

## ANALYSIS OF FINANCIAL STABILITY TO THE BANKING SYSTEM AND ASSESSMENT LEVEL INFLUENCE OF INNOVATIVE TECHNOLOGIES

Yulia O. Shumeiko<sup>1</sup>, Larysa L. Hrytsenko<sup>2</sup>, Katherina A. Daher<sup>3</sup>

*The transition of the banking system to innovative technologies is one of the main elements of maintaining the economic system and financial relations. The importance of the digitalization process is growing in an uncertain environment, in which the rationality and efficiency of its application significantly affects the stability of the financial system and increases the mobility of uninterrupted transaction operations for the formation of savings and their further investment. The study reveals the application of the latest technologies in the financial sector and outlines their impact from the point of view of rating assessments. The main results of the activities of financial institutions under martial law are characterized. The pace of implementation of digital strategies in the domestic banking sector and in comparison, with foreign companies is revealed. The dependence of financial stability of banking institutions on the speed of adaptation to changes in the external environment, as well as orientation to the needs of consumers and responsiveness to customer requests is substantiated. It is proved that the position of the bank in the reliability rating is associated with the successful implementation of innovative and information technologies, as well as the ability to apply them competently. The study proves that the role of banking innovations remains significant under different conditions and at different stages of the economic cycle.*

**Keywords:** financial stability, banking system, innovations technologies, economy, digital.

**JEL Classification:** G21, G24

**Introduction.** New opportunities associated with the use of modern technologies by financial institutions are of great importance for the population. Their use is aimed at facilitating, accelerating, improving the process of obtaining financial products and services and leads to an increase in the viability of banking institutions. It is the stability of banking institutions that determines the relevance of this study, which aims to diagnose the determination of bank positions by rating agencies through the development and use of modern innovative and information technologies.

**Problem statement.** The efforts to study the problem of financial stability were made by X. Hempel, A. V. Coleman, D. J. Simonson, T. M. Havrileschi, P. S. Rose, E. J. Dolan, R. J. Campbell, C. D. Kempb, R. L. Miller et al. In their works, they explored and substantiated the role of modernization of financial processes in ensuring the viability of the banking system, focusing on the risk of bank failure and possible effective ways to manage it.

It should be noted that the results of the study were based on the peculiarities of the legislation on the formation of the banking system, methods of its regulation and the specifics of financial reporting, which take place in countries with developed economies.

The **article is aimed** at analyzing the indicators of financial stability of the banking system of Ukraine as a result of the impact of innovative technologies.

**Research methods.** To achieve the set goal and solve the formulated tasks, general scientific and special methods of cognition were used: analysis and synthesis – to determine the essence of the concept of "financial stability of the bank"; graphical method and method of building analytical tables – for visual presentation of the research results; cluster analysis – to determine the ratings of Ukrainian banks based on sound software.

**Results of the research.** Currently, in the conditions of uncertainty of financial stability of the economy and the growing need for funds, there is a need to improve the ways to identify the viability of the banking system, its stability and efficiency in the market.

Analyzing the legislation of Ukraine in order to derive a unified approach to defining the essence of the term "financial stability of the bank", it can be stated as follows: "the state of the bank, which is characterized by balanced financial flows, sufficient funds to maintain its solvency and liquidity, as well as profitable activities. The financial stability of the bank is understood as the constant ability of the bank to meet its obligations and ensure profitability at a level sufficient for normal functioning in a competitive "environment" [1].

The banking sector of Ukraine is going through quite difficult times. During 2018–2019, it demonstrated quite high resilience and stability. However, the period of the

<sup>1</sup> Yulia O. Shumeiko, Student at the Academic and Research Institute of Business, Economics and Management, Sumy State University

<sup>2</sup> Larysa L. Hrytsenko, Dr.Sc. (Economics), Professor, Head of the Department of Financial Technologies and Entrepreneurship, Sumy State University

<sup>3</sup> Katherina A. Daher, C.Sc. (Pedagogical), Associate Professor, Assistant Professor at Business School, Lebanese International University, Beirut, Lebanon

coronavirus crisis, and now martial law, has forced it to show flexibility to external shocks.

With the beginning of the full-scale invasion of the aggressor country in the banking market of Ukraine, the consequences of military actions and the introduction of reactive measures of the NBU, which affected the reduction of the loan portfolio and reduced profitability, are clearly visible.

Demand for credit resources from households declined. Improved government programs have significantly increased lending to corporations. The outflow of foreign currency from households' accounts leads to an increase in the amount of hryvnia funds on demand.

In the first quarter of 2022, the net loss of the banking system amounted to UAH 7.426 billion. During the second and third quarters of 2020, the banking sector remained operationally profitable, in particular due to cost cuts and the active use of mobile services in its work. Currently, the main challenge for the banks' profitable activity is losses from the deterioration of the loan portfolio quality, which led to an increase in significant deductions to reserves and resulted in a loss of UAH 4.5 billion in the second quarter, UAH 4.6 billion – since the beginning of the year.

It should be noted that the banks that did not introduce innovative mobile services into their activities were the least resistant to external shocks. As a result, the number of loss-making banks in the first half of 2022 amounted to 24 institutions [2].

Analyzing the research of the NBU and national financial institutions and international centers, where the assessment of financial stability based on stress testing was conducted, it can be noted that before the onset of economic destabilization the largest banks of Ukraine passed this test. The results are based on the analysis of 29 banks, which account for over 90% of the total assets of the entire banking system. It can also be confirmed that

during the analyzed period, namely 2019, the leaders of financial stability were banks with foreign capital, namely: Raiffeisen Bank, Credit Agricole Bank and Ukrsibbank [3].

In turn, the own research of banks' reliability was conducted by the rating agency "Forinsurer" on the basis of the NBU reports, official statistics of banks and expert estimates.

When compiling the rating of the largest Ukrainian banks (Table 1), their ability to repay deposits in time in case of problems with loan repayment and growth of customer debt, as well as the level of support from shareholders and the state was taken into account.

It should be emphasized that the factor of the owner in terms of replenishment of capital and liquid resources, which is the basis of stability in stressful conditions, is significant. That is, banks owned by the state or international financial holdings are recognized as stable.

The analytical indicators of the five most stable domestic banks and their ratings are evaluated (table 2) during 2022 according to the MIND rating study. The general level of the banking system is 3.37, which is an indicator of low stability of banks [4].

Judging by the above indicators, it can be concluded that there is a significant share of bad debts, which negatively affects the rating. This situation indicates the difficult financial condition of the borrowers during the analyzed period.

Thus, analyzing Table 2, it can be noted that due to 8 indicators, the Rating agency determines the level of viability, and evaluating the data presented, it can be indicated that the return on assets and financial leverage and capital adequacy suffer the most, that is, the unfavorable processes of 2022 affected the bank's profitability. In turn, the interest spread demonstrates absolute compliance with high criteria and increases the level of bank sustainability [4].

**Table 1 – Rating of the most reliable banks in Ukraine in 2021**

<b>Position in the rating</b>	<b>Rating of the most reliable banks in Ukraine in 2021</b>	<b>For individuals</b>	<b>For legal entities</b>
1	Raiffeisen Bank Aval (Austria)	PrivatBank (state-owned)	UkrGasbank (state-owned)
2	Credit Agricole Bank (France)	Oschadbank (state, guaranteed 100% of deposits)	Ukreximbank (state, guaranteed 100% of deposits)
3	Ukrsibbank (BNP Paribas Group, France)	Ukreximbank (state, guaranteed 100% of deposits)	Oschadbank (state, guaranteed 100% of deposits)
4	PrivatBank (state-owned)	UkrGasbank (state-owned)	Raiffeisen Bank Aval (Austria)
5	Oschadbank (state, guaranteed 100% of deposits)	Raiffeisen Bank Aval (Austria)	Credit Agricole Bank (France)
6	Ukreximbank (state, guaranteed 100% of deposits)	Ukrsibbank (BNP Paribas Group, France)	Ukrsibbank (BNP Paribas Group, France)
7	Kredobank (PKO Bank Polska, Poland)	Kredobank (PKO Bank Polska, Poland)	Citibank Ukraine (Citigroup, USA)
8	UkrGasbank (state-owned)	ProCredit Bank (Germany)	Kredobank (PKO Bank Polska, Poland)
9	OTP Bank (Hungary)	OTP Bank (Hungary)	ProCredit Bank (Germany)
10	ProCredit Bank (Germany)	Pravex-bank (Intesa Sanpaolo, Italy)	ING Bank Ukraine (ING Group, the Netherlands)

Source: compiled by the author based on [3]

Table 2 – Top 5 most stable banks in Ukraine according to the MIND rating in 2022

FINANCIAL ANALYSIS	Ukrsibbank		Raiffeisen Bank Aval		PrivatBank		Citibank		Credit Agricole Bank	
	%	□	%	□	%	□	%	□	%	□
Return on assets	1.63	3	0.88	3	2.65	3	1.27	3	0.1	3
Return on equity	14.1	4	7.8	4	17.59	4	14.21	4	1	3
Instant liquidity	12	5	15.43	5	9.63	4	8.78	4	9.76	4
Capital adequacy	11.56	3	11.24	3	15.07	4	8.93	2	10.1	3
Percentage spread	13.17	5	8.25	5	21.88	5	15.89	5	7.24	5
Problem loans	5.34	4	5.85	4	67.54	1	18.42	3	4.88	5
Leverage	13.07	3	12.66	3	17.74	4	9.8	2	11.24	3
Owners risks	5	5	5	5	4	4	5	5	5	5
Overall rating	4,5		4,5		4,5		4,5		4.0	

Source: compiled by the author based on [4]

Table 3 – Top 10 most stable banks in Ukraine according rating the Ministry of Finance in 2022

№	Bank	Overall rating	Stress resistance	Loyalty	Evaluation analysts	Place in the ranking
1	Raiffeisen Bank Aval	4.05	3.8	4.3	4.26	3
2	Ukrsibbank	3.9	3.7	3.9	4.26	7
3	Credit Agricole Bank	3.83	3.8	3.7	4.19	11
4	PrivatBank	3.81	3.3	4.1	4.33	1
5	OTP Bank	3.62	3.7	3.3	4.04	10
6	Kredobank	3.61	3.6	3.6	3.67	12
7	Ukreximbank	3.56	3.3	3.8	3.81	8
8	Procredit Bank	3.41	3.2	3.5	3.67	16
9	Oschadbank	3.35	2.4	4.2	4.04	2
10	Ukrasbank	3.28	3	3.4	3.81	9

Source: compiled by the author based on [5]

Comparing the ratings given in the previous tables, it can be concluded that the most stable positions are occupied by banks with foreign capital, in particular, they are headed by Raiffeisen Bank Aval. This is evidenced by Table 3, compiled according to the rating assessment of the Ministry of Finance of Ukraine.

Analyzing the list of banks, starting from the second position in the rating, there is a discrepancy between the distribution by rating agencies in the analyzed tables. This situation arises due to the use of different assessment methods by each of the agencies.

A big problem now is the general decline in business activity during the instability of economic processes (pandemic and martial law) and the fall in demand for loans and banking services, which negatively affected the interest and commission income of banks, however, the recovery of commission income and the return of banks to profit was carried out at the expense of non-cash transactions. That is, banks did not worsen their condition solely due to the applications developed by them.

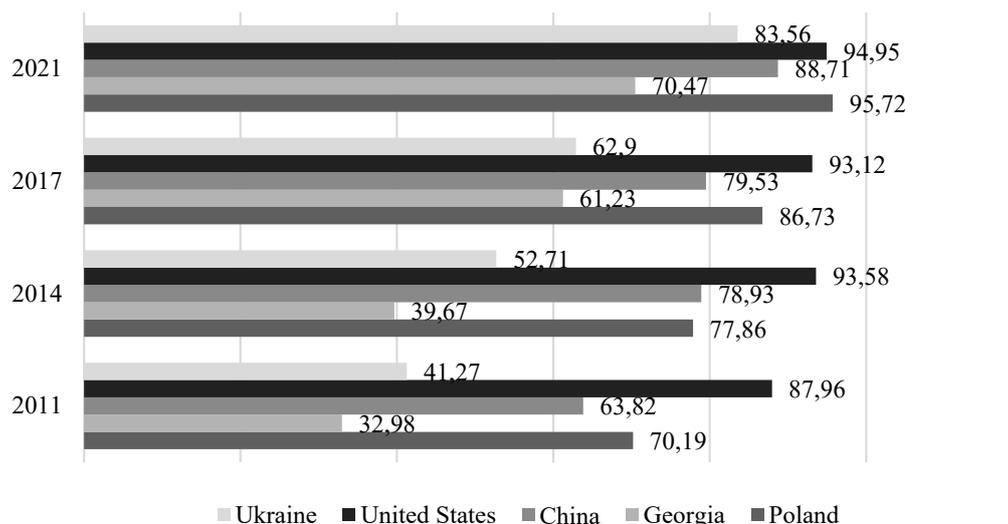
In order to more clearly highlight the level of digitalization of the banking sector of Ukraine, let us compare the indicators of the level of penetration of innovative technologies with other countries based on the data of Global Financial Inclusion [6].

Based on the indicators developed by the World Bank (Global Findex) to measure the use of innovative technologies, the percentage ratio is calculated in Fig. 1.

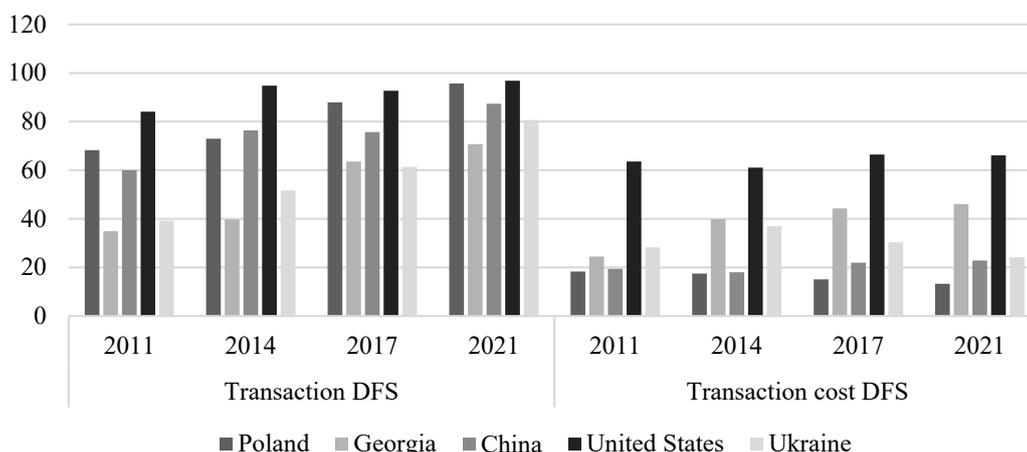
Evaluating the above data, it can be concluded that Ukraine, although increasing the level of customer involvement in digital banking, but in comparison with the developed countries of the world, Ukraine occupies a low position. This situation is due to the slow pace of transition to modern technologies in the banking sector, the high cost of innovation and consumer distrust in the digitalization process.

Analyzing the DFS transactions (by volume) to the registered account, it is possible to trace positive dynamics in all represented countries (Fig. 2), i.e., the level of use of modern financial services demonstrates the confidence of customers in these developments. The leader is the USA, where the process of transformation of services is the most advanced and 97% of financial transactions are carried out through accounts.

It should be noted that Georgia made a leap in the transition to cashless payments due to the backwardness of the banking infrastructure. After all, 20% of the adult population of this country by 2015 were deprived of access to banking services: there are only 55 ATMs and eight bank branches per 100 thousand people – this is five times less than in the United States.



**Figure 1 – Percentage of active Digital Financial System accounts during 2011–2021, %**  
 Source: compiled by the author based on [6]



**Figure 2 – The level of transactions made through financial technology services and their cost during 2011–2021, %**

Source: compiled by the author based on [6]

It should also be pointed out the Chinese innovative progress. According to the laws of the PRC, foreign banks cannot conduct their activities in the country, which negatively affected the development of bank cards. Instead of conventional plastic cards, the government introduced multifunctional smart cards, and as a result, an increase in transactions by 28%.

As for the value of DFS operations, every year the accounts were created faster than the volume of operations, as indicated by the decrease in 2021 compared to 2011.

Evaluating the position of Ukraine in relation to the analyzed countries, it can be noted that the level of penetration of innovative technologies, although lagging behind compared to developed countries, but due to the crisis, has a positive trend.

Attention should be paid to the peculiarities of innovative technologies in the European banking sector.

Their main difference from Ukrainian banking is that about half of the best innovative models found in mobile applications of European banks have no direct analogues in Ukraine – mainly due to the peculiarities of the development of European online banking.

For example, thanks to the payment account directive (PAD) in the mobile bank of the British Starling, it is possible to initiate a paperless process of transferring funds from another bank, in most of the studied applications of German banks it is possible to connect to the account management of customers of other banks [7].

A radical difference of European digital banking (including mobile banking applications) is that payment for services is made by direct debiting of funds from suppliers (direct debit).

Since 2019, banks and payment services in Europe have been actively switching to 24/7/365 instant transfers – the system in the Pay by Bank application already works

in the Pingit application from Barclays. Such processing speed allows using bank transfers as an alternative to card transfers when paying in online stores and in the future can be used for offline purchases [8].

Thus, the analysis of the use of modern innovative and information technologies by financial institutions allows us to identify the main trends in this process:

- 1) giving sluggishness to the population to remotely operate their calculations;
- 2) activation of credit and deposit operations;
- 3) facilitating the transition of banks to the individualization of their services in relation to customers;
- 4) transition of the bank's clients to a more rational distribution of their own funds during transactions;
- 5) growth of investment activity of clients as private investors;

6) increasing the level of financial literacy of the population.

**Conclusion.** Taking into account the difficult situation with the banking sector during the recent period, the financial stability of the system, although slightly deteriorated, remains at a stable level, the active transition of banks to remote work and the growth of digitalization of business processes helped the banking system not to weaken its viability in the face of economic turbulence.

Therefore, in forecasting the post-war development of Ukraine's economy, its financial stability and modernization, in particular of the banking sector, should take a leading place, but the recovery should be based on improved principles of interaction with regulatory institutions and external investors. These issues require deeper study and are the subject of further research.

#### REFERENCES:

1. Financial Stability of the bank. Available at: [https://bank.gov.ua/control/uk/publish/article?art\\_id=123698](https://bank.gov.ua/control/uk/publish/article?art_id=123698).
2. Trends in the banking sector. National Bank of Ukraine. – 2022. Available at: <https://attachment/u/0/?ui=2&ik=be14533d23.&attid=0.6&permmmsgid=msgf:1689525937216221413&th=177266e36e94f0e5&view=att&disp=inline&realattid>.
3. Reliability rating of Ukrainian banks 2022. Available at: <https://forinsurer.com/rating-banks>.
4. Mind Ranking Technique. Available at: <https://mind.ua/banks/rating>.
5. Bank Resilience Rating. Available at: <https://minfin.com.ua/ua/banks/rating>.
6. Data Extract From Global Financial Inclusion. Available at: [https://www.academia.edu/34003256/Data\\_Extract\\_From\\_Global\\_Financial\\_Inclusion](https://www.academia.edu/34003256/Data_Extract_From_Global_Financial_Inclusion).
7. Mobile Banking Review Europe «Marksw Webb». 2021. Available at: <https://marksw Webb.ru/upload/iblock/4c9/4c9b21a-147b3854e45ee92b08c5dc3a.pdf>.

#### СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ:

1. Фінансова стійкість банку. URL: [https://bank.gov.ua/control/uk/publish/article?art\\_id=123698](https://bank.gov.ua/control/uk/publish/article?art_id=123698).
2. Тенденції банківського сектору. Національний Банк України. 2022. URL: <https://attachment/u/0/?ui=2&ik=be14533d23.&attid=0.6&permmmsgid=msgf:1689525937216221413&th=177266e36e94f0e5&view=att&disp=inline&realattid>.
3. Рейтинг надійності банків України 2022. URL: <https://forinsurer.com/rating-banks>.
4. Методика рейтингу Mind. URL: <https://mind.ua/banks/rating>.
5. Рейтинг стійкості банків. URL: <https://minfin.com.ua/ua/banks/rating>.
6. Data Extract From Global Financial Inclusion. URL: [https://www.academia.edu/34003256/Data\\_Extract\\_From\\_Global\\_Financial\\_Inclusion](https://www.academia.edu/34003256/Data_Extract_From_Global_Financial_Inclusion).
7. Mobile Banking Review Europe «Marksw Webb». 2021. URL: <https://marksw Webb.ru/upload/iblock/4c9/4c9b21a-147b3854e45ee92b08c5dc3a.pdf>.

## АНАЛІЗ ФІНАНСОВОЇ СТІЙКОСТІ БАНКІВСЬКОЇ СИСТЕМИ ТА ОЦІНКА РІВНЯ ВПЛИВУ ІННОВАЦІЙНИХ ТЕХНОЛОГІЙ

Юлія Олександрівна Шумейко<sup>1</sup>, Лариса Леонідівна Гриценко<sup>2</sup>, Катерина Анатоліївна Дахер<sup>3</sup>

*У статті здійснено аналіз рівня фінансової стійкості банківської системи у період кризових явищ. Дослідження проведено за допомогою даних найбільш відомих рейтингових агентств, базуючись на звітності НБУ, офіційній статистиці банків та експертних оцінках. В процесі здійснення рейтингування основними критеріями оцінки виступили: рентабельність активів та власного капіталу; рівень миттєвої ліквідності та фінансового левериджу; частка проблемних кредитів; ризики власників та рівень загальної стресостійкості. В ході дослідження виявлено, що основними проблемами є загальне зниження бізнес-активності під час карантину та воєнного стану в країні, падіння попиту на кредити та банківські послуги, що негативно позначилися на процентних і комісійних доходах банків, проте, їх відновлення та забезпечення прибутковості було*

<sup>1</sup> Шумейко Юлія Олександрівна, студент Навчально-наукового інституту бізнесу, економіки та менеджменту Сумського державного університету, e-mail: [shumeyko.yulya00@gmail.com](mailto:shumeyko.yulya00@gmail.com)

<sup>2</sup> Гриценко Лариса Леонідівна, доктор економічних наук, професор, завідувач кафедри фінансових технологій і підприємництва Сумського державного університету, e-mail: [l.hrytsenko@biem.sumdu.edu.ua](mailto:l.hrytsenko@biem.sumdu.edu.ua)

<sup>3</sup> Дахер Катерина Анатоліївна, кандидат педагогічних наук, доцент бізнес школи Ліванського міжнародного університету, м. Бейрут, Ліван, e-mail: [daherkath@gmail.com](mailto:daherkath@gmail.com)

здійснено за рахунок безготівкових операцій. Для визначення рівня впливу інноваційних технологій на банківський сектор України в статті здійснено порівняння показників рівня проникнення діджитал з іншими країнами на основі даних Глобальної Фінансової Інклюзії. Аналіз здійснено за допомогою індикаторів проведення фінансових транзакцій через мобільні банківські сервіси. За результатами аналітичної оцінки визначено, що рівень проникнення інноваційних технологій в банки України по відношенню до аналізованих країн значно відстає, проте має позитивну динаміку. Розкрито особливості інноваційних технологій в банківському секторі Європи. Доведено, що основна їх відмінність від українських сервісів полягає в тому, що приблизно половина кращих інноваційних моделей, знайдених в мобільних додатках європейських банків, не має прямих аналогів в Україні – переважно в силу особливостей розвитку Європейського онлайн-банкінгу. За результатами дослідження зроблено висновки, що не зважаючи на складну ситуацію з банківським сектором протягом останніх років, фінансова стійкість банківської системи значно знизилася свій рівень стабільності, проте активний перехід банків на дистанційний режим роботи та зростання цифровізації бізнес-процесів допомогли банкам не погіршити життєздатність в умовах кризових явищ. Безпосередній вплив якісних мобільних сервісів банку дозволить підвищувати не тільки його фінансову стійкість, а й конкурентоспроможність на ринку.

**Ключові слова:** фінансова стабільність, банківська система, інноваційні технології, економіка, діджитал.

Стаття надійшла до редакції 2.10.2022

The article was received October 2, 2022