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Econometric Modeling of the Stability of Assets and Liabilities of the use of Innovations in the Banking System

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Abstract: The article highlights the urgency of introducing the bank innovation index in the banking system of Uzbekistan, analyzes the factors affecting the efficiency of commercial banks, as a result of which the bank innovation index was formed. In the development of the bank innovation index, correlation analysis and analysis of one-factor regression equations were carried out, and the calculated bank innovation index was expressed through a multi-factor regression equation.

The bank innovation index was forecast based on the above model, and pessimistic, programmatic and optimistic forecasts were used in the forecasting process. The created model confirmed that the increase in the share of private banks in bank assets has a positive effect on the bank innovation index, which in turn depends on encouraging the use of innovations in the management of bank assets and liabilities by the private sector. It was concluded that the purpose of developing the bank innovation index of commercial banks is to increase deposits and loans in banks and increase the efficiency of the banking system, which in turn contributes to economic growth.

Key words: innovation index, methodology, commercial banks, ATM, method, BII, GDP.

Introduction. There is no single methodology for evaluating the innovative approach of banking activities by international financial organizations. However, countries such as Great Britain and South Africa maintain a national financial innovation index. There is a component of evaluation of innovations in banking activity in the maintenance of these indices.

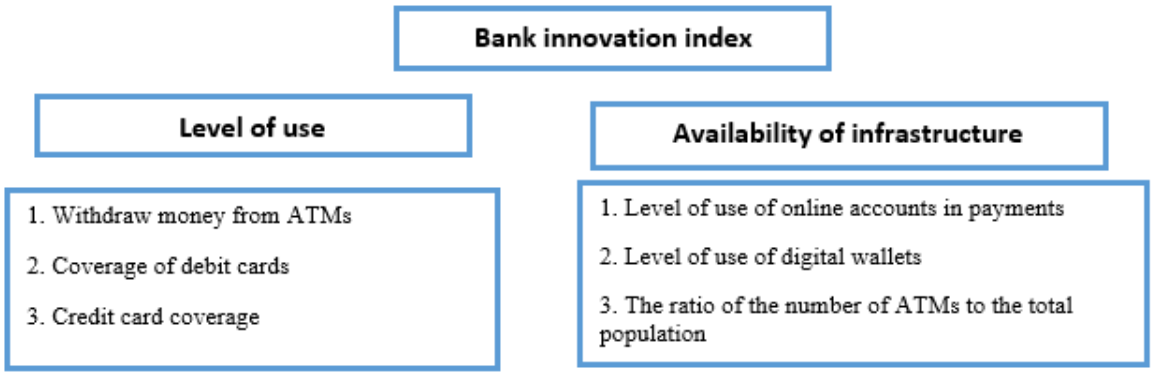

Figure 1. Bank innovation index [1].

Based on the world experience, the banking system innovation index was developed in this study. In the development of this index, (1) indicators of the level of use of innovative products in the banking system and (2) indicators of the availability of the innovative infrastructure of the banking system are calculated (Figure 1).

[1] Author development.

Also, the World Bank monitors the indicators of financial inclusion and implements a system of additional indicators. Based on this system of indicators, an index of the use of innovations in the banking system was developed in the study.

The level of use component of the BII used indicators of the state of operation of the existing infrastructure and its use by the population.

1. The indicator of cashing out of ATMs, what percentage of the population under 15 years of age use cashing out of ATMs.

2. Coverage of debit cards - this indicator represents what percentage of the population under 15 years of age uses debit cards. The main purpose of using this indicator in the study was to evaluate the confidence of the country's population in the banking system and their ability to put their money in bank deposits in the short, medium and long term.

3. Coverage of credit cards - this indicator represents what percentage of the population under 15 years of age uses credit cards. The main purpose of using this indicator in the research is to evaluate the quick allocation of loan funds provided by banks to the population in the country.

The indicators used in the infrastructure component of the Bank Innovation Index are close to the utilization level component. In addition, by many researchers, the term infrastructure takes into account the general infrastructure in the country. However, in this study, the availability of the package of services provided by the banks in the conditions of the availability of the infrastructure is considered to represent its infrastructure. The following indicators are used in this component:

1. Level of use of online accounts for payments - represents the level of use of online purchases or payments by the population over 15 years of age. This indicator, on the one hand, represents the level of financial literacy of the population, and on the other hand, it shows that the banking system has created the necessary infrastructure for the population to make calculations via the Internet.

2. The level of use of digital wallets - showing the level of use of digital wallets by the population over 15 years old, the banking system represents the existence of the necessary infrastructure for the use of digital wallets by the population.

3. The ratio of the number of ATMs to the total population - this indicator is an elementary indicator of the banking infrastructure and thus shows the coverage of the population with ATMs.

This indicator differs from BII's usage-level ATM withdrawal indicator in that it measures the performance of AMTs at the usage level, while the ratio of ATMs to the total population represents their coverage.

Research methodology. In order to develop the bank innovation index in Uzbekistan and determine its forecasts, we will analyze the factors affecting the bank innovation index and the impact of the bank innovation index on the economy of the country. Numerous studies have shown that the existence of competitive and infrastructural environment plays a key role in the implementation of the innovative approach in all aspects of the country.

Results and analysis of the study. The method of calculating proxy indicators was used to calculate the bank's innovation index.

Based on the above-mentioned studies, each component of the bank innovation index is expressed in percentages, given the same weight and calculated using the following formula.

$$BII = \frac{1}{6} * Use_{atm} + \frac{1}{6} * Debtcard + \frac{1}{6} * Creditcard + \frac{1}{6} * Intpay + \frac{1}{6} * Electpay + \frac{1}{6} * Cover_{atm}$$

The BII varies between 0 and 100, and a higher index indicates a higher level of banking innovation in the country.

The BII was calculated for 96 countries using data from a 2017 post-survey using the World Bank's Financial Inclusion Indicator System.

BII is the highest in Singapore, Latvia, and Estonia (59 on average) was the lowest in Myanmar, Congo, Iraq and Bangladesh (2.8 on average).

In addition, this indicator was 47% in the group of high-income countries, 28% in the upper group of middle-income countries, 16% in the lower group of middle-income countries, and 9.4% in low-income countries. It can be seen that the indicator is consistent with the economic development of the country (Figure 2).

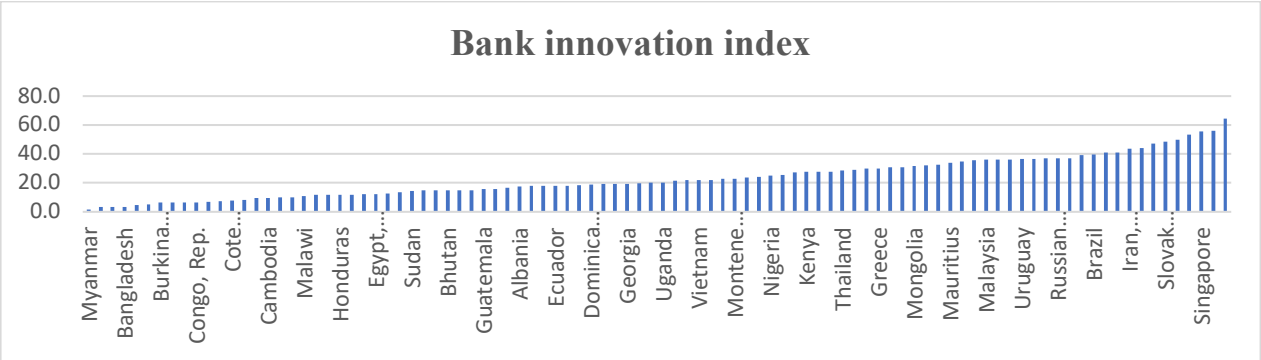

Figure 2. Bank innovation index [2]

In order to increase the applicability of the calculated bank innovation index, the research evaluates, firstly, the factors affecting the bank innovation index, and secondly, the impact of the bank innovation index on the country's economy.

Research results of a number of international financial organizations and researchers show that competition is the main factor in the development of bank innovation. That is why the bank innovation index is evaluated through the indicator of the state's share in the banking system. At the next stage, an increase in the innovation index should lead to an increase in deposits and loans in banks. That is, the efficiency of the banking system increases. This in turn leads to economic growth. Based on this, the following hypotheses are put forward in the research.

1. The increase of the private sector in the banking system increases the bank innovation index;
2. An increase in the bank innovation index increases deposits and loans in banks;
3. An increase in the bank innovation index increases the efficiency of financial intermediation (subtracting the loan and deposit percentage);
4. An increase in the bank innovation index leads to a decrease in bad loans in the banking system;
5. An increase in the bank innovation index increases the flow of investments in fixed capital;
6. An increase in the bank innovation index leads to an increase in GDP per capita.

Pessimistic forecast results. According to the results of the research, the main factors in the model of multi-factor bank innovation index are the share of state banks in bank assets, GDP per capita and bank efficiency index. In this version of the forecast, the share of state banks in bank assets will remain unchanged at the level of 68 percent, the GDP per capita will have an inertial growth trend and its volume will reach 68 percent by 2026, and the financial efficiency indicator will be around the current level of 6.6 percent (6.2 percentage) is taken into account.

[2] It was developed based on the author's calculations.

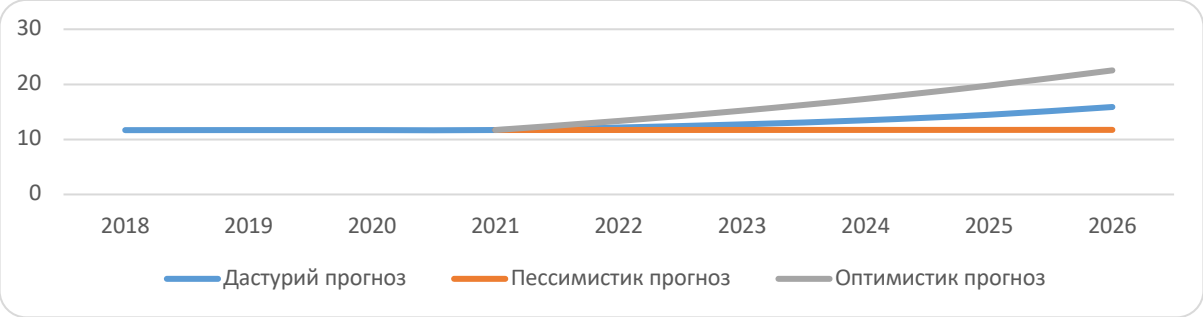

Figure 4. Is a variant forecast of the innovative banking index [3]

As a result, the bank innovation index is predicted to remain unchanged from 11.7% in 2021 to 11.73% in 2026. As a result, it is estimated that the ratio of bank assets to GDP will remain at the level of 2018 and make 55.1 percent.

Optimistic forecast results. In this version of the forecast, the share of state banks in bank assets will decrease from 68 percent to 22.5 percent by 2026, GDP per capita will have high growth rates and its size will reach 4,000-45,000 dollars by 2026, and the financial efficiency indicator will be medium according to the classification of countries of the World Bank. being at the level of the high group of income countries (4 percent) was taken into account.

As a result, the bank innovation index is predicted to be 11.53 percent by 2026 from 11.7 percent in 2021. As a result, it is estimated that the ratio of bank assets to GDP will remain at the level of 2018 and make 57 percentДастурий прогноз натижалари.

This forecast was implemented on the basis of the goals set in the New Development Strategy of Uzbekistan, approved by the Decree of the President of the Republic of Uzbekistan No. PF-60 of January 28, 2022. According to it, the share of state banks in bank assets will decrease from 68 percent to 40 percent by 2026, GDP per capita will have high growth rates and its volume will reach 2800-2900 dollars by 2026, and the financial efficiency indicator will be at the level of 5 percent.

As a result, the bank innovation index is predicted to increase from 11.7 percent in 2021 to 15.9 percent in 2026. As a result, it is estimated that the ratio of bank assets to GDP will remain at the level of 2018 and make 56 percent.

Table 3. Bank innovation index and key economic indicators index forecast

Indicator name	2018й.	2019й.	2020й.	2021	2026
Software forecast					
Bank innovation index	11,68	11,69	11,69	11,70	15,88
State share in bank assets	68	68	68	68	40
GDP per capita	1 597	1 784	1 749	1 983	2 800
Financial performance	7,2	7,2	6,6	6,5	6,2
Share of bank assets in GDP	55,1	52,7	53,3	53,6	55,1
Pessimistic forecast					
Bank innovation index	11,68	11,69	11,69	11,70	11,73
State share in bank assets	68	68	68	68	68
GDP per capita	1 597	1 784	1 749	1 983	2 500
Financial performance	7,2	7,2	6,6	6,5	5,5
Share of bank assets in GDP	55,1	52,7	53,3	53,6	55,0
An optimistic forecast					
Bank innovation index	11,68	11,69	11,69	11,70	22,52
State share in bank assets	68	68	68	68	22,3

[3] It was developed based on the author's calculations.

GDP per capita	1 597	1 784	1 749	1 983	4 500
Financial performance	7,2	7,2	6,6	6,5	4,3
Share of bank assets in GDP	55,1	52,7	53,3	53,6	55,2

Conclusions and proposals.

The bank's innovation index was formed, the level of use of indicators close to infrastructure components was evaluated. In the study, the bank innovation index was determined based on the following hypotheses: an increase in the private sector in the banking system increases the bank innovation index, an increase in the bank innovation index increases deposits and loans in banks, an increase in the bank innovation index increases the efficiency of financial intermediation (subtracting the percentage of deposits from loans), an increase in the bank innovation index increases the bank leads to a decrease in bad loans in the system, an increase in the bank innovation index increases the flow of investments in fixed capital, an increase in the bank innovation index leads to an increase in GDP per capita.

Based on the above, the bank innovation index is forecasted. In the process of forecasting, pessimistic, programmatic and optimistic forecasts were used.

The results of the analysis show that the researched bank innovation index is mainly influenced positively by the increase in the share of private banks in bank assets, which in turn shows that the private sector encourages the use of innovations in the management of bank assets and liabilities. As can be seen from the results of the pessimistic forecast, the influence of the private sector's share in the banking system on the bank's innovation index is almost non-existent despite economic growth rates.

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