscal and monetary policies, assess the effectiveness of their implementation and interaction on the growth of macroeconomic indicators.

The effectiveness of coordinating fiscal and monetary types of policy depends on the state goals. The main goals that reflect the overall results of economic development are the convergence of production volumes to potential GDP, the reduction of unemployment to the natural level and the provision of inflation at the optimal level. It should be noted that an increase in the norm of mandatory reserve leads to a reduction of the money supply and an increase in the discount rate, and its reduction — to the opposite results. In addition, if the increase in the volume of GDP and the reduction of unemployment are consistent with each other, the achievement of these goals contradicts with another goal — a reduction in inflation. This means that the key issue for achieving the effectiveness of the interaction between the implementation of fiscal and monetary policy is to find a rational relationship between these results.

Horizontal and vertical comparison of the variables of fiscal and monetary policy will allow the determination of the impact on the change of the resulting indicators given in Figure 1.

			Fiscal policy					
			Expansion (FE)			Restriction (FR)		
			GDP↑	CPI↑	Ur↓	GDP↑	CPI↑	Ur↓
Monetary policy	Expansion (ME)	GDP↑	GDP↑ CPI↑ Ur↓			GDP↑ CPI↑ Ur↓		
		CPI↑						
		Ur↓						
	Restriction (MR)	GDP↑	GDP↑ CPI↑ Ur↓			GDP↑ CPI↑ Ur↓		
		CPI↑						
		Ur↓						

Fig. 1. Horizontal and vertical comparison of fiscal and monetary policy variables

Source: formed by authors

The values of generalizing the resulting indicators of the effectiveness of the interaction of fiscal and monetary policies depend on the influence of many factors that operate simultaneously, differently and with varying strength. This dependence of the interaction between fiscal and monetary policy is deterministic. The deterministic connection implies the existence of additive and combined types of models in the economic analysis of fiscal and monetary policy (see, for example, Fragetta M., Kirsanova T. [8]; Leeper Eric M. [9]; da Silva C.G., Vieira F. V. [10]) (Figure 2):

- if the government is implementing a Fiscal And Monetary Expansion Policy (Monetary Expansion / Fiscal Expansion (ME/FE)), then there will be an increase in GDP and employment growth, but there is a risk of rising inflation;

- if the government is implementing Fiscal Restriction / Monetary Expansion (ME/FR), then the slowdown in GDP growth will slow down, lowered inflation and increased employment;

- if the government is implementing Fiscal Expansion / Monetary Restriction (FE/MR)), it will accelerate GDP growth, reduce unemployment, but with increasing inflation expectations;

- if the government is implementing a Fiscal Restriction / Monetary Restriction (MR/FR), then there will be a slight increase in GDP, a slight drop in unemployment at a low inflation rate.

Thus, an optimal combination of fiscal and monetary policies to achieve Ukraine's economic growth (aggregate demand increase, GDP growth, employment growth, and inflation risk) is possible through interaction between incentive-driven monetary and stimulating fiscal instruments that will increase purchasing power, will lead to an increase in investment and, ultimately, an increase in employment and production.

			Fiscal policy			
			Expansion (FE)		Restriction (FR)	
			GE↑	t↓	GE↓	t↑
Monetary policy	Expansion (ME)	Ms↑	ME/FE (growth of GDP, the risk of inflation increase of employment level)		ME/FR (slower growth volumes of GDP slower decline inflation rate increase of employment level)	
		dr↓				
		rr↓				
	Restriction (MR)	Ms↓	MR/FE (accelerated growth of GDP, increasing inflation expectations, reducing unemployment)		MR/FR (insignificant growth of GDP, low inflation, slight decrease in the unemployment rate)	
		dr↑				
		rr↑				

Fig. 2. Influence of fiscal and monetary policy interaction on the change of generalizing result indicators

Source: formed by authors

By empirically analyzing the determinants of the effectiveness of the interaction between fiscal and monetary policies, we will detailize the tools of fiscal and monetary policies and the effectiveness of their interaction.

Among the components of aggregate demand, a significant place is taken out to public expenditures and taxes. Manipulating these elements enables the state to influence both aggregate demand and aggregate supply, as well as to regulate the macroeconomic equilibrium. Therefore, an analysis of the implementation of fiscal policy will be carried out through an assessment of their volumes and trends in their changes.

Government Expenditures. Government expenditures in UAH in the period of 2007—2017 tended to increase, but in USD did not always increase. Since the period of 2007—2017 the Ukrainian hryvnia devalued (depreciated by almost 5,2 times), so it is expedient to estimate the government expenditures of Ukraine in US dollars. In 2007, government expenditures amounted to \$45076.9 million. During the period of 2007—2009, they decreased by 13.8%. However, by 2013, compared to 2009, they grew by 63%. The period 2014—2015 was characterized by a decrease of this indicator by 62%. In 2016 and 2017, compared to the previous period, Ukraine's government expenditures grew by 4.8% and 22.5% respectively.

The total amount of tax revenues to the state budget. On average, the State Budget of Ukraine is formed by 79% with the help of tax revenues.

The total amount of tax revenues in 2007 compared to 2006 increased by 27.6%, and in 2008, compared with 2007, by another 20%. In 2009, the amount of tax revenues decreased by almost 2 times, but during the period 2010—2012 their amount increased by 65.1%. However, the growth was again replaced by a downturn: in 2015 compared with 2012, the volume of tax revenues decreased more than 2 times. In 2016, growth was 16.5%, and in 2017 — 29.2%. But the amount of tax revenues in 2017 reached only 60.8%. This indicates a suboptimal structure of budget revenues, since according to European norms non-tax revenues in the state budget structure should be no more than 5%.

In general, Ukraine's fiscal policy for the reviewed period characterized by a lack of a systemic approach and unbalanced public finances. Thus, the highest increase of the state budget deficit of \$5190.2 million was observed in 2011 and \$4362.2 million in 2015. Since 2007, against the backdrop of slowing economic development, a growing tendency of the budget deficit has been formed. During 2008, the growth of the state and state-guaranteed debt under the influence of the devaluation of Ukrainian hryvnia and the IMF's stabilization loan obtained at the end of the year amounted to \$20833.3 million. The 2009 year ended with a deficit of 3.9% of GDP. During 2010, financing of the general fund with deficit and special fund with shortages was mainly due to the short-term and medium-term loans, which led to an increase in public debt by more than 63%. In the period 2012—2017, the budget was also implemented with a deficit, although it decreased by 72.5%. In general, the change in the budget deficit was influenced by the pace of economic development, expressed in the dynamics of gross domestic product; an increase in the lack of financial resources of local budgets that led to an excess of the consolidated budget deficit over the state; devaluation of Ukrainian hryvnia, acceleration of inflation, slowdown in export growth, etc.

The analysis of fiscal policy indicators is summarized in table 1.

Thus, during the analyzed period, the type of fiscal policy was partially consistent with the instruments used. The consistency of fiscal policy instruments in Ukraine was only in 2007—2008 (restraining) and in 2013 (stimulating). Inconsistency of instruments (simultaneous increase / decrease of state expenditures and tax revenues) negatively affected the state economy, generating a significant amount of the state budget deficit and its high annual growth rate.

Determining the type of monetary policy of the country depends on the level of supply of money and instruments that determine the change in its volume (the size of the discount rate, the rate of mandatory reserve, the rate of the national currency).

Table 1.

Analysis of fiscal policy indicators in Ukraine in the period of 2007—2017

Years	State expenditures (\$ million), GE	Changes in Indicator (growth — ↑; decrease — ↓)	Tax amount of income (\$ million), T	Change the indicator (growth — ↑; decrease — ↓)	Deficit the state budget (\$ million), Gb	Changing the score (growth — ↑; decrease — ↓)
2007	45076,9	↓22,3%	33257,2	↑27,6%	-1949,1	↑159,6%
2008	40519,9	↓-10,1%	49100,1	↑47,6%	-2604,3	↑33,6%
2009	38851,0	↓-4,1%	26223,6	↓-46,6%	-4439,7	↑70,5%
2010	47626,9	↑22,6%	29987,5	↑14,4%	-8134,9	↑83,2%
2011	52833,5	↑10,9%	40498,9	↑35,1%	-2944,7	↓-63,8%
2012	61626,4	↑16,6%	43498,3	↑7,4%	-6680,7	↑126,9%
2013	63309,6	↑2,7%	42645,6	↓-2,0%	-8088,5	↑21,1%
2014	33172,2	↓-47,6%	28434,2	↓-33,3%	-6244,2	↓-22,8%
2015	24038,0	↓-27,5%	21151,5	↓-25,6%	-1882,0	↓-69,9%
2016	25188,8	↑4,8%	24650,8	↑16,5%	-2656,5	↑41,2%
2017	30854,6	↑22,5%	31852,3	↑29,2%	-1840,4	↓30,7%

Source: formed by authors on: [11; 12]

Money offer. In 2017, the current volume of cash outside the banking system amounted to \$12,779 (27.5% of the M3), which is evidence of distrust of the banking system, the existence of significant risks associated with savings in banks, the existence of inflationary expectations from the public and high levels shadow economy of Ukraine.

The results of the analysis of the dynamics of M3 show its growth (except 2009), although there is no certain regular trend in growth rates. The uniform increase of the M3 aggregate took place in 2007, 2013 and 2016, in other periods its change was asymmetric.

It is important to note the stronger (more than twice) decline in the money supply during the crisis in 2009 (-42.7%), which indicates a direct dependence on the decline in GDP (-34.9%). In general, the supply of money for the analyzed period decreased by 39.2%.

The analyzed situation shows a lack of regulation of the central bank on volumes of monetary aggregates, money supply and fiscal coverage of budgets of different levels, which led to an increase in inflation in Ukraine.

Discount rate. Ukraine introduced a mode of inflation targeting, according to which the main tool of monetary policy is the discount rate.

In the period of 2005—2007, there was a tendency to decrease the discount rate (from 01.06 to 31.12.2007 the discount rate in Ukraine was 8%). Since 2008, due to the negative effects of the financial crisis, its size has been increased initially to 10%, and subsequently up to 12%. This led to the flow of speculative capital into the state and led to a sharp increase in the mass of money in the country. In order to avoid such a problem as inflation, the size of the discount rate had to be increased. However, in the period from 30.04.2008 to 1.08.2013 there was a tendency to decrease the discount rate: it decreased almost 2 times (from 12% to 6.5%).

Between 13.08.2013 and 04.03.2015, the discount rate increased by 15.5% to 22%. Such a policy was used by the government of the country to limit the effect of increasing the discount rate on the value of stabilization loans already granted to banks — their value has not changed.

Between 04.03.2015 and 14.09.2017, in order to increase the nominal GDP and to reduce inflation (12.9% in 2017), which exceeded inflation targeting ($8\% \pm 2$), the discount rate decreased to 14.5%.

Rate of mandatory requirement. By 2007 (since 2003), the mandatory reserve requirement (all types) in foreign currency declined and in 2008 it was 5%. But since December 5, 2008, till December 30, 2010, this tool of all types has grown to 8%, from 2012 — to 8.5%, and in the period of 2013—2014 — up to 10% and 15% (from 01.07.2013 the government divided the category into two categories: non-financial corporations (10%) and households (15%). In terms of Ukrainian

hryvnia, in the period 2007—2008, the mandatory reserve requirement was at 1%, and in the period 2009—2014 — at level 0).

Since 2015, the supply of money had to be increased, the government lowered the rate of mandatory redundancy. Thus, for banks to comprise mandatory reserves for current accounts and deposits at the request of non-financial corporations and households in both national and foreign currencies during 2015—2017, it was 6.5%.

A slight change in the level of mandatory reserve requirements was directly related to the resulting figures.

Exchange rate. On July 02, 2007, the hryvnia exchange rate against the US dollar amounted to 505 UAH for 100 USD. In 2008, there was a slight revaluation (UAH 484.9 for \$100 as of 01.07.2008). In 2009, the hryvnia devalued by 65% (800.5 UAH per 100 USD). In the period of 2009—2013, slight fluctuations of the Ukrainian hryvnia rate took place, and since 2014, the hryvnia exchange rate began to increase sharply (in 2017 — 2,623.3 USD). For the period of 2007—2017, the hryvnia devaluated against the US dollar almost 5 times.

For the period of 2007—2017, the hryvnia devalued relative to other currencies. The NBU and other government bodies failed to stabilize the hryvnia, which has caused the economy of Ukraine, and, in particular, its economic performance deteriorated.

Balance of Ukraine's payments. In 2008, 2009, 2011, 2012, 2014, the consolidated balance of payments of Ukraine was deficient with the highest level of deficit in 2009 (\$-13.7 billion). In general, in 2009, the current account deficit substantially decreased by 86.43% compared to 2008. This was due to a decrease in revenues from exports of goods and services due to the global crisis in 2009 and the drop in imports due to the devaluation of the hryvnia in late 2008.

In 2010, this figure reached a surplus of \$5.0 billion.

Thus, compared to the balance of payments in 2009, the balance of the consolidated balance reached a positive value and increased by 136.65%.

In 2011, the consolidated balance of payments deficit became negative again (\$-2.5 billion), having decreased by 148.8% compared to 2010.

Compared with the situation in 2011, the balance of payments continued to deteriorate and in 2012 the consolidated balance of payments deficit increased to \$4.2 billion, i.e. 70.06% compared to the previous year.

In 2013, this indicator improved, reaching a positive balance of \$2.0 a billion, and in 2014 deteriorated again to a negative value (\$-13.3 billion) — decreased by 757.8% compared to 2013.

The period 2015—2017 could be characterized by a positive balance of payments of Ukraine. Thus, the consolidated balance of payments surplus was \$2.6 billion (in 2015—2016, respectively, \$0.8 and \$1.3 billion respectively).

The analysis of monetary policy indicators in Ukraine in the period of 2007—2017 is given in table 2.

So, during the analyzed period, the type of selected monetary policy did not match the applicable instruments. Such inconsistency of monetary policy instruments (mismatching the change in the size of the discount rate and the norms of mandatory reserve changes in money supply, etc.) negatively affected the hryvnia exchange rate and Ukraine's balance of payments.

Monetary policy did not ensure the implementation of the main functions — ensuring the stability of the national currency and maintaining balance of payments in equilibrium.

Monetary policy of the state should be formed in accordance with the «monetary rule» M. Friedman, according to which in the economy should be consistent with the growth rate of money supply in accordance with the growth rate of real GDP, as the fluctuations of the money supply — the source of the most significant economic upheaval. Thus, the growth rate of the money supply should correspond to the rate of GDP growth, or if the rate of circulation of money is slowed down, then by 3—5% the value of the growth rate of money supply should be higher. We can conclude that the monetary rule operates in a developed economy, and in the conditions of the economy of developing countries, when the rate of circulation of money is variable or the demand for money is

highly sensitive to changes in the interest rate, leads to an increase in inflation. Therefore, in order to avoid the excessive inflation growth, the supply of money should increase annually by 1—3% regardless of the phase of the cycle and the current situation on the domestic and foreign markets.

Table 2.

Analysis of indicators of monetary policy in Ukraine in the period of 2007—2017

Years	Money supply (\$ million), Ms	Indicator change (growth — ↑; decrease — ↓)	The discount rate (%), dr	Indicator change (growth — ↑; decrease — ↓)	Reserve requirement (%) (in national currency / in foreign)	Indicator change (growth — ↑; decrease — ↓)	Exchange rate (for \$100)	Indicator change (growth — ↑; decrease — ↓)	Balance of payments (\$ million)	Indicator change (growth — ↑; decrease — ↓)
2007	76466,5	↑47,9%	10,0	↑1,5%	1/5	↓	505,0	↑0,4%	9421	↑292,2%
2008	106335,5	↑39,1%	12,0	↑2,0%	1/5	W/o changes	484,9	↓-4,0%	-3063	↓-132,5%
2009	60836,2	↓-42,7%	10,25	↓-1,75%	0/7	↑	800,5	↑65,1%	-13726	↓348,1%
2010	75298,7	↑23,8%	7,75	↓-2,5%	0/7	W/o changes	791,1	↓-1,2%	5031	↑136,7%
2011	85582,4	↑13,7%	7,5	↓-0,25%	0/8	↑	797,4	↑0,8%	-2455	↓-148,8%
2012	96770,8	↑13,1%	7,5	W/o changes	0/8,5	↑	799,3	↑0,2%	-4175	↓-70,1%
2013	113766,5	↑17,6%	6,5	↓1,0%	0/10;15%	↑	818,8	↑2,4%	2023	↑148,5%
2014	76538,2	↓-32,7%	14,0	↑7,5%	0/10; 15%	W/o changes	1538,3	↑87,9%	-13307	↓-757,8%
2015	41419,3	↓-45,9%	22,0	↑12,0%	6,5/6,5	↓	2349,2	↑52,7%	849	↑106,4%
2016	42575,3	↑2,8%	14,0	↓-12,0%	6,5/6,5	W/o changes	2483,7	↑5,7%	1346	↑58,5%
2017	46494,6	↑9,2%	14,5	↑0,5%	6,5/6,5	W/o changes	2602,3	↑4,8%	2566	↑90,6%

Source: formed by authors on: [11; 12]

Conclusions. In order to assess the effectiveness of implementing fiscal and monetary policies and the results of their interaction, we will analyze the resulting GDP figures, inflation and unemployment. It is the achievement of stabilization and the optimal value of these indicators is the goal of the interaction of both policies (Table 3).

Nominal GDP. Let's analyze the nominal GDP of Ukraine, expressed in \$. In the period of 2007—2008, the value of GDP grew. In 2009, it (\$ million) decreased by 35.0% to \$117.2 billion. In the period from 2010 to 2013, the value of this indicator increased, exceeding the level of 2008. But from 2014 to 2016, inclusive, GDP declined every year. Comparing nominal GDP, in 2016 and 2017, it was lower by 34.6% and 21.4%, respectively, than in 2007 (2007 — \$142.7 billion, 2016 — \$93.3 billion, 2017 — \$112.2 billion). However, in 2017 compared with 2016, the nominal GDP in \$ increased by 20.2%, which is positive.

GDP per capita (\$) has the same tendency as the nominal GDP (\$ million). Thus, during 2007—2008, it increased, and in 2009 compared with the previous period decreased by \$ 1.4 billion (by 34.7%). After that, by 2013, the volume of this indicator grew, and in 2014 and 2015 again fell and was lower than the crisis in 2009. In 2016, the nominal GDP per capita was \$2.2 billion, and in 2017 — \$2.6 billion (\$ 430.7 million, or 14% less than in 2007).

Consequently, the nominal GDP in UAH did not always indicate the real situation, since in the period of 2007—2016 the UAH devalued. Therefore, it is expedient to evaluate and analyze the nominal GDP, expressed in USD. It declined in Ukraine, indicating that fiscal policy was not applied effectively.

Consumer price index. Before the financial crisis, inflation is mostly moderate (in 2007 — 116.6%, in 2008 — 122.3%). In the period of 2009—2012, measures were taken to overcome it. In 2009, the consumer price index was 112.3%, and in 2012 it was 99.8% (deflation). Since 2012, inflation has begun to grow and in 2013 the consumer price index was 100.5%. In 2015, inflation targeting was applied, according to which inflation targeting was initially $5 \pm 1.5\%$ in 2015, and subsequently increased to $8\% \pm 2\%$ (CPI was 143.3%), in 2016 it was up to $12\% \pm 3\%$ (CPI —

112.4%), and in 2017 — to 8% ± 2% (CPI — 112.9%). Consequently, inflation targeting never matched its real indicator.

Unemployment rate. In the period of 2007—2008, the unemployment rate in Ukraine was 6.9%. In 2009, it grew to 9.6%. From the period of 2010—2013, the unemployment rate decreased: from 8.8% to 7.7%. In 2014, the unemployment rate in Ukraine in one year increased by 2%.

An analysis of the resulting indicators of fiscal policy in Ukraine in the period 2007—2017 is given in table 3.

Table 3

Analysis of the indicators of implementing fiscal and monetary policies effectiveness in Ukraine in the period of 2007—2017

Years	Nominal GDP, (\$ million)	Indicator change (growth — ↑; decrease — ↓)	CPI, (%)	Indicator change (growth — ↑; decrease — ↓)	Unemployment rate (%), Ur	Indicator change (growth — ↑; decrease — ↓)
2007	142719	↑32,5%	116,6	↑5%	6,9	↓-0,5%
2008	179992	↑26,1%	122,3	↑5,7%	6,9	W/o changes
2009	117228	↓-34,9%	112,3	↓-10%	9,6	↑2,7%
2010	136419	↑16,4%	109,1	↓-3,2%	8,8	↓-0,8%
2011	163160	↑19,6%	104,6	↓-4,5%	8,6	↓-0,2%
2012	175781	↑7,7%	99,8	↓-4,8%	8,1	↓-0,5%
2013	183310	↑4,3%	100,5	↑0,7%	7,7	↓-0,4%
2014	131805	↓-28,1%	124,9	↑24,4%	9,7	↑2,0%
2015	90615	↓-31,3%	143,3	↑18,4%	9,5	↓-0,2%
2016	93270	↑2,9%	112,4	↓-30,9%	9,7	↑0,2%
2017	112154	↑20,2%	112,9	↑0,5%	9,9	↑0,2%

Source: formed by authors on: [11; 12]

In 2007, 2008, 2010—2013, due to the inconsistency of fiscal and monetary policy instruments for inflation, there was a slight increase in GDP and lower unemployment.

The application of fiscal and monetary policy instruments is largely contradictory. Thus, in 2009, 2014 and 2015, government expenditures decreased along with tax revenues, while in 2010—2012, 2016—2017, on the contrary, they increased. Regarding the use of monetary policy tools, during the analyzed period, they were completely uncoordinated. The lack of interaction between fiscal and monetary policies and the correct use of their instruments (they mutually offset positive effects) led to negative outcomes of the state development — inflation, devaluation, insignificant growth of the economy, negative balance of payments, etc.

Following Auerbach Alan J., Gorodnichenko Yuriy [4], we can note the following trend in the changes in the multiplier of government expenditures and GDP of Ukraine, which shows a change in the country's GDP and government expenditures per monetary unit. Thus, in 2008 compared with 2007, the reduction of government expenditures by \$1 has led to a decrease of \$28 in additional production during the period of the growth of crisis phenomena. And in 2009, compared with 2008, the reduction of government expenditures by \$1 led to an increase in additional production by \$47; in 2010, the growth of government expenditures by \$1 provided an increase in additional production by \$5; in 2011, the drop in government spending by \$1 led to a decrease in additional production by \$7; in 2012, the rise in government spending by \$1 has given rise to an additional production of \$8; in 2013, the increase in government spending by \$1 has led to a decrease in additional production by \$8; in 2014, the drop in government spending by \$1 has led to a decrease of \$47 in additional production; in 2015, a drop in government spending of \$1 led to an increase in additional production of \$5; in 2016, the rise in government spending by \$1 led to an increase of \$ 8 in additional production; in 2017, a drop in government spending of \$1 led to an increase in additional production by \$4. Accordingly, unjustified growth or decrease in government expenditure did not ensure long-term economic growth of the country's economy during the

analyzed period. In addition, it should be noted that in developing countries, government spending needs to be respected. Thus, according to Wagner's law (Wagner A. [1]) and the principles of constructing a Scully point, the share of government expenditure in GDP of up to 23% will have a positive effect on the pace GDP growth, and more than 23% — will lead to a decline in economic growth. The analysis shows that in Ukraine only in 2008, the share of government expenditures in GDP was 22.5%, and during 2009—2017 it varied within 25—35% (the largest share was in 2012). And this is evidence of the prevailing negative dynamics of losses of GDP of Ukraine in comparison with the volumes of government expenditures for the current and previous periods.

Let's check the correspondence of the growth of the money supply to GDP according to Friedman's monetary rule, according to which the growth rate of the money supply should correspond to the GDP growth rate, or if the rate of money turnover is slowed down, the value of the rate of money supply growth of 1—3% should be higher. The results of the analysis showed that in Ukraine the growth rate of the money supply exceeded the GDP growth rate each year, except in 2016, when the growth rate of the money supply was almost equal to the GDP growth rate (0.1% less). Decrease of money supply growth rate in 2009, 2014 and 2015 by 7.8%; 4.6% and 14.6%, respectively, were higher than the decline in GDP. And the growth rate of the money supply was even lower in 2011 by 5.9% than the growth rate of GDP. In 2007, the growth rate of money supply exceeded the growth rate of GDP by 15.4%; in 2008 — by 13%, in 2010 — by 7.4%, in 2012 — by 5.4%, in 2013 — by 13.3%, in 2017 — by 11.1%. This testifies to the discrepancy of the growth rates of money supply with GDP growth rates and the ineffectiveness of the use of monetary policy instruments: the lack of regulation in terms of monetary aggregates, money supply, mismatches in the volume of money supply of manufactured goods and services, which led to an increase in inflation in Ukraine.

For the effective implementation of fiscal and monetary policies, it is necessary to apply instruments in accordance with one type (ME/FE; ME/FR; MR/FE; MR/FR). Only from such a condition, in the long run, one can expect economic growth of the country.

It was established that simultaneous achievement of fiscal and monetary policy indicators in Ukraine was impossible. This is due to the fact that the indicators proved to be incompatible with the result, which showed in the use of a multi-directional toolkit for regulating fiscal and monetary markets. But such discrepancies in the interaction of instruments made it impossible to achieve the positive result — growth / stabilization of economic indicators.

Consequently, the harmonization of the fiscal and monetary policy of the developing country's economic development will have its particularities, first of all, in the differences between the rates of economic growth and inflation, the growth rates and structure of public debt, the pace of growth of the money supply, shadow economy etc. If in developed countries economic recessions can be accompanied by deflation, in the developing countries, economic crises are characterized by a rapid devaluation of the exchange rate and, consequently, on the contrary — there is an increase in inflation. From the development of inflationary processes, the growth of the exchange rate, the following problems arise in harmonizing fiscal and monetary policy in the economies of developing countries: the growth of public debt, the cost of servicing debt. This can lead to the accumulation of public debt, its untimely payments and the acceleration of inflation, which creates risks for the maintenance of inflation targets, which will then be accompanied by an increase in interest rates. As a result, we will observe the dominance of fiscal policy over monetary.

The growth rate of the money supply should correspond to the GDP growth rate, or if the rate of money turnover is slowed down, then by 1—3% the value of the growth rate of money supply will be higher. For the economies of developing countries, it is necessary to take into account the rate of circulation of money, the change in the interest rate and the rate of obligatory redundancy. This is due to the fact that the change in the reserve ratio leads to a greater change in the money supply in accordance with the money multiplier. In emerging economies, changes in the mandatory reserve rules affect the supply of money.

			Fiscal policy			
			Expansion (FE)		Restriction (FR)	
			GE↑	t↓	GE↓	t↑
Monetary policy	Expansion (ME)	Ms↑	ME/FE 2007; 2008; 2013		ME/FR 2011; 2012	
		dr↓				
		rr↓				
	Restriction (MR)	Ms↓	MR/FE -		MR/FR 2010	
		dr↑				
		rr↑				

Fig. 3. Influence of fiscal and monetary policy interaction on the change of generalizing result indicators
Source: formed by authors

One of the reasons for the lack of co-ordination of fiscal and monetary policies of Ukraine's economy is the shadow economy. According to preliminary calculations by the Ministry of Economic Development, the level of the illegal economy is different from 43% of the GDP in 2014 to 32% in 2017. Irrational use of state expenditures, concealment of financial results from taxation, money laundering, cash flow outside banks, etc. leads to unproductive losses of financial, material and labor resources, and, as a result, deepening the crisis in the Ukrainian economy. Illegal economy penetrates all stages of the processes of production, distribution and redistribution of GDP, while removing significant financial flows from official circulation, which, if they are legalized, can be a source of investment for a sustainable economic growth in Ukraine.

Thus, the graphic representation of the elements of fiscal and monetary policies and their coordination and the revealed interrelations between them allows not only to analyze its directions of the realized tools, but also to discover new properties and characteristics. New knowledge about the process of coordinating the choice of types of fiscal and monetary policy implementation in accordance with the stimulating or restraining economic development will allow developing effective measures to stabilize the main macroeconomic indicators.

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Стаття рекомендована до друку 20.05.2019

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Галуцак В. Л.

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The article is recommended for printing 20.05.2019

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