



Fusion of Economic and Financial Factors Affecting Household Deposits in Banks: An Econometric Analysis

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Abstract

The examination of commercial bank deposits together with their influencing factors relies on econometric analyses in this paper. The econometric model for commercial bank deposit base factors used a multiple linear regression (LS) method because the data came from time series that included multiple variables. The research used 74 economic indicators spanning an eight-year period and collected those indicators in monthly intervals. The dependent variable was the deposit volume (y), while the independent variables were the inflation rate (x_1), the minimum wage (x_2), the number of individuals using digital banking services (x_3), the average interest rate on term deposits (x_4), and the per capita GDP (x_5). Our analysis, based on data from the Central Bank of the Republic of Uzbekistan, indicates that the selected independent variables are significantly related to the growth of the deposit base. The implementation of multiple linear regression (LS) answered Gauss-Markov assumption tests successfully while the Durbin-Watson test and Shapiro-Wilk test along with the Breusch-Pagan test evaluated the statistical import of the obtained results. The key findings indicate that a 1% increase in the inflation rate leads to a 1.06% decrease in the deposit volume; a 1% increase in the minimum wage results in a 0.32% increase in the deposit volume; a 1% increase in the number of individuals using digital banking services leads to a 0.59% increase in the deposit volume; a 1% increase in the average interest rate on term deposits results in a 0.81% increase in the deposit volume; and a 1% increase in per capita GDP causes a 0.79% increase in the deposit volume. Banks should concentrate their efforts on fighting inflation while developing their digital systems because these strategies build a better deposit base, which boosts interbank rivalry and supports economic stability.

Keywords: Deposits; Household Deposits; Deposit volume; Inflation rate; Average interest rate on term deposits; Minimum wage

1. Introduction

Banks that adopt modern funding attraction methodologies gain increased competitive advantages through public funding acquisition. Commercial banks providing traditional homogeneous services could use incentive methods to gain extra customers because of today's operating conditions. The banking system requires deep reform of its public deposit protection mechanisms because multiple contemporary factors have emerged which demand action. Most of

the initial explanations stem from natural-historical aspects that combine advancing banking procedures along with traditional banking service market competition. The intensifying competition for delivering quality services among banks has become problematic because not every institution can keep up with the expanding core banking services range that resulted from bank establishment activities. Banking operations continue to grow more complex while traditional banking competition increases throughout the industry. The financial market welcomes emerging advanced financial tools that create rigorous work requirements for bank personnel. A bank faces the risk of bankruptcy when inflation changes and markets become unstable because incorrect managerial decisions prove disastrous for the bank operations. Historical conditions determine the second set of reasons that directly affect bank operations through deteriorating external factors. During economic downturns, the probability of non-performing loans rises swiftly because companies face payment challenges. The spread of payment problems from private entities to banking institutions results in severe difficulties faced by many credit institutions. The banks focusing on industrial clients demonstrate high vulnerability to massive losses through non-performing loans. When economies grow business entities and industrial companies found numerous commercial banks to resolve their financial issues but also to access extra financial resources. Banks, which face such pressure, must comply with demands from both shareholders and stakeholders for privileged loan conditions.

Brunnermeier and Sannikov in their research report show that “US banks provide regular deposit options and also offer specialized accounts and term-based funds together with accounts that generate earnings” to their customers through diverse choices [1]. The Central Bank of the Republic of Uzbekistan made a strategic decision to boost commercial bank deposits at least 30% through bank reforms planned for 2024. The Central Bank aims to achieve this goal through consistent deposit account diversity and enhanced public savings collection system for commercial banks. Financial institutions worldwide execute various strategies to build up and enhance public deposits in banking institutions. The banking industry implements multiple strategies to enhance trust in deposit security and acquire market advantages by deploying technology-based solutions for public fund management. The most efficient method to draw depositors involves offering attractive deposit interest rates in the market. Through mobile banking solutions together with online platforms and financial technology tools banks now have an easier way to draw public funds into deposits. The public needs deposit products that enable early withdrawal of term funds while maintaining interest payment without fees thus commercial banks should promote these options. Effective process organization by commercial banks leads to increased appeal of public deposits and greater trust among customers that translates into lasting growth of their deposit base.

Our research evaluates the extent to which the attractiveness and volume of public deposits in commercial banks are linked to several influencing factors. To do this, we utilized comprehensive panel data from 74 monthly observations covering the period from 2016 to 2023. Based on the study of the impact of factors such as the inflation rate, the minimum wage, the number of individuals using digital banking services, the average interest rate on term deposits, and per capita GDP on the volume of public deposits, appropriate conclusions and recommendations have been developed.

2. Related work

The income level of the population develops through individual characteristics alongside economic conditions and social settings in addition to multiple other determining elements. The population's deposit growth strongly depends on increased income levels. Through their research, G.Psacharopoulos and H.A.Patrinios demonstrated that higher education leads to higher earnings in different nations [2]. The education one receives determines their future earning potential through access to properly funded educational facilities staffed by capable educators. Institutions with high reputation provide their students with networks to secure high-paying jobs after completing their studies. The research by D.Card and A.B.Krueger showed that learners who study under educated teachers will later receive higher incomes. Higher education institutions granting quality education directly affect the future money students will earn after graduation [3]. According to D.H.Autor, F.Levy and R.J.Murnane research has shown that the technological developments cause wages to split steeply between workers who possess intricate problem-solving abilities while also requiring advanced technical expertise [4].

Behavioral economics researchers have established key insights that help understand consumer saving behavior. Through mental accounting, researchers introduced new classification systems, which depend on a person's money sources as well as their money goal orientation [5]. Multiple aspects that originate from culture and society powerfully influence spending choices and saving activities. According to G.Hofstede's research, societies that demonstrate high uncertainty avoidance tend to save money as a protection against unknown threats [6]. People frequently modify their financial behavior to fit their social groups because social norms play a role in such decisions. People's financial literacy skills serve as a crucial determining element that guides their decisions between spending and saving choices. Lusardi and Mitchell discovered that well-informed people about finance handle their income better by organizing retirement plans and maximizing higher interest rates on deposit accounts [7]. Educational programs implementing financial literacy instruction potentially lead to major welfare improvements throughout the economy. Matthias Bank

et al. describe public deposits as vital instruments allowing commercial banks to handle liabilities and boost borrowing power while connecting internal goals to external limitations [8].

Inflation negatively affects the population's interest in deposits and the mobilization of deposits, as it sharply reduces the real value of savings, because of which the population stops depositing their money in banks [9]. Inflation directly affects purchasing power and can reduce real income if wage growth does not keep pace with price increases. However, moderate inflation can stimulate spending and economic activity, which can benefit overall income levels [10]. In addition, the income of the population has a strong impact on the level of depositing. Because the high-income level of the population usually leads to an increase in savings and deposits, that is, they want their excess money to generate more discretionary income [11]. Zerihun's research found that "slow deposit growth has a 0.68 percent impact on the future deposit flow of banks, while liquidity has a negative relationship with the growth of deposits by -0.64 percent." This means that having excess liquidity reduces the bank's ability to earn more income [12].

Kiiza & Pederson, in their study, examined several financial factors that affect the population's deposits in banks, and noted that the main factors are the availability of loans to the population, the unattractive interest rates on deposits, and the population's high-income employment [13]. Kochaniak, studying the impact of socio-demographic characteristics on population deposits, uses a logit model to analyze data on population deposits and finds that wealth has a significant impact on the propensity to hold different types of deposits. In particular, high financial and real assets increase the likelihood of having valuable deposits, while low assets reduce this propensity, which indicates the importance of financial factors in deposit stability [14]. James Dow studied how different demographic factors affect population trust in banks. This shows that the study examined specific characteristics (age, income, education, etc.) that may affect the population's trust in banks. It is also important to consider these factors when attracting population deposits [15]. Social security programs are government programs such as unemployment benefits, social insurance, and various subsidies that provide financial assistance, especially to low-income populations, thereby affecting the overall distribution of income [16].

Interest rates are a key factor in attracting deposits from the population. In many commercial banks, interest rates are relatively low, and when real interest rates are below the inflation rate, depositors perceive the possibility of financial losses [17]. As a result, the population is reluctant to make deposits. The level of trust between banks and depositors is sometimes low. In particular, this is due to factors that undermine economic stability, including liquidity problems of banks and the weakness of the deposit guarantee system [18]. When withdrawing deposits, banks are required to receive their deposits on demand or to have short-term liquidity.

The article by Yulia Melnychuk et al. reports that public deposits found by commercial banks act as stable funding sources with low costs while other financial instruments and interbank loans are more expensive [19]. The studied method functions best when applied to commercial banks with substantial financial resources and trained staff since it enables ideal management of their financial framework. Public savings in commercial banks depend on public consumption abilities because these abilities directly affect financial activity [20].

3. Research Methodology

The research methodology section defines the systematic process related to measuring the impact of factors or analyzing hypotheses. It encompasses the overall research design, data collection, and analytical techniques that ensure the replicability and reliability of the study.

3.1. Research Design. The research design uses quantitative methods in an empirical study to evaluate the various factors that influence bank deposit attractiveness and volume from public sources. This study design measures the complex linkages between the volume of deposits and the inflation rate together with the minimum wage level and digital banking user base as well as average term deposit interest rates and per capita GDP [21].

3.2. Data Collection. The research team retrieved its data from the official web page of the Central Bank of the Republic of Uzbekistan located at www.cbu.uz. The statistical data retrieved from the Central Bank of the Republic of Uzbekistan spans a duration of 74 months from 2016 to 2023 in a complete panel format. The dataset contains five variables that consist of the inflation rate as well as the minimum wage along with the digital banking user population count and average term deposit interest rate and per capita GDP statistics.

3.3. Methods. This study utilizes multiple linear regression (LS) methodology because its data take the form of multivariate time series. The researchers conducted diagnostic testing of the multiple linear regression (LS) model after confirming the Gauss-Markov conditions for their econometric analysis by utilizing Durbin-Watson test results alongside Shapiro-Wilk test and Breusch-Pagan test outcomes. Visual diagrams combined with detailed statistical tables provided the econometric study with trend processes analysis among all variables. The research evaluated the connections that existed between each dependent variable and independent variable. Multicollinearity diagnosis occurred in the assessment of the econometric equation through an analysis of correlation matrices between all variables.

In econometric research, multiple regression analysis is a complex statistical tool that extends simple linear models by incorporating several independent variables, thereby providing a more precise understanding of the relationships between variables. According to Martin Schmettov, “in a multiple linear regression model, forecast indicators can be combined to assess their overall impact, which is of significant importance for understanding the complex interrelationships in the data [22].”

The formula for the multiple linear regression (LS) model is presented below:

$$y_t = \alpha_0 + \alpha_1 c_1 + \alpha_2 c_2 + \dots + \alpha_k c_k + \epsilon \quad (1)$$

Here,

y_t - represents the dependent variable;

c_1, c_2, c_3 - denote the independent variables;

α_0 - is the intercept;

$\alpha_1, \alpha_2, \alpha_3$ - are the coefficients of the independent variables;

ϵ - denotes the error term.

In the econometric equation, the factors affecting the deposit volume of commercial banks include the inflation rate, the minimum wage, the number of individuals using digital banking services, the average interest rate on term deposits, and per capita GDP; the interrelationships among these factors have been examined.

All variables in the econometric study were transformed using natural logarithms and are defined as follows:

- Deposit volume of commercial banks – logvol_deposit (dependent variable);
- Inflation rate in the national economy – loginfl_rate (independent variable);
- Minimum wage in the national economy – logmin_wage (independent variable);
- Number of individuals using digital banking services in commercial banks – logdigital_serv (independent variable);
- Average interest rate on term deposits – logdepos_rate (independent variable);
- Per capita GDP – logGDP_per_cap (independent variable).

The hypotheses for the econometric model were formulated as follows:

3.1.1. Null hypothesis (H_0):

The inflation rate, the minimum wage, the number of individuals using digital banking services, the average interest rate on term deposits, and per capita GDP in the national economy do not have a significant impact on the deposit volume of commercial banks.

3.1.2. Alternative hypothesis (H_1):

The inflation rate, the minimum wage, the number of individuals using digital banking services, the average interest rate on term deposits, and per capita GDP in the national economy have a significant association with the deposit volume of commercial banks.

4. Analysis and Results

4.1. In the initial stage of the study, descriptive statistics were generated for all variables.

According to Table 1 below, the descriptive statistics of the model are positive mean values of the dependent and independent variables, with confidence intervals. The outcome variables and their influencing factors have a complete set of 74 observations, which ensures that the data set contains positive conclusions for the next stage of analysis. This indicates the prospects for the development of important conditions in the next stages of the econometric model.

Table 1: Descriptive statistics of dependent and independent variables according to the econometric model

	logvol_deposit	loginfl_rate	logmin_wage	logdigital_serv	logdepos_rate	logGDP_per_cap
Mean	13.36297	7.717761	2.98086	10.75602	11.25897	3.257435
Maximum	14.65535	9.256629	3.883212	13.42886	13.31383	3.730501
Minimum	11.08214	6.792751	2.189416	8.356731	8.827464	2.484907
Std. Dev	1.017672	.7637953	.4018768	1.353555	1.356317	.3770678
Std. Err.	.118302	.0887894	.0467172	.1573475	.1576686	.0438332
Skewness	-.8910484	.8756416	.1724611	-.2527463	-.2091802	-.4543723
Kurtosis	2.577766	2.430623	2.605117	1.969964	1.75993	2.015732
Observation	74	74	74	74	74	74

Source: It was developed by the authors based on Stata software.

According to the study, the graph of dependent and independent variables over time has the following form (Figure 1). According to this Figure 1, during the analyzed period, the volume of household deposits in commercial banks and the factors affecting it formed a strong growth dynamics. According to it, a forecast of the growth trend of these variables in the future was formed. The impact of variables such as the inflation rate in the national economy, the number of users of commercial distance services, and the deposit rate on the direct growth of household deposits in commercial banks can be seen through the graphs.

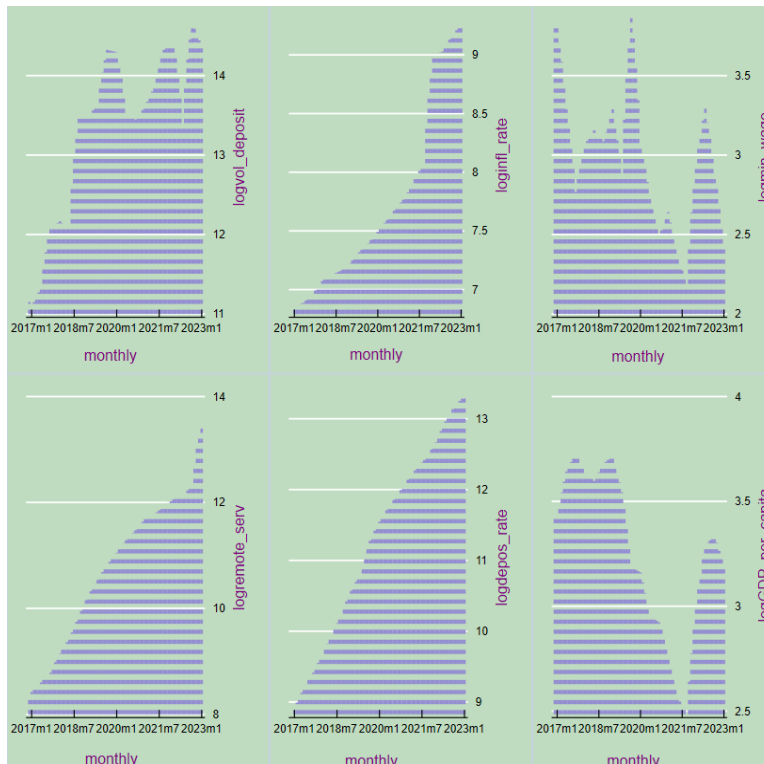


Figure 1. Analytical graphical representation of the volume of household deposits in commercial banks and the factors affecting it over time

Source: It was developed by the authors based on Stata software.

At the next stage, a graphical representation of the relationship (rconnected) of the volume of household deposits in commercial banks and the factors affecting it is presented (Figure 2).

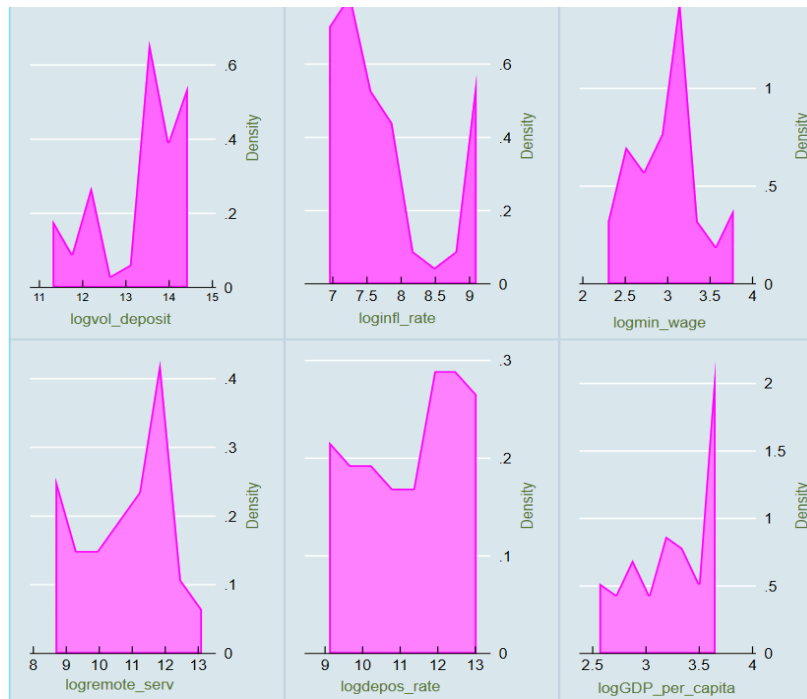


Figure 2. Graphical representation of the analytical relationship (rconnected) between the volume of household deposits in commercial banks and the factors affecting it.

Source: It was developed by the authors based on Stata software.

Figure 2 below shows a graphical representation of the relationship between the volume of household deposits in commercial banks and the factors affecting it. The density of the graph shows peaks with a wide average distribution. GDP per capita in the national economy has a peak with high variability, indicating potential growth opportunities.

According to this figure, peaks and clusters in specific ranges reflect stability in existing economic indicators, as well as explain areas of opportunity for further growth in this process.

Additionally, the peaks of variables indicate that they can serve as a stimulus for further economic development and suggest highly efficient regions or periods. Based on the graphical representation, the deposit rate of commercial banks demonstrates strong effects of transactional practices across a broad range.

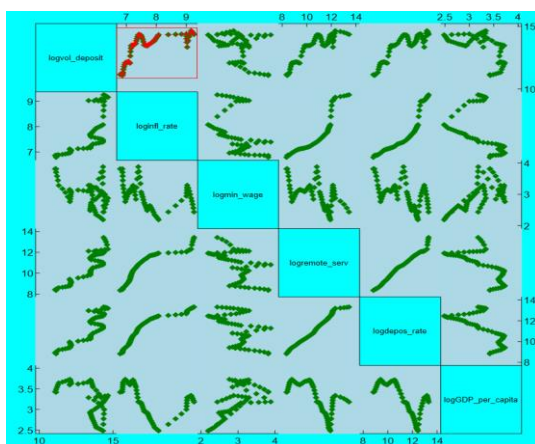


Figure 3. Graphic matrix of the volume of household deposits and factors affecting it

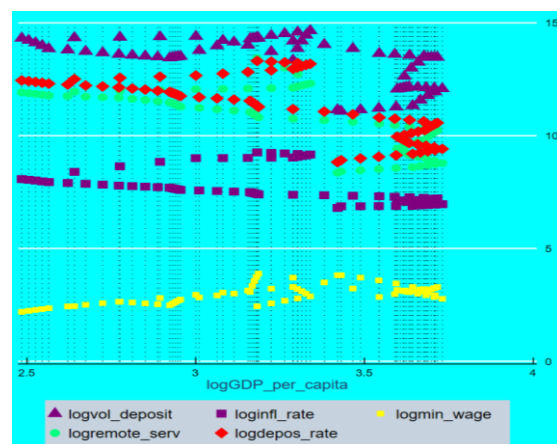


Figure 4. Scatter plot of the volume of household deposits and the factors affecting it

Source: It was developed by the authors based on Stata software.

According to the data in Figure 5, the distribution of the volume of household deposits in commercial banks and the influencing factors is represented, where the x-axis reflects frequency and the y-axis represents the significance of the variable values.

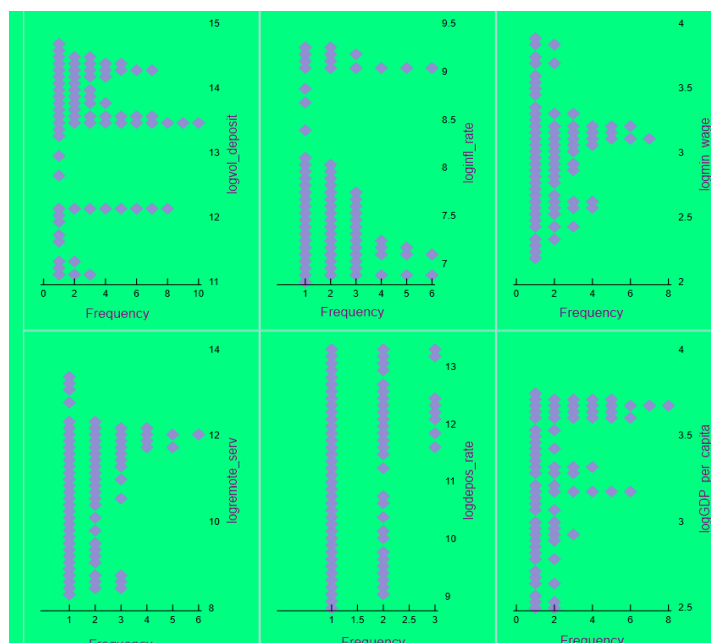


Figure 5. Graphical representation of the frequency distribution of the volume of household deposits in commercial banks and the factors affecting it

Source: It was developed by the authors based on Stata software.

The frequency distribution graph represents the central tendency and spread of values for the variables, reflecting their robust distribution.

At the next stage of the study, a correlation matrix was developed for the volume of household deposits in commercial banks and each of the variables affecting it (Table 2).

Table 2: The correlation matrix of the volume of household deposits in commercial banks and the factors affecting it.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) logvol_deposit	1.000						
(2) loginfl_rate	0.7000 (0.0000)	1.000					***
(3) logmin_wage	-0.3866 (0.0007)	-0.3870 (0.0000)	1.000				***
(4) logdigital_serv	0.8905 (0.0000)	0.8847 (0.0000)	-0.5458 (0.0000)	1.000			***
(5) logdepos_rate	0.8744 (0.0000)	0.9077 (0.0000)	-0.5316 (0.0000)	0.7928 (0.0000)	1.000		***
(6) logGDP_per_cap	-0.5683 0.0000	-0.4785 0.0000	0.6360 0.0000	-0.7016 0.0000	-0.7073 0.0000	1.000	***

Source: It was developed by the authors based on Stata software.

According to the results in Table 2, the relationships between variables demonstrate strong, significant, and inverse correlation linkages. Additionally, the correlation matrix in Table 1 indicates that there is no multicollinearity between the dependent and independent variables. Considering that the p-value is less than 0.05, it can be concluded that the correlation coefficient is reliable and statistically significant.

Using a multiple linear regression (LS) model, an econometric equation was developed to analyze the high-liquidity assets of commercial banks and the factors influencing them (Table 3).

Regression equation indicators:

$$\log\text{vol_deposit}=2.40-1.06\log\text{infl_rate}+0.32\log\text{min_wage}+0.59\log\text{digital_serv}+0.8\log\text{depos_rate}+0.79\log\text{GDP_per_capita}+\varepsilon\quad (2)$$

Statistical significance level. The p-value of all independent variables is less than 0.05, indicating that they exhibit a statistically significant prediction of the volume of household deposits in commercial banks at the 5% significance level.

Table 3: Regression equation indicators on the volume of household deposits in commercial banks and the factors affecting it

logvol_deposit	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
loginfl_rate	-1.068	.172	-6.20	0	-1.412	-.724	***
logmin_wage	.327	.141	2.32	.023	.045	.608	**
logdigital_serv	.596	.29	2.06	.043	.018	1.175	**
logdepos_rate	.819	.348	2.35	.022	.125	1.514	**
logGDP_per_capita	.796	.213	3.74	0	.371	1.22	***
Constant	2.404	1.022	2.35	.022	.364	4.444	**
Mean dependent var	13.363		SD dependent var		1.018		
R-squared	0.882		Number of obs		74		
F-test	102.103		Prob > F		0.000		
Akaike crit. (AIC)	65.158		Bayesian crit. (BIC)		78.983		
*** $p < .01$, ** $p < .05$, * $p < .1$							

Source: It was developed by the authors based on Stata software.

R-squared (0.88): This indicates that the variability in the volume of household deposits in commercial banks can be explained by the model's independent variables with 88% probability, presenting a positive relationship in terms of econometric equation quality.

Based on the hypothesis testing of the regression model, the null hypothesis ($H_0: y=0$) is rejected when $F < 0.05$ and $t < 0.05$, demonstrating that the primary hypothesis ($H_0: y=0$) is statistically insignificant. Furthermore, the main hypothesis was rejected in favor of the alternative hypothesis ($H_1: y \neq 0$), which is statistically significant.

- The inflation rate increases by one percent while deposits from households in commercial banks decrease by 1.06 percent.
- The minimum wage elevation by 1% causes bank commercial deposits from households to expand by 0.32%.
- An additional 1% of digital banking service users produces a 0.59% increase in total deposits.

- An increase of 1% in the weighted average term deposit interest rates drives household commercial bank deposits by 0.81%.

- By increasing per capita GDP by 1% the volume of household deposits in commercial banks increases by 0.79%.

This research performed confidence tests on the multiple linear model that followed Gauss-Markov conditions. For the regression equation: The calculated value from Durbin-Watson test reached 0.23. - Shapiro-Wilk W test resulted in 0.19. The Breusch-Pagan test computed 0.09 as its outcome. The hypothesis testing was conducted with a $p > 0.05$ significance level to evaluate $H_0: y=0$ versus $H_1: y \neq 0$. The acceptance of the null hypothesis stems from the results obtained through Durbin-Watson, Breusch-Pagan, and Shapiro-Wilk tests. The value of $p > 0.05$ demonstrates that independent variables and error terms show no relationship in the analysis, fulfilling Gauss-Markov conditions. The econometric model provides results in accordance with all the essential Gauss-Markov condition requirements.

The VIF test during the research displayed no evidence of multicollinearity across the built model. The VIF test determined that the connection between household deposit levels at commercial banks and their influencing elements reached 7.26. The analysis of multiple linear regression models confirmed the main hypothesis $H_0: y=0$ and $H_1: y \neq 0$ as significant at $p < 10$ though it did not support the alternative hypothesis. The VIF test provided a value below the standard range of 1 to 10, verifying compliance with the Gauss-Markov conditions.

5. Conclusion and Recommendations

The following recommendations stem from the econometric model along with its subsequent findings about how inflation rate and minimum wage interact with remote banking service users and term deposit interest rates and GDP per capita to impact commercial bank household deposits.

5.1. Research shows that household deposit volumes decrease by 1.06% when inflation rates increase by 1%. The volume of deposits falls by 1.06% when the inflation rate experiences a 1% increase. An increase in inflation makes household savings through deposits lose value in real terms that leads people to decrease their savings. The control of stable low inflation exists as a vital condition for increasing savings among the population. Accessibility of inflation control strategies by commercial banks serves to keep their deposits stable.

5.2. An examination shows that when minimum wage rises by 1% the amount of household deposits increases by 0.32%. When minimum wage increases by 1% the bank-deposits volume grows by 0.32%. The rise in minimum wage payments produces positive impacts on bank deposits because workers earn more, which results in an increase of saved funds. Government initiatives, which boost income particularly among low-income strata, create conditions for increased bank deposits growth.

5.3. The analysis demonstrates that increased numbers of digital banking service users drive up household deposits. The deposit volume grows by 0.59% when digital banking service utilization expands by 1%. Digital banking infrastructure adoption creates positive effects on the mobilization of bank deposits. Digital banking infrastructure needs sufficient investment alongside digital solutions for financial participation to achieve their full potential.

5.4. Research reveals that when interest rates rise household deposits grow by 0.81% percent. Term deposit rates influencing interest rates by 1% yield a corresponding 0.81% increase in deposits across the banking industry. The improvement of term deposits interest rates acts as a motivating factor for people to boost their savings. Commercial banks need to set attractive deposit rates to grow their savings portfolio when they experience low liquidity.

5.5. The analysis reveals that per capita GDP affects household deposit levels by 0.79%. Each 1% rise in household per capita Gross Domestic Product results in an 0.79% larger amount of deposits put into the system. A growing economy and each person earning more money will result in increased savings performance. Higher economic conditions throughout the country drive savings levels to grow. Strategies to elevate GDP and household income will positively influence the development of deposit funds.

5.6. The bank will achieve higher household deposit volumes by expanding digital banking operations with attractive interest rates to attract online deposits. Online deposits provide customers with convenient banking options whereas attractive interest rates generate increased banking deposits, which eventually fulfill the requirement for lending resource allocation.

5.7. An inflation stabilization approach alongside wage growth will serve as a basis to enhance deposit collection. Banking institutions must collaborate with government entities and Central Bank administration to execute proper fiscal strategies for resolving this particular issue.

5.8. Financial growth alongside enhanced public knowledge about money management creates better saving habits. Many people refrain from online deposit usage even though banks operate several incentives such as excellent interest rates on digital deposits versus traditional deposits. Additional measures are essential to boost financial literacy because the current results suggest inadequate public financial knowledge exists.

By adhering to these recommendations, Uzbekistan's commercial banks can accelerate the growth of household deposits, ensure a stable and continuously expanding deposit base that contributes to economic stability, widely utilize digital technologies in attracting household deposits, and enhance the competitiveness of banks in the economy by regulating inflation.

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