ASSESSMENT OF THE EFFECTIVENESS
OF FISCAL AND MONETARY LEVERS
OF ECONOMIC DEVELOPMENT IN UKRAINE

ОЦІНКА ЕФЕКТИВНОСТІ
ФІСКАЛЬНО-МОНЕТАРНИХ ВАЖЕЛІВ
ЕКОНОМІЧНОГО РОЗВИТКУ УКРАЇНИ

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This article is devoted to topical issues of studying the operation of fiscal and monetary levers of economic development of the country, the peculiarities of their implementation in modern transformational conditions in relation to macroeconomic indicators. Monetary policy in combination with fiscal regulation instruments forms the basis of the country's stabilization policy. Monetary impulses, passing through a number of transmission channels, contribute to the achievement of the main general economic goals: sustainable economic growth, a moderate level of inflation and balance of payments. The study of existing and the search for new effective tools and forms of implementation of fiscal and monetary policy, changing the basic conditions of the functioning of the national economy of Ukraine becomes a challenge for improving the effectiveness of fiscal and monetary regulation. The main indicators for assessing the effectiveness of fiscal and monetary instruments of Ukraine are determined. The importance of monetary and fiscal instruments for macroeconomic stability is analysed, in particular by indicators: GDP, budget expenditures, tax revenues, discount rate and money supply. An economic and mathematical model for analysing the effectiveness of fiscal and monetary levers on the economic development of Ukraine is constructed. Ways to improve the effectiveness of fiscal and monetary levers of economic development in Ukraine are proposed based on the obtained main modelling results.

Keywords: fiscal and monetary levers, GDP, budget expenditures, tax revenues, discount rate, money supply.
Problem definition and its relationship with important scientific and practical tasks. Today, fiscal and monetary policy occupies a key place in the mechanism of state regulation of the economy. The success of implementing these policies and ensuring their positive impact on the development of the national economy depends on the availability of an effective system of state regulation and management, coordination of actions of state regulators both at the level of developing common strategies and at the level of making tactical operational decisions.

Through the system of state regulation, using certain tools, which include fiscal and monetary levers, the state regulates the national economy, ensuring its development. Therefore, there is a need to assess the effectiveness of fiscal and monetary levers of economic development.

Analysis of recent research and publications. The problem of fiscal and monetary levers are not new, but it does not lose its relevance, as the transformation of the Ukrainian fiscal and monetary policy is currently in active stage. That is why the research in this direction is ongoing. However, it should be noted, that researchers focus mainly on the general benefits of fiscal and monetary levers. From recent scholars we can mention Bilyk O. [1], Barannyk L. [2], Bidliuk V. [3], Vdovychenko A. [4], Honcharenko O. [5], Hrytsyuk O. [6], Hashchyshchyn A. [7], Zakharchenko V. [8], Krukoves O. [9], Pasichny M. [10] and others occupy a proper place in the study of fiscal and monetary levers.

Setting objectives. The main task of the article is analyse the effect of fiscal and monetary levers of economic development in modern transformational conditions.

Main results of the study. Based on the analysis of literary sources [1; 3; 4; 5; 6] it is revealed that the generally accepted approach is to interpret the definition of “lever” as a set of appropriate tools and methods for managing the national economy using a certain set of tools; and as tools for managing the economy, which are an integral part of the economic mechanism. In other words, in this study, we will consider fiscal and monetary levers of economic development as a set of tools for fiscal and monetary policy in their mutual connection. Therefore, before studying the essence of fiscal and monetary levers, it is advisable to determine what monetary and fiscal policy is, the implementation of which occurs at the expense of monetary and fiscal instruments, which, in turn, are activated by the corresponding fiscal and monetary levers.

Given the variety of existing interpretations of “monetary policy” in works of theoretical and applied significance [7; 8; 9], we have summarized the following definition: monetary policy is a set of coordinated and interrelated measures that are aimed at regulating the money market and are carried out in order to achieve pre-defined socio-economic goals. This policy is implemented through the National Bank of Ukraine. Based on this, monetary policy levers are a set of measures and methods used by the NBU to regulate bank reserves, money supply in circulation and lending volumes to the economy, in order to ensure economic growth, reduce inflation and unemployment, and equalize the balance of payments.

In turn, the generalization of numerous literature sources and scientific developments on the study of “fiscal policy” [2; 4], allows us to determine that fiscal policy is a set of measures aimed at ensuring full employment and producing non-inflationary GDP by changing public spending, the tax system and approaches to the formation of the state budget as a whole. After analysing different scientists' approaches we can say that fiscal levers are a set of budget and tax instruments in their content.

Taking into account the theoretical provisions outlined above, Figure 1 reflects the set of...
fiscal and monetary levers used in the process of regulating the economic development of the country.

World experience shows that the selection of effective monetary policy instruments affects the economic growth of the country as a whole, the growth of competitiveness of business entities and overcoming structural imbalances in the state economy.

As you know, most economic indicators are formed under the influence of not one, but many factors. To assess the effectiveness of fiscal and monetary levers, we construct an economic and mathematical model based on multivariate correlation and regression analysis, based on the multiple linear regression equation. In this case, the effective feature (Y) is associated using the multiple regression equation with two or more factor features (X_1, X_2, X_3, ..., X_m). The multiple linear regression equation has the form:

\[ Y = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + ... + a_mX_m + e, \]  

where \( a_0, a_1, a_2, ..., a_m \) – parameters of the multiple regression equation, and \( X_1, X_2, X_3, ..., X_m \) – variable models, \( e \) – model error.

Denote: dependent variable \( Y \) – gross domestic product (GDP); explicative variables: \( X_1 \) – budget expenditures; \( X_2 \) – tax revenues to the state budget; \( X_3 \) – discount rate; \( X_4 \) – money supply.

Array of variables for constructing a model based on statistical data for the Ukrainian economy for 2008-2021 is presented in Table 1.

To estimate the parameters of a linear multiple regression equation, the least squares method is used, i.e. a system of normal equations is constructed, the solution of which allows us to obtain estimates of regression parameters.

The economic and mathematical model will be built using GRETL software.

The results of the multiple regression model are presented in Table 2.

Based on the modelling results, the multiple regression equation has the form:

\[ Y = 186,528 + 3,196X_1 + 1,180X_2 - 7,978X_3 - 0,316X_4 + e. \]  

Analysis of the economic content of the model proves the existence of an inverse relationship between the regressor \( X_3 \) (average annual discount rate value), \( X_4 \) (money supply volumes) and the dependent variable \( Y \) (nominal GDP), that is, an increase in the values of these variables leads to a decrease in \( Y \).
the existence of a direct relationship between the regressor \( X_1 \) (budget expenditures) and \( X_2 \) (tax revenues to the state budget) and the dependent variable \( Y \) – their increase has a direct impact on the growth of nominal GDP.

Coefficient of determination \( R^2 = 0.995 \) indicates that the variation \( Y \) (GDP) is by 99.5% explained by the variation in the model variables. This connexion is quite strong, since the multiple correlation coefficient \( R = 0.992896 \).
To check the quality of regression, we use Fisher exact test to check the insignificance of the regression as a whole and Student's test to check the insignificance of an individual coefficient in the regression. If P is the value (F) < 0.01, the model is significant at the significance level α=0.01. For our model, P (F) = 0.000225 < 0.01. Therefore, the null hypothesis about the insignificance of regression is generally rejected at the significance level α=0.05, that is, the coefficients for all regressors at the same time are not zero, which confirms the combined influence of factors on the dependent variable.

One of the problems that makes it difficult to obtain reliable modelling results and analyse functional relationships is the presence of multicollinearity. Multicollinearity occurs when more than two factors are connected by a linear relationship, that is, there is an influence of factors on each other. Let us check the model for collinearity using the inflationary factors method using the VIF criterion (variance inflation factor). Parameter VIF<sub>j</sub> for j-regressor shows how many times the standard deviation estimate for the coefficient for the regressor will increase compared to the situation if there were no multicollinearity. If VIF<sub>j</sub> > 10, then the presence of multicollinearity for the j-regressor is confirmed.

Checking the model for multicollinearity using the toolkit in GRETL yielded the following VIF values for regressors: VIF<sub>X1</sub> = 49.85; VIF<sub>X2</sub> = 4.35; VIF<sub>X3</sub> = 1.42; VIF<sub>X4</sub> = 30.86. As you can see, value VIF<sub>X1</sub> and VIF<sub>X4</sub> > 10, i.e. there is multicollinearity between variables X<sub>1</sub> and X<sub>4</sub>. In addition, according to Belsley-Kuh-Welsch collinearity diagnosis, conditionality index (cond) and variance proportions, which express the fractions of variance, are given. Each value from variance proportions corresponds to its own conditionality index (cond). The sum of elements in variance proportions columns is always equal to one. We select the row with the highest conditionality index (cond), we find the largest values of the variance fractions in this row. In our case, the largest fractions of the variables X<sub>1</sub> and X<sub>4</sub>, which means that between the variables X<sub>1</sub> and X<sub>4</sub> multicollinearity is observed. This means that one of these variables must be removed from the model. Since according to Table 2. variable X<sub>1</sub> is significant, then we will remove X<sub>4</sub> from the model. The adjusted model is shown in Table 3.

A linear three-factor regression model has the following form:

\[ Y = 73,369 + 2,798X_1 + 1,247X_2 - 6,780X_3 + e \]  

Normalized R\(^2\) = 0.993148.

Thus, with an increase in budget expenditures by UAH 1 billion, nominal GDP is growing by an average of UAH 2.798 billion with constant...
amounts of tax revenues to the state budget at the level of the discount rate; with an increase in tax revenues by UAH 1 billion, nominal GDP increases by UAH 1.24 billion if other variables remain unchanged; an increase in the discount rate by 1 percentage point leads to a decrease in nominal GDP by UAH 6.78 billion. The model explains 99.3% of the variation in nominal GDP.

GRETL also allows you to plot confidence intervals for regression coefficients. We get a result with 95% confidence intervals for the coefficients of the regression equation (Table 4).

The values of coefficients that are within the upper and lower limits of the confidence interval are considered normal. In our case, the coefficients are within confidence intervals, so their values are acceptable. True value of the coefficient for $X_1$ – budget expenditures with a probability of 95% are covered by the interval [2.14362; 3.45329] billion UAH; at $X_2$ – tax revenues to the state budget with a probability of 95% are covered by the interval [0.109854; 2.38588] billion UAH; at $X_3$ – the discount rate with a probability of 95% is covered by the interval [-25.1988; 11.6386] %.

Given the complex realities of today, namely the increase in the level of inflation, the increase in the state budget deficit, the war with Russia, the COVID-19 pandemic, excessive growth of the money supply in circulation, as a result of monetary issuance, the reduction of gold and foreign exchange reserves, the issues of effective use of fiscal and monetary levers and their regulatory impact on economic development become particularly relevant. Research of existing and search for new effective tools and forms of implementation of fiscal and monetary policy, changing the basic conditions for the functioning of the national economy of Ukraine becomes a challenge for improving the effectiveness of fiscal and monetary regulation.

World experience shows that the selection of effective monetary policy instruments affects the economic growth of the country as a whole, the growth of competitiveness of business entities and overcoming structural imbalances in the state economy.

The decline in the effectiveness of market instruments and high uncertainty in the context of full-scale military operations made it impossible to implement monetary policy in the traditional format of inflation targeting. In order to preserve macroeconomic stability in Ukraine, contain panic moods and prevent the unwinding of the inflationary spiral, the NBU at the beginning of the war was forced to fix the exchange rate of UAH to USD and imposed some administrative restrictions, in particular on currency transactions and capital movements. In addition, in accordance with the amendments made to the legislation of Ukraine, the NBU received a temporary opportunity for the period of martial law to purchase government bonds to finance critical expenditures of the Government of Ukraine in limited volumes, primarily to ensure the country’s defence capability [13].

Economic collapse, significant budget needs and adjustments of the hryvnia exchange rate led to a rapid increase in the level of public debt relative to GDP. However, this ratio will remain less than 90% on the forecast horizon due to significant amounts of grants [13].

Aware of the potential risks of monetization of the state budget deficit, the National Bank will finance only critical government expenditures in limited amounts and only by purchasing Government securities on the primary market. The National Bank will also maintain maximum transparency in covering such operations. Together, limiting the volume of monetization of the budget deficit and transparent communications will prevent the threat of increased fiscal dominance and, accordingly, the effect of “fiscal displacement” and high inflation; weakening confidence in monetary policy and unbalanced expectations, as well as complicating the process of Ukraine’s European integration and cooperation with international financial donors.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>95% confidence intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>const</td>
<td>73.2693</td>
<td>(-156.113, 302.651)</td>
</tr>
<tr>
<td>$X_1$</td>
<td>2.79846</td>
<td>(2.14362, 3.45329)</td>
</tr>
<tr>
<td>$X_2$</td>
<td>1.24787</td>
<td>(0.109854, 2.38588)</td>
</tr>
<tr>
<td>$X_3$</td>
<td>-6.78012</td>
<td>(-25.1988, 11.6386)</td>
</tr>
</tbody>
</table>

Table 4: Confidence intervals for coefficients of the regression equation of the corrected model

Calculated and constructed by the author based on the results of the study
International support will remain a key source of funding for budget needs. Together with the increase in market participation, this will allow us to completely stop monetizing the budget deficit from 2023.

**The results of this study and further research in this area.** Based on the developed and evaluated model, it is argued that monetary and fiscal policies jointly affect one of the key macroeconomic indicators, in particular GDP. At the same time, an additional analysis of the dynamics of the main instruments of fiscal and monetary policy suggests that, on average, coordinated policies have a greater stimulating effect on maintaining macroeconomic stability and non-inflationary economic growth than uncoordinated ones. The analysis of the calculation results based on the developed data model confirmed the importance of mutual coordination of fiscal and monetary policies. In addition, monetary policy can increase the effectiveness of fiscal policy, despite the fact that it may not be influential.

Thus, taking into account the current risks of macro-financial instability and the balanced application of appropriate fiscal and monetary levers to overcome it are necessary in the near future, along with the continuation of in-depth research and analysis of improving the effectiveness of fiscal and monetary levers in the Ukrainian economy under martial law.

**REFERENCES:**


**СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ:**

4. Вдовиченко А. Як фіскальна політика впливає на ВВП та інфляцію в Україні. Вісник НБУ. 2018. № 244. С. 26–45.


