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## ВПЛИВ КРЕДИТОУТВОРЮЮЧИХ ЧИННИКІВ НА СТАН РОЗВИТКУ РЕАЛЬНОГО СЕКТОРА ЕКОНОМІКИ В УМОВАХ ЕКОНОМІЧНОЇ НЕСТАБІЛЬНОСТІ

Анотація. Проведено аналіз стану банківського кредитування реального сектору. Оцінено масштаби обсягів кредитів для фінансування суб'єктів реальної економіки. З метою визначення впливу банківського кредитування на стан реальної економіки встановлено залежність між обсягом кредитів, наданими банками в економіку країни, активами банківської галузі та основним макроекономічним показником — ВВП. Проведено факторний аналіз впливу кредитоутворюючих чинників на стан розвитку реального сектора економіки в умовах економічної нестабільності. Визначено, що система кредитування реального сектору економіки в Україні потребує суттєвого переосмислення в напрямі орієнтації банківських установ на першочергове кредитування пріоритетних у національній економіці видів діяльності.

**Ключові слова**: банківське кредитування, реальний сектор, валовий внутрішній продукт, активи банків, валютний курс, облікова ставка, ставка за кредитами, економічна нестабільність.

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# THE INFLUENCE OF CREDIT FACTORS ON THE DEVELOPMENT OF THE REAL ECONOMIC SECTOR IN THE CONDITIONS OF ECONOMIC INSTABILITY

**Abstract.** The analysis of the status of bank lendingin the reals ectoriscarriedout. The scope of credits for financing of subjects of the real economy are estimated. In order to determine the

impact of bank lending on the state of the real economy, the relation ship between the volume of loansprovidedby banks to the country's economy, assets of the banking industry and the main macroeconomic indicator – GDP have been established.

The application of economic-mathematical modeling in the study of the banking sector's activity enabled the collection and streamlining of statistical information on the main parameters of the banking system development; using the leastsquaresmethod, to construct a six-factor linear regression model of the in fluence of the factors of the banking system on GDP on a matrixbasis; the correlation between the indicators of the banking system, the exchangerate, inflation, return on assets and capital of the banking system, the interest rate on loans are investigated.

It is determined that thelending of the real economysectorin Ukraineneeds a substantialre think ingin the direction of orientation of banking institution stolends of priority activities in the national economy.

The practical application of the calculation senablesto in crease the level of the Nationa lBank's management in order to ensure the efficientfunctioning of bothindividual banking institutions and the banking systemas a wholes in cethefurthergrowth of Ukraine dependson the stable development of the banking system, the possibility of enteringthe international financial market sandactive participation in the globalization processes. A reliable and developed banking sector play sanextremely important rolein stabilizing the country's economy.

**Keywords:** banklending, realsector, grossdomestic product, bankassets, exchangerate, discountrate, interestrateonloans, economic in stability.

**JEL Classification**: E51, E59, G20, G21 Formulas: 2; fig.: 1; tabl.: 4; bibl.: 12.

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## ВЛИЯНИЕ КРЕДИТООБРАЗУЮЮЩИХ ФАКТОРОВ НА СОСТОЯНИЕ РАЗВИТИЯ РЕАЛЬНОГО СЕКТОРА ЭКОНОМИКИ В УСЛОВИЯХ ЭКОНОМИЧЕСКОЙ НЕСТАБИЛЬНОСТИ

Аннотация. Проведен анализ банковского кредитования реального сектора. Оценены масштабы объемов кредитов для финансирования субъектов реальной экономики. С целью определения влияния банковского кредитования на состояние реальной экономики установлена зависимость между объемом кредитов, предоставленных банками в экономику страны, активами банковской отрасли и основным макроэкономическим показателем — ВВП. Проведен факторный анализ влияния банковского кредитования на состояние реального сектора экономики в условиях экономической нестабильности. Определено, что система кредитования реального сектора экономики в Украине требует существенного переосмысления в направлени и ориентации банковских учреждений на первоочередное кредитование приоритетных в национальной экономике видов деятельности.

**Ключевые слова**: банковско екредитование, реальный сектор, валовой внутренний продукт, активы банков, валютный курс, учетная ставка, ставка по кредитам, экономическая нестабильность.

Формул: 2; рис.: 1; табл.: 4; библ.: 12.

**Introduction.** Emergence of a market economy in Ukraine enhances the attention of economic science to all the components of market relations. Today, the most urgent aspect is the development of new conceptual foundations of credit tools for the development of the real economy. Credit as an economic category has not only the internal essence, which manifests it self in its structure, laws of motion, forms and species, but also actively interacts with the external environment and stimulates the process of expanded reproduction.

The movement of loan capital between economic entities at the national and international levels takes place in various forms using a variety of lending tools—forms of providing economic entities with borrowed financial resources to finance the real sector of the economy, which are implemented through the mechanism of the credit market. The real sector of the economy must have such lending tools that would ensure the overall economic reproduction and continuity of the business cycle. The main banking credit tools for the development of the real sector of the economy are consumer loans, loans to economic entities, mortgage loans, leasing, factoring and franchising. The main purpose of such tools is to prevent interruptions in the field of social production and generally economic reproduction.

Credit activity of modern commercial banks is quite diverseand includes various forms and types of loans, provided to legal entities or individuals in order to receive income, as well as banking services of a credit nature. However, the financial instability, under which the Ukrainian economy is in need, requires a thorough analysis of the situation in order to work out mechanisms for ensuring the restoration of economic growthand normal functioning of the financial sector.

Analysis of researches and target setting. A lot of attention in scientific works of domestic scholars is paid to separate aspects of credit tolls development and their influence on the real sector of economy: O. Vovchak [1], U. Vladychyn [2-3], V. Vovk [4], I. Gutsal, O. Dzuybliuk [5], N. Zhukov, V. Kovalenko, V. Lagutin, N. P. Ploiak [6], S. Reverchuk, M. Savluk, O.V. Skaletska, N. Sleludko and others. In foreign literature, these issues were considered by: A. Gan, W. Lexis, J. Law, R. Miller, A. Smith, N. Samsonov, D. Ricardo, J. Shumpeter [7] and others.

Despitesignifican tachievements of domesticand foreignscientists, there are a number of issues related to the search for mechanisms in order to improve the efficiency of bank lending to the real economywith the purpose of revitalizing economic processes and stabilizing the situation in Ukraine in the current conditions. The system onassessment of the efficiency of using credit tool sand way sofitsimp rovement order to provide the development of the real economy in conditions of the latest challenges and threatsrequires fur ther scientific-methodological elaborations. Inview of this, there is aneed for further researchin the direction of combining theoretical developments with mathematical tools concerning analysis of the credit activity of the domestic banking system, use of methods of economic and mathematical modeling for quantitative assessment of credit factors, which influence the development of the real sector and determine the direction for ensuring its dynamics.

Purpose of the work is to study the state of bank lending to the real sector of the economy of Ukraine and to identify problems that affect the efficiency level of credit provision of the economy.

Methods of research used in the analysis of the impact of bank lending on the development of the real sector of the economy under conditions of economic instability – analysis and synthesis, method of comparison, economic-statistical, mathematical, grouping and modeling, table and graphic.

**Results of the research.** The banking system is the largest lender of the real economy in Ukraine, and bank lending plays an important role in meeting the needs of the real sector of the economy (along with investments and state support) and consumer demand of population for additional financing. However, the imbalance between demand and supply in the market for bank

lending leads to crises throughout the economic systemand becomes a factor in slowing down its recovery process. After all, for a long time in the domestic banking practice, short-term lending prevails, while the share of medium- and especially long-term loans is low, the loan is mainly used to cover the working capital deficit and has little effect on structural changes, increasing the scientific and technological level of production, competitiveness of products in the domestic and foreign markets [8, p. 56].

Thus, for moving temporarily free funds through the mechanism of the credit market, its subjects use the appropriate tools, which because of their credit nature received the name of the credit ones. Based on the fact that a "credit tool" is an integral part of a financial instrument, it will largely reflect the forms of the movement of loan capital between the subjects of the real economy. Atthesametime, its hould benoted thatin credit policy, namely, atthestageofdevelopmentofcreditproducts, itisexpedienttousethetermtypesofloans, and at the stage of their sale they become the appropriate tools, through which the redistribution of resources from creditors to those who have them in need takes place.

To analyze the state of bank lending to the real sector, let's consider the state of the banking market:according to official NBU data, as of January 1, 2017, there were 96 banking institutions in Ukraine, that is 21 units less than a year earlier, Of these, 37 are banks with foreign capital. This is due to the liquidation of financially unstable banks and the outflow of foreign capital from the banking system of Ukraine. During this period, the activity of banks with foreign capital in the retail markets is reduced and their reorientation into the corporate segment takes place; In addition, some banks have left the Ukrainian banking market due to the ineffective business atmosphere [9].

The domestic market of bank loans was significantly influenced by the political and economic situation. In this regard, individual bank shave virtually ceased lending, having doubts about the long-term solvency of potential borrowers. However, a significant number of Ukrainian banks are actively engaged in lending to individuals for consumer needs (Table 1).

Loans granted by the Ukrainian banks in 2012-2016 UAH million

Table1

	As of 01.01.					Growth rate
Indicators	2013	2014	2015	2016	2017	in 2016 until 2012, %
Granted loans	815 327	911 402	1 006 358	965 093	1 005 920	123,38
including						
loans granted to economic entities, including	609 202	698 777	802 582	786 918	847 092	139,05
short-term	255 865	293 486	342 610	334 770	360 014	140,07
long-term	353 337	405 291	459 972	452 148	487 078	137,85
share of loans granted to economic entities	75	77	80	82	84	112
loans granted to individuals, including	161 775	167 773	179 040	152 971	157 385	97,28
short-term	134 273	142 607	155 765	130 815	134 564	100,22
long-term	27 502	25 166	23 275	22 156	22 821	82,98
share of loans to individuals	25	23	20	16	16	64

Source: compiledbytheauthorsbased on the data of the National Bank of Ukraine [9].

Consequently, the volume of loans issued at the beginning of 2017 compared to the beginning of 2013 increased by more than 23%, amounting to UAH 1,005,920 million. In addition, as of January 1, 2017, the loans to economic entities increased in comparison with the previous 2016 year the same, as in 2013 increased by 39,05%. While loans to individuals increased in comparison with 2016, while in comparison with 2013 they decreased by about 3%.

Among the loans granted to the economy, the largest share belongs to loans to legal entities. During the investigated period loans to legal entities amounted to an average of 80% of their total volume. The conducted analysis according to the NBU revealed, that a sharp increase in the use of loans by enterprises occurred in 2014 and 2016, with their share as of 01.01.2014 amounted to

76,7% of the total volume of loans granted by the banks of Ukraine. The smallest increase in the volume of such loans occurred in 2013 – UAH 28 295.0 million, or 4,7% compared to 2012.

Thus, short-term loans for enterprises are more profitable, and banks, in turn, do not have enough free financial resources to provide long-term investment loans to the real economy.

In terms of scale of loans to finance real economy subjects, we will analyze them in comparison with the growth rates of total assets of domestic banks for 2012–2016, presented in Fig. 1.

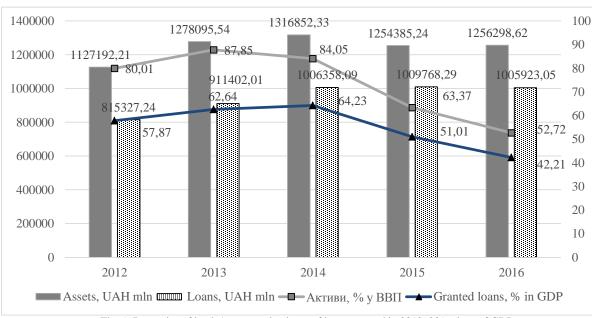


Fig. 1. Dynamics of banks' assets and volume of loans granted in 2012–2016, in% of GDP *Source*: compiled by the authors by the data of State Statistic Service and the National Bank of Ukraine [9; 10].

According to the datapresented in Fig. 1, we can state the fact that bank loanswere the largest in 2014–2015, there was an increase before this period, whereas after 2015 there is a trend of lending contraction.

This situation characterizes the growth of the physical volume of lending, while the relative value relative to GDP generally does not have a clear tendency, after all, by 2014, there is an increase and then a reduction, in 2016, the share of loans in GDP decreased in comparison with 2014 by 22,02%, and since 2012 – by 15,66%.

These gaps are due to the growth of GDP and lower lending rates by banks,GDP in 2016 increased by UAH 403723,56 million, while the volume of issued loans decreased by UAH 3845,24 million. However, the decline in lending activity of banking institutions last year is primarily determined by focusing banks only on a limited number of reliable clients, which would faithfully fulfill their obligations during the crisis, in order to protect themselves from the emergence of troubled loans.

As for the assets of the banking system of Ukraine, they reached the largest size in 2014 in terms of money in the period under review. In the future, the clear dynamics of assets is not available in monetary terms, whereas in percentage terms, assets relative to GDP began to increase from 2012 to 2013 by 7,84%, and afterwards their significance began to decrease dynamically.

The assets in percent age reached the lowest meaning in 2016,namely during the analyzed period, they decreased by 27,29%,at the same time compared to 2013 – by 35,13%. Devaluation of hryvna, highrateo finflation, and increase in overdue loans by both corporate borrowers and the population can be considered the reasons of the decrease in the volume of banks assets.

In order to determine the impact of bank lending on the state of the real economy, we will conduct a factor analysis based on data from the National Bank of Ukraine and the State Statistics Service, grouped in Table. 2 during the last seven years, relating the impact of the average interest

rate on loans in national currency, the NBU discount rate, the weighted average hryvna to dollar exchange rate on the interbank foreign exchange market of Ukraine, index of inflation, indicators of profitability of assets and return on capital of the banking system of Ukraine to the dependent variable – gross domestic product (GDP) [9; 10].

Input data of the factor model

Table 2

Period	GDP, UAH million	Average interest rate on loans in national currency	Average NBU discount rate	Average weighted rate on the interbank foreign exchange market of Ukraine (at the time of establishing the official hryvnia rate), UAH	Inflation index, annual value	Return on assets	Profitability of apital
01.01.2011	1083	0,15	0,09	796,36	1,091	-0,0145	-0,1019
01.01.2012	1317	0,15	0,08	803,51	1,046	-0,0076	-0,0527
01.01.2013	1409	0,18	0,08	802,4	0,998	0,0303	0,0045
01.01.2014	1455	0,16	0,07	814,95	1,005	0,0012	0,0081
01.01.2015	1567	0,19	0,11	1577,96	1,249	-0,0407	-0,3046
01.01.2016	1979	0,21	0,22	2378,37	1,433	-0,05	-0,5191
01.01.2017	2383	0,18	0,17	2669,24	1,124	-0,13	-1,17

Source: compiled by the authors by the data of State Statistic Service and the National Bank of Ukraine [9; 10].

Calculations of the pair correlation coefficients allowed determining the degree of connection between the investigated factors.

As a result of the calculations of partial correlation coefficients, the least significant factors were rejected, and the following were selected as influential factor variables:

- average interest rate on loans in national currency( $x_1$ );
- average NBU discount rate( $x_2$ );
- weighted average rate on the interbank foreign exchange market of Ukraine (at the time of establishing the official exchange rate of hryvnia),  $UAH.(x_3)$ ;
  - inflation index, annual value( $x_4$ );
  - profitability of assets of the banking system of Ukraine( $x_5$ );
  - profitability of capital of the banking system of Ukraine( $x_6$ ).

Repeated calculations of the pair correlation coefficients allowed determining the degree and direction of connection between the volume of GDP and selected factors.

Table3

Matrix of pair correlation coefficients

	V	$X_1$	$X_2$	$X_3$	$X_4$	$X_{5}$	$X_6$
У	1						
$X_1$	0,6626	1					
$X_2$	0,79517	0,78068	1				
$X_3$	0,94308	0,74032	0,91475	1			
$X_4$	0,46755	0,78877	0,84172	0,69556	1		
$X_5$	-0,8591	-0,4106	-0,7291	-0,9071	-0,4738	1	
$X_6$	-0,9221	-0,4916	-0,7508	-0,9301	-0,4213	0,97136	1

Source: own calculations of the authors.

Data analysis was performed using MS Excel, as a result of calculating the quality of approximation, which is determined by the coefficient of determination= $R^2$  and in our case, is close to 1. This means that the impact of the studied indicators X1, X2, X3, X4, X5, X6 on (GDP) is quite high.

The value of the coefficient of multiple correlation R indicates the adequacy of the constructed model.

After calculating the values of independent variables, the regression equation will have the form:

$$Y = 3158,88 - 10818,13X1 - 3817,76X2 + 2,05X_3 - 1394,77X_4 + 8772,15X_5 + 789,28X_6$$
 (1)

Statistical significance of the independent variables of the model is determined by the t-criterion. Theoretical value of the t-criterion is 2,179. so the variables X3, X5 and X6 have a significant impact, and X1, X2, and X4 are not statistically significant coefficients, i.e., their influence in the observed period is non-systematic.

Let's consider the coefficients of partial elasticity, which clearly demonstrate the dependence of the change in the effective indicator of GDP on changes in one of the factor indicators, provided that other factors remain unchanged.

We calculate the partial elasticity coefficients of the constructed model, which characterize the effect of changing the specific weight Xi on Y in the assumption that the influence of other factors is absent.

The partial elasticity coefficient shows how many % will change Y if Xi changes to 1% and is determined by the formula:

$$k_{el(i)} = a_i \times X_{\overline{i}} \tag{2}$$

Table 4

where,  $K_{el(i)}$  – partial elasticity coefficient;

 $a_i$ -model parameters to be evaluated;

 $X_{\overline{i}}$  average values of independent variables of the model;

Y – value of the dependent variable of the model[11].

Calculations of partial elasticity coefficients were performed in MS EXCEL (Table 4).

Calculation results of partial elasticity coefficients

Elasticity coefficients				
K_el(1)	-1,29			
K_el(2)	-0,23			
K_el(3)	1,82			
K_el(4)	-1,09			
K_el(5)	-0,18			
K_el(6)	-0,15			

Source: own calculations of the authors based on [11].

The calculate delasticity coefficients for the constructed model indicatet hat the most sign ificantimpacton GD Pisthe exchangerate, while other factor sareless influential. There sults of the factor modeles tima tionareas follows: growth of the rate on loans in national currency, as well as growth of the discountrate, negatively influence GDP, theoretically lead to its decrease; however, growth of the exchange rate of foreign currency leads to GDP growth; in turn, inflation leads to a decrease inreal GDP in Ukraine; he indicator of return on capital describes the level of efficiency of the use of bank capital, according to calculations it has a positive impact on GDP; the indicator of the profitability of assets of the banking system of Ukraine shows the level of efficiency of the use of bank resources, based on data analysis of the growth of this indicator will lead to GDP growth.

Conclusions. Application of economic-mathematical modeling in the study of the banking sector's activity enabled the collection and streamlining of statistical information based on the analysis of the main parameters of the banking system; using the least squares method, to construct a six-factor linear regression model of the influence of the factors of the banking system on GDP on a matrix basis; to investigate the correlation between the indicators of the NBU discount rate, the exchange rate, inflation, return on assets and capital of the banking system, and the interest rate on loans.

Based on the analysis of bank lending to the real sector of the economy, it is worthwhile to note measures that will increase its level in Ukraine:

- increasing the role of non-bank financial and credit institutions in lending not only to the population but also the real sector of the state's economy;

- promotion of in creasing the creditfacilities of commercial banks [12, p. 244];
- reduction of their terestrate through the mechanism of state compensation of the loans cost forenterprises of strategically importants ectors of the economy;
- in crease of legal protection of credit or sand creation of institution almotivation for attracting banks to lending to enterprises of the realsector of the economy for their innovative development;
- in order to reduce administrative and operation alcosts of commercial banks, it is necessary to introduce a preferential taxation regime for banks that lend to enter prises of strategically important industrie sand spheres of the economy.

Practical application of the calculations enables to raise the level of bank management of the National Bank in order to ensure the efficient functioning of both individual banking institutions and the banking system as a whole, since the further economic growth of Ukraine, an opportunity to enter the international financial markets and active participation in the globalization processes depend on the stable development of the banking system. A reliable and developed banking sector plays an extremely important role in stabilizing the country's economy.

Development of Ukraine directly depends on the development level of the real sector of the economy, which is possible for the effective implementation of measures of credit policy of banks and non-bank lending institutions, formation of national competitive advantages and creation of a reliable foundation for modernization and integration of Ukraine into the European and world economic space. Therefore, in order to ensure further development of the domestic economy, stability of its operating conditions, profitability of enterprises and the welfare of the population, it is necessary to combine the efforts of all subjects of economic relations.

Prospects for further scientific developments are related to the urgent need for scientific analysis and generalization of best international experience in the field of bank lending to the real economy sector. However, the approaches to bank lending to the economy, which are actively pursued by foreign countries, should be critically rethought taking into consideration the Ukraine's economic reality.

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