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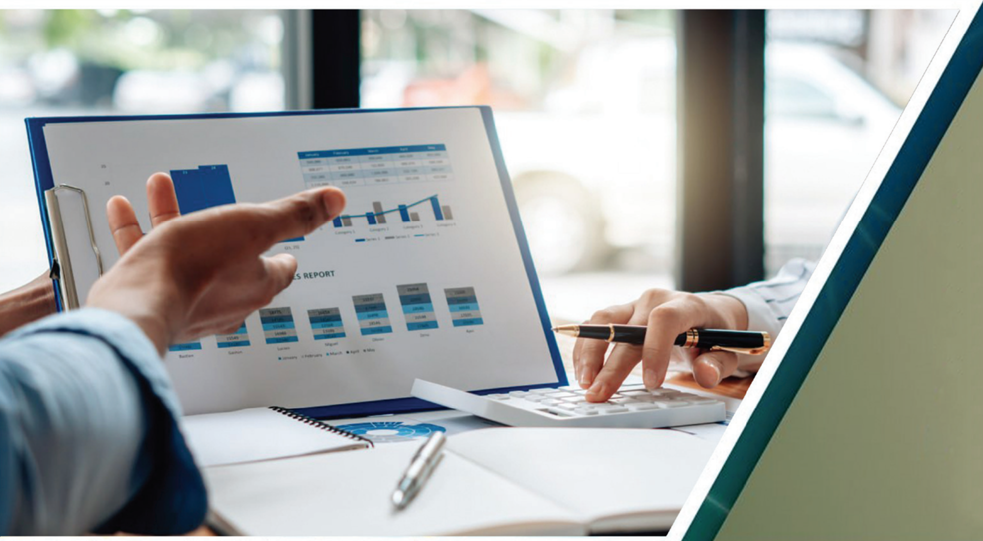

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UDK 332.1(330.322.1)
THE RELATIONSHIP BETWEEN GDP, DEPOSITS AND LOANS

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Abstract. The relationship between gross domestic product (GDP) and deposits and loans of commercial banks in the Republic of Uzbekistan is examined. Financial intermediation is considered an important factor contributing to economic growth by facilitating the transformation of savings into investment. Using statistical data for 2020–2025, the dynamics of these indicators are analyzed, and correlation analysis is conducted to quantitatively assess the strength of the relationships among GDP, deposits, and loans. Based on the Pearson correlation coefficient, a very strong positive relationship ($r > 0.99$) is identified among the indicators under consideration, with statistical significance at the 1% level. The findings demonstrate that growth in bank deposits and loans is closely associated with GDP growth, highlighting the significant role of the banking system in economic development. Conclusions are formulated regarding the need for further development of financial intermediation to support sustainable economic growth.

Keywords: GDP, gross domestic product, deposits, loans, commercial banks, correlation, Pearson correlation coefficient, financial intermediation, economic growth, regression, banking system, investment, Republic of Uzbekistan.

Аннотация. Исследована взаимосвязь между валовым внутренним продуктом (ВВП), депозитами и кредитами коммерческих банков Республики Узбекистан. Финансовое посредничество рассматривается как важный фактор, способствующий экономическому росту посредством трансформации сбережений в инвестиции. На основе статистических данных за 2020–2025 годы проанализирована динамика исследуемых показателей и проведён корреляционный анализ, позволяющий количественно оценить тесноту взаимосвязи между ВВП, депозитами и кредитами. На основе коэффициента корреляции Пирсона установлена весьма высокая положительная взаимосвязь ($r > 0{,}99$) между рассматриваемыми показателями, статистически значимая на уровне 1%. Результаты показывают, что рост объёма банковских депозитов и кредитов тесно связан с ростом ВВП, что подчёркивает значимую роль банковской системы в экономическом развитии. Сформулированы выводы о необходимости дальнейшего развития финансового посредничества в целях обеспечения устойчивого экономического роста.

Ключевые слова: ВВП, валовой внутренний продукт, депозиты, кредиты, коммерческие банки, корреляция, коэффициент корреляции Пирсона, финансовое посредничество, экономический рост, регрессия, банковская система, инвестиции, Республика Узбекистан.

INTRODUCTION

The relationship between the development of the banking system and economic growth is a fundamental issue in economic science. Gross domestic product (GDP), as a summary indicator of economic performance, largely depends on the efficiency of the financial system, which ensures the accumulation of savings and their transformation into investment. Deposits and loans issued by commercial banks are key indicators of the development of financial intermediation, which directly influences the dynamics of economic growth.

In the context of ongoing economic reforms in the Republic of Uzbekistan, the relationship between banking activity and economic growth is particularly relevant. The rapid development of the banking system, the growth of the deposit base, and the expansion of lending to the economy are accompanied by a steady increase in GDP. A quantitative assessment of the strength of this relationship requires the use of statistical analysis methods that make it possible not only to establish the presence of a relationship but also to measure its strength and statistical significance.

The relevance of this topic stems from the need to scientifically substantiate the role of the banking system in ensuring economic growth in the Republic of Uzbekistan. Understanding the nature and strength of the

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relationship between GDP, deposits, and loans allows for a more informed formulation of monetary policy aimed at stimulating economic development through financial intermediation mechanisms. Correlation analysis is an effective tool for such a quantitative assessment.

The objective of this study is to quantitatively assess the relationship between GDP, deposits, and loans issued by commercial banks using correlation analysis. To achieve this goal, the theoretical foundations of the relationship between finance and economic growth are examined, the scientific literature is reviewed, the methodology of correlation analysis is substantiated, and an empirical assessment of statistical data for 2020–2025 is conducted by calculating correlation coefficients. The practical significance of the work lies in substantiating the role of the banking system in economic development and developing recommendations for improving financial intermediation to ensure sustainable GDP growth.

LITERATURE REVIEW

The theoretical foundations of the relationship between financial development and economic growth were laid in the works of classical economists. J. Schumpeter, in his work "Theory of Economic Development," was one of the first to substantiate the key role of bank credit in financing innovation and ensuring economic dynamism [1, p. 157]. J. M. Keynes considered the relationship between savings, investment, and national income to be the basis of macroeconomic equilibrium [2, p. 210]. R. Goldsmith empirically demonstrated the relationship between the level of financial development and economic growth [3, p. 48].

In Western economic literature, the relationship between finance and growth is studied using quantitative methods. In their well-known work, R. King and R. Levin empirically demonstrated that the level of development of financial intermediation is a statistically significant predictor of long-term economic growth [4, p. 719]. R. Levin, in his subsequent studies using data from many countries, confirmed a stable positive relationship between the depth of financial intermediation and GDP growth rates [5, p. 691]. Thus, the Western tradition emphasizes an empirical and statistically proven relationship between financial development and economic growth.

Russian scientists pay considerable attention to the analysis of the relationship between the banking system and the economy. O. I. Lavrushin, in his textbook "Banking," reveals the mechanisms through which bank credit influences economic growth [6, p. 214]. The application of statistical methods to the analysis of economic relationships is covered in detail in the works of I. I. Eliseeva on econometrics, where methods of correlation and regression analysis are considered [7, p. 132]. The influence of the monetary and credit sector on macroeconomic dynamics is considered in the works of S. R. Moiseev [8, p. 156].

In Uzbek economic literature, the relationship between banking and economic growth is considered in the context of financial system reform. Sh. Z. Abdullaeva, in her monograph "Banking," analyzes the role of banks in ensuring the economic development of Uzbekistan [9, p. 176]. T. M. Koraliev studies the impact of banks' deposit and credit activities on the country's macroeconomic indicators [10, p. 98]. N. Kh. Jumaev's work examines the role of financial intermediation in ensuring sustainable GDP growth [11, p. 104]. An analysis of the literature demonstrates the existence of a well-developed theoretical basis; at the same time, further quantitative assessment of the relationship between GDP, deposits, and loans using recent data from Uzbekistan and correlation analysis can contribute to expanding the existing body of research, which determines the scientific relevance of this work.

RESEARCH METHODOLOGY

The methodological basis of the study was formed by statistical, dynamic, and correlation-regression analysis. The database consisted of data on GDP, deposits, and loans issued by commercial banks in the Republic of Uzbekistan during 2020–2025 (Table 1). To quantitatively assess the strength of the relationship between the indicators, the Pearson linear correlation coefficient was used:

$$r = \Sigma(X_i - \bar{X})(Y_i - \bar{Y}) / \sqrt{[\Sigma(X_i - \bar{X})^2 \, \Sigma(Y_i - \bar{Y})^2]}, \quad (1)$$

where X_i and Y_i are the indicator values, and $\bar{X}$ and $\bar{Y}$ are their average values. The value of the coefficient ranges from −1 to +1.

The closer r is to 1, the stronger the positive relationship. The statistical significance of the correlation coefficient was assessed using Student's t-test:

$$t = r \cdot \sqrt{(n - 2)} / \sqrt{(1 - r^2)}, \quad (2)$$

where n is the number of observations. In addition, the coefficient of determination, $R^2 = r^2$, was calculated, which shows the proportion of variation in the outcome variable explained by the factor. To assess the quantitative impact of deposits on GDP, a pairwise linear regression equation of the form $Y = a + bX$ was constructed. The use of these methods makes it possible not only to determine the presence of a relationship but also to measure its strength, direction, and statistical significance.

ANALYSIS AND RESULTS

The analysis of the data in Table 1 shows steady growth in all indicators during 2020–2025. Gross domestic product increased from 668,038.0 to 1,849,650.0 billion soums, representing a 2.77-fold increase, while the annual growth rate remained stable within the range of 106–108%. Deposits of commercial banks increased from 1,735,931.5 to 7,698,129.3 billion soums, representing a 4.43-fold increase, while loans granted increased from 127,207.5 to 389,972.7 billion soums, representing a 3.07-fold increase. The growth rates of deposits and loans exceeding GDP growth reflect the process of financial deepening in the economy—the increasing role of the banking sector in the economic system.

Table 1.
GDP, deposits and loans ratio billion soums[1]

№	Indicators	2020	2021	2022	2023	2024	2025
		annual	annual	annual	annual	annual	annual
1	2	3	4	5	6	7	8
	GDP	**668038,0**	**820536,6**	**995573,1**	**1204485,4**	**1535431,7**	**1849650,0**
	Real growth compared to the previous year, in percent	101,6	108,0	106,0	106,3	106,7	107,7
	attracted deposits	**1735931,5**	**2567152,4**	**3738723,6**	**4481692,0**	**5607221,3**	**7698129,3**
	credits allocated by commercial banks	**127207,5**	**166673,5**	**203126,6**	**251401,5**	**287181,5**	**389972,7**

To quantitatively assess the closeness of the relationship between the indicators, a correlation analysis was conducted using the Pearson correlation coefficient. Table 2 presents the calculation for the GDP–deposits pair, where X is GDP and Y is deposits. The average values were $\bar{X}$ = 1,178,952.5 billion soums and $\bar{Y}$ = 4,304,808.4 billion soums.

Table 2.
Calculating the correlation coefficient between GDP and deposits[2]

Years	$X - \bar{X}$	$Y - \bar{Y}$	$(X - \bar{X})(Y - \bar{Y})$	$(X - \bar{X})^2$	$(Y - \bar{Y})^2$
2020	−510 914	−2 568 877	$1.312 \cdot 10^{12}$	$2.610 \cdot 10^{11}$	$6.599 \cdot 10^{12}$
2021	−358 416	−1 737 656	$0.623 \cdot 10^{12}$	$1.285 \cdot 10^{11}$	$3.019 \cdot 10^{12}$
2022	−183 379	−566 085	$0.104 \cdot 10^{12}$	$0.336 \cdot 10^{11}$	$0.320 \cdot 10^{12}$
2023	25 533	176 884	$0.005 \cdot 10^{12}$	$0.007 \cdot 10^{11}$	$0.031 \cdot 10^{12}$
2024	356 479	1 302 413	$0.464 \cdot 10^{12}$	$1.271 \cdot 10^{11}$	$1.696 \cdot 10^{12}$
2025	670 698	3 393 321	$2.276 \cdot 10^{12}$	$4.498 \cdot 10^{11}$	$11.515 \cdot 10^{12}$
Σ	—	—	$\mathbf{4.784 \cdot 10^{12}}$	$\mathbf{1.001 \cdot 10^{12}}$	$\mathbf{2.318 \cdot 10^{13}}$

Substituting the resulting sums into the Pearson correlation coefficient formula, we obtain:

$$r = 4.784 \times 10^{12} / \sqrt{(1.001 \times 10^{12} \times 2.318 \times 10^{13})} = 4.784 \times 10^{12} / 4.817 \times 10^{12} = 0.9932$$

The correlation coefficients for the remaining pairs of indicators were calculated in a similar manner. The calculation results are as follows: the correlation coefficient between GDP and deposits was $r = 0.9932$; between GDP and loans, $r = 0.9900$; and between deposits and loans, $r = 0.9974$. All the obtained values are close to

1 Author's elaboration
2 Author's elaboration

one, indicating a very high (very close) positive linear relationship between the indicators under consideration according to the Chaddock scale.

Student's *t*-test for statistical significance confirmed the reliability of the obtained results. The calculated value for the GDP–deposits relationship was $t = 0.9932 \cdot \sqrt{4} / \sqrt{(1 - 0.9865)} = 17.11$, and for the GDP–loans relationship, $t = 14.01$. Both values significantly exceed the critical value of the *t*-test at a significance level of 0.01 and 4 degrees of freedom ($t_{cr} = 4.604$). Therefore, the identified correlations are considered statistically significant with a probability of 99%.

The coefficient of determination for the GDP–deposits relationship was $R^2 = 0.9865$, i.e., 98.7% of the change in GDP is explained by changes in the volume of deposits. For the GDP–loans relationship, $R^2 = 0.9800$, i.e., 98.0% of the change in GDP is associated with the dynamics of lending. Such high values of the coefficient of determination demonstrate the significant role of bank intermediation in the dynamics of economic growth.

The equation for the pairwise linear regression of GDP on deposits is: $Y = 290\,593.2 + 0.2064X$, where X is the volume of deposits. The regression coefficient $\beta = 0.2064$ shows that an increase in deposits by 1 billion soums is accompanied by an average increase in GDP of 0.206 billion soums. This reflects the multiplier effect of bank intermediation in the economy.

At the same time, it is important to consider the methodological nature of the interpretation: deposits and loans represent accumulated balances (stocks), while GDP is a flow indicator over an annual period. Therefore, the high correlation primarily reflects the convergence of long-term development trends. The identified stable and statistically significant relationship confirms that the development of the banking system—the growth of the deposit base and the expansion of lending—is closely related to economic growth. This is consistent with theoretical propositions regarding the role of financial intermediation as a factor in economic development and with the results of empirical research by King and Levin.

CONCLUSION AND SUGGESTIONS

This study allowed us to quantitatively assess the relationship between GDP, deposits, and loans issued by commercial banks in the Republic of Uzbekistan. It was found that during 2020–2025, all indicators under consideration showed steady growth: GDP increased 2.77-fold, deposits increased 4.43-fold, and loans increased 3.07-fold, indicating the process of financial deepening in the economy.

Correlation analysis using Pearson's *r* revealed a very high positive correlation between the indicators: $r(\text{GDP–deposits}) = 0.9932$, $r(\text{GDP–loans}) = 0.9900$, and $r(\text{deposits–loans}) = 0.9974$. Student's *t*-test confirmed the statistical significance of these relationships at the 1% level. The coefficient of determination showed that more than 98% of the variation in GDP is explained by the dynamics of deposits and loans, demonstrating the significant role of the banking system in economic growth.

The results obtained demonstrate a close relationship between the development of banking intermediation and economic growth in the Republic of Uzbekistan. To further ensure stable GDP growth, it is advisable to continue the policy of developing the banking system, expanding the deposit base, and increasing lending to the real sector of the economy. Effective financial intermediation is one of the main factors contributing to the country's long-term economic development.

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