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THE COMPARATIVE ANALYSIS OF METHODS FOR ASSESSING THE IMPACT OF OPERATIONAL RISK ON BANKS' CAPITAL

ABSTRACT

The aim of the study is to compare international and national approaches to measuring the impact of operational risk on bank capital, to identify the advantages and the level of complexity of each approach, and to reveal the level of strain on banks' regulatory capital. The study found a significant impact of operational risk on the sufficiency of banks' capital, highlighting the need to form substantial capital reserves to absorb potential losses. A detailed comparative analysis of banks, including PrivatBank, Oschadbank, and Ukreximbank, indicated a significant influence of the size of banking assets on the amount of capital under operational risk. The study revealed differences in measuring the impact of operational risk on the regulatory capital of a bank depending on the use of international (BIA, TSA) or national approaches to assessing potential losses. The results of the study show a substantial difference in the assessment of reserves under operational risk using international and national approaches. This difference indicates the need for a more harmonized approach to the assessment and management of operational risk in the banking sector. The national approach to assessing reserves under operational risk creates more strain on banks' capital compared to international approaches. It was determined that the most significant difference in assessing the minimum capital for covering operational risk is observed between the international approach BIA and the national approach. It was established that the banks' priority task is to minimize reserves under operational risk in order to reduce the strain on bank capital, which can only be achieved by building and maintaining an effective operational risk management system by the banks.

Keywords: banks, risk, operational risk, capital, regulatory capital, risk management, risk assessment, capital adequacy, international standards, regulation, provisions, losses, stability, financial stability

JEL Classification: G21, G28, G32, M21

INTRODUCTION

In today's environment of rapid technological development, globalisation and transformation processes, banking activities are highly vulnerable to risks. Hundreds and thousands of forecasts cannot fully eliminate the unpredictability, uncertainty and randomness that characterise risk. The concentration of significant amounts of assets and liabilities by banks, the increasing role of sales of banking products and online banking services under the pressure of the global pandemic, the digitalisation of the banking business in the context of the digital transformation of society and the economy of Ukraine, military events, as well as the need to ensure and maintain sufficient bank capital in accordance with national and international laws - all these factors create significant operational risks. An important component of the operational risk management process is its assessment. It should be noted that in assessing operational risk, it is important to analyse not only actual losses from operational risk events that have occurred but also to take into account forecast estimates of potential losses (expenses) that the banking institution may incur in the future. The amount of the bank's capital to cover losses from operational risk, as well as the level of own capital adequacy to ensure the bank's stability, significantly depends on the assessment of operational risk.

LITERATURE REVIEW

Attention to operational risk management, including attention to security, plays an important role in mitigating the dangers of operational risk. Scientists distinguish several approaches to defining the essence of operational risk. G.V. Yevtushenko, A.I. Baboshko and D.I. Bushlya [1] adhere to the managerial approach, defining operational risk as «a potential risk for the existence of a bank associated with imperfect corporate governance, the use of outdated information technologies and data reduction processes that create possible failures in the bank's system». The same approach is followed by I.M. Posokhov [2] and N. Balashova [3], who consider operational risk to be a «structure risk». However, here we are talking more about the operational and technological risk of the bank. A. Lukatskyi [4] and O.O. Pavliuk [5] follow the historical approach, defining operational risk as «the risk of losses due to errors, violations, inaccurate, erroneous or criminal actions of people, damage caused by internal processes or systems or caused by external events». The economic approach to the definition of operational risk is adhered to by L.I. Dmytrysh, O.S. Kushnir [6] and O.S. Dmitrova [7], who understand operational risk as «uncertainties and dangers that a company faces when trying to carry out its daily business activities in a particular industry». Operational risk was first considered as an independent regulatory issue in the document «Operational Risk Management» published by the Basel Committee on Banking Supervision in 1998, in the document «New Basel Capital Accord».

In addition to understanding the essence of operational risk, scientists are actively discussing measurement approaches to determine the appropriate level of provisioning. In particular, Jou [8]; Liu [9]; Chen et al. [10]; Tafari, Hamid, Mira, and Omar [11]; Gatsi et al. [12]; Gadzo and Asiamah [13]; propose to use the leverage ratio, which is measured by the ratio of provisions to capital, considering it both as an indicator of effective management of operations and portfolio concentration, and as an indicator of operational risk. Their view is that a well-performing bank requires an increase in reserves, which will ultimately be higher if expressed as capital. According to Chen et al. [10], portfolio concentration is important when assessing the role of regulatory requirements on operational risk. Salas and Saurina [14] point to the tendency of state-owned banks to take on riskier projects rather than provide more profitable loans to SMEs in order to promote economic development. However, such risky behaviour leads to a higher level of bank leverage, and thus to an increase in operational risk. Overcoming the consequences of the financial crisis in the banking sector around the world has stimulated the development and implementation of new international capital management standards - the Basel III recommendations: A global regulatory framework for more resilient banks and banking systems.

Operational risk under Basel III is calculated on the basis of a single standardised approach. The Standardised Approach (SA) for calculating the operational risk capital requirement (ORCR) is based on two components: a business indicator component (BIC) and an internal cost multiplier (ILM). By requiring capital to protect against operational risk losses, the new framework is intended to encourage banks to improve their risk management practices to reduce their exposure to operational risk and mitigate losses caused by operational failures. Alina Mihaela Dima [16] believes that the new capital accord provides incentives for lower capital requirements for those banks that demonstrate enhanced risk management practices and risk mitigation. Basel doesn't define a mandatory methodology but stipulates that the banks should classify operational risk losses by type of event to calculate the operational risk allowance. This classification helps to identify risk factors.

The Basel II Accord proposes three approaches to quantifying operational risk and calculating the amount of capital required to cover operational risk: the basic indicator/key indicators approach; the standardised approach (general and alternative); and the in-depth assessment approach. The first approach is the simplest and provides for the possibility of its use by banks, regardless of their size and nature of activity. I. Gutsal, A. Davletova [17] emphasise that the use of the other two approaches requires compliance with the requirements and permission of the banking supervisory authority. The first two approaches are based on fairly simple calculations of the debit capital of a banking institution with respect to operational risk based on the amount of gross income for the last three years using appropriate indicators. N.L. Ivashchuk [18] notes that when applying the in-depth assessment approach, it is recommended to use one of three quantitative methods: the scorecard approach; the scenario analysis approach, i.e. the «what if» method; the LDA (Less Distribution Approach). The basis for calculating the required capital charges to cover operational risk under all approaches, except for the alternative standardised approach, is the bank's gross income.

In Ukraine, the requirements for mandatory classification of operational risk events by banks were introduced much later in 2018 with the approval of NBU Regulation No. 64 [19] and the definition of a gradual action plan to bring Ukrainian banks' operational risk management in line with the requirements of NBU Regulation No. 64.

The introduction of the requirement for banks to calculate, form and reserve capital to cover operational risk is one of the most discussed and debated issues of Basel III. The biggest problematic issue is the inability to reliably quantify operational

risk, including based on its essence, as the Basel Committee considers operational risk as the risk of losses caused by failures of internal systems, processes, inadequate actions of personnel, as well as the impact of external events. In practice, it is often impossible to determine exactly what should be taken as the basis for calculating the amount of operational risk. This makes it difficult to determine the required level of capital to cover operational risk and to assess the likelihood of an operational risk event occurring, and thus the losses (damages) that are a manifestation of the bank's operational risk.

AIMS AND OBJECTIVES

The main objective of the study is to compare international and national approaches to measuring the impact of operational risk on bank capital, determine the advantages and level of complexity of each approach, and identify the level of burden on banks' regulatory capital. The objectives of the study:

- to analyse the integration of operational risk assessment within the Basel Accord;
- to assess different approaches to quantifying operational risk and calculating the required capital to cover it;
- to conduct a comparative analysis of the performance indicators of the selected banks, focusing on the assessment of operational risk and its impact on the bank's regulatory capital;
- to explore the differences between domestic and international approaches to calculating provisions for operational risk.

METHODS

All the approaches proposed by the Basel Committee were used to assess operational risk and calculate the amount of required capital. A detailed and comparative analysis of the approaches to quantifying banks' capital to cover operational risk is provided in Table 1.

Table 1. Details and comparative analysis of approaches to quantitative assessment of capital to cover operational risk. (Source: [7, 17, 18, 20, 21, 22, 23, 24])

No.	Name of the approach	Brief description	Formula for determining
1	BIA (Basic Indicator Approach)	This approach is considered to be the main one. It is based on the distribution of the operational risk ratio using a single indicator as a benchmark for all bank activities (without division into business lines). It determines the amount of provisions (i.e. capital) to cover operational risk as a proportion of the bank's gross income.	$C_{BIA} = \sum(GI_{i-n} \times \alpha)/n,$ where - GI is the average annual gross income (the sum of net interest income or non-interest income as defined by the supervisory authority or accounting standards), if positive for the last three years; n - years in which the annual gross income was positive; $\alpha = 15\%$, the prescribed alpha coefficient.
2	Standardised Approach (TSA) or Alternative standard Approach (ASA)	It provides for the division of the bank's activities into eight production (operating) business lines and standardisation of capital expenditures (amount of deductions) for each based on certain indicators and risk factors (depending on the amount of income and equity provisioning rates for each type of activity). This classification of the bank's business lines and corresponding provisioning ratios may indirectly affect the focus of the bank's activities due to differences in the amount of provisioning for different business lines by 1.5 times (12% and 18%, respectively).	$C_{TSA} = \{\sum_{years\ 1-3} \max[\sum(GI_{1-8} \times \beta_{1-8}), 0]\}/3,$ where GI_{1-8} is the annual gross income for the respective year by each business line; β is the beta coefficient set for each business line (8 business lines with respective beta coefficients ranging from 12% to 18%).
3	Advanced Measurement Approach (AMA)	Requires banks to model the distribution of losses of business line elements/type of loss event from statistical data on operational risk losses (losses) collected by banks, taking into account external data on operational risk events	Banks need to develop their own methods for assessing operational risk, perform appropriate modelling, and define their own models and formulas. In essence, the in-depth approach uses the same formula as the standardised approach, but the values of the coefficients are determined by the bank itself.

The Basel Committee on Banking Supervision has defined gross bank income as the sole basis of calculation for the BIA, TSA and AMA approaches. In this sense, the Basel Committee on Banking Supervision defines gross bank income as the

sum of net interest income and net non-interest income as defined by local supervisory authorities or accounting standards of the respective country. The only exception is that under the alternative standardised ASA approach, the measurement basis for retail and commercial lending is the bank's loan portfolio, but the beta coefficient remains unchanged. The alternative capital requirement is converted to the equivalent of risk-weighted assets (for use in the TSA formula) by multiplying by 12.5. The classification of the provisioning beta coefficients according to the standardised approach is shown in Table 2.

Table 2. Classification of provisioning beta coefficients according to the standardised approach. (Source: [22])

Business line	Beta coefficient, %
Corporate Finance	18
Trading and Sales	18
Retail Lending	12
Commercial Lending	15
Cash Management Services	18
Agency Services	15
Asset Management	12
Retail Brokerage Services	12

The above division of the bank's activities into eight business lines and the determination of beta coefficients for each line differ from the approach of the core indicator. The types of business lines and beta coefficients are prerogatively determined by the Basel Committee on Banking Supervision.

To increase the sensitivity of the business indicator when calculating the provisioning amount under the TSA approach, the Basel Committee on Banking Supervision proposed to use another indicator. This is the internal loss multiplier (ILM). The requirements for calculating this indicator stipulate the need for a high-quality bank database of annual losses from operational risk over the past ten years. However, if the bank doesn't have such a database (the requirements for operational risk management by banks in Ukraine were introduced in 2018), the amount of the required reserve is calculated based on the business indicator component.

It is worth noting that the complexity of applying approaches to quantifying the amount of banks' capital to cover operational risk and the amount of calculated deductions are inversely proportional (Table 3).

Table 3. Matrix of Complexity of Approaches to Quantifying the Amount of Capital to Cover Operational Risk.

Complexity	Size of capital deductions		
	Smallest	Medium	Largest
Smallest (Simplest)			BIA Approach
Medium (More Complex)		TSA Approach	
Largest (Most Complex)	AMA Approach		

An in-depth comparative analysis of approaches to quantifying the amount of capital to cover a bank's operational risk is shown in Figure 1.

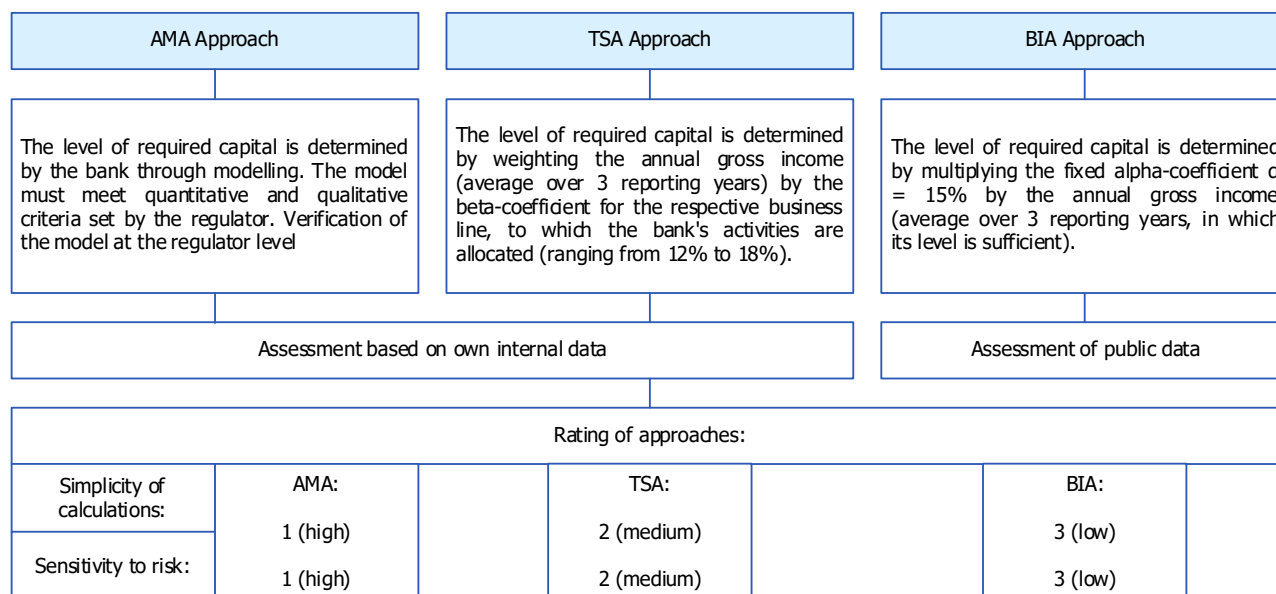


Figure 1. In-depth comparative analysis of approaches to quantifying the amount of capital to cover operational risk.

The advantage of the BIA approach is its simplicity and ease of application, as well as the possibility of using it to calculate the provision for operational risk by all banks, regardless of size, structure, nature of activities, etc. The advantage of the TSA approach is that it takes into account the specifics of the bank's activities, and risk profiles of the bank by different business lines, i.e. the respective individual volumes of banking services provided when calculating the provision for operational risk. The advantage of the AMA approach is the bank's freedom of choice in terms of using data on internal losses (damages) from operational risk but taking into account the qualitative and quantitative criteria established by the regulator.

An analysis of the operational risk loss pools shows that a significant amount of retail banking-related operational risk losses impact the credit risk capital charge. Under Basel II, such losses should be excluded from the calculation of operational risk capital under the Advanced Measurement Approach (AMA) to avoid double counting. Thus, banking institutions that are strategically focused on retail business and whose activities are dominated by retail business should take into account such views:

1. In terms of minimising regulatory capital, significant savings can be achieved by a retail bank by choosing the AMA approach over the standardised approach due to the credit risk-related content. In this case, most of the operational risk losses that could form the basis of the historical loss allocation and scenario analysis of the AMA calculation are excluded;
2. In practical terms, this is important for the complementary and close coordination and integration of credit risk management and operational risk management. The factors that mitigate operational risk can play an important role in reducing a bank's losses from credit risk exposures.

In Ukraine, a mandatory requirement for banks to reserve capital to cover potential losses (damages) from operational risk was introduced in 2022. In Ukraine, the procedure for banks to determine the minimum amount of operational risk to be taken into account when calculating capital adequacy ratios is set out in the Regulation on the Procedure for Determining the Minimum Amount of Operational Risk by Banks of Ukraine, approved by Resolution of the Board of the National Bank of Ukraine No. 156 dated 24.12.2019 (hereinafter - Regulation 156) [25]. Regulation 156 provides for the calculation of the minimum exposure to operational risk as of 1 January of each year based on the annual audited financial statements and additional data using the following formula:

$$ORCR = BIC * ILM, \quad (1)$$

where *ORCR* is the minimum amount of operational risk; *BIC* – business indicator component; *ILM* – internal loss (damages) multiplier from operational risk events.

The National Bank of Ukraine has established in Regulation 156 that banks shall apply the value of the minimum amount of operational risk equal to 1 to calculate the minimum amount of operational risk. The revision of the value of the ILM is

carried out by the National Bank of Ukraine taking into account the results of banking supervision to verify the completeness and quality of statistical data on losses (damages) from operational risk events accumulated by banks in accordance with the requirements of Regulation 64.

The elements of formula (1) are calculated according to the algorithm, which is structurally presented in Figure 2.

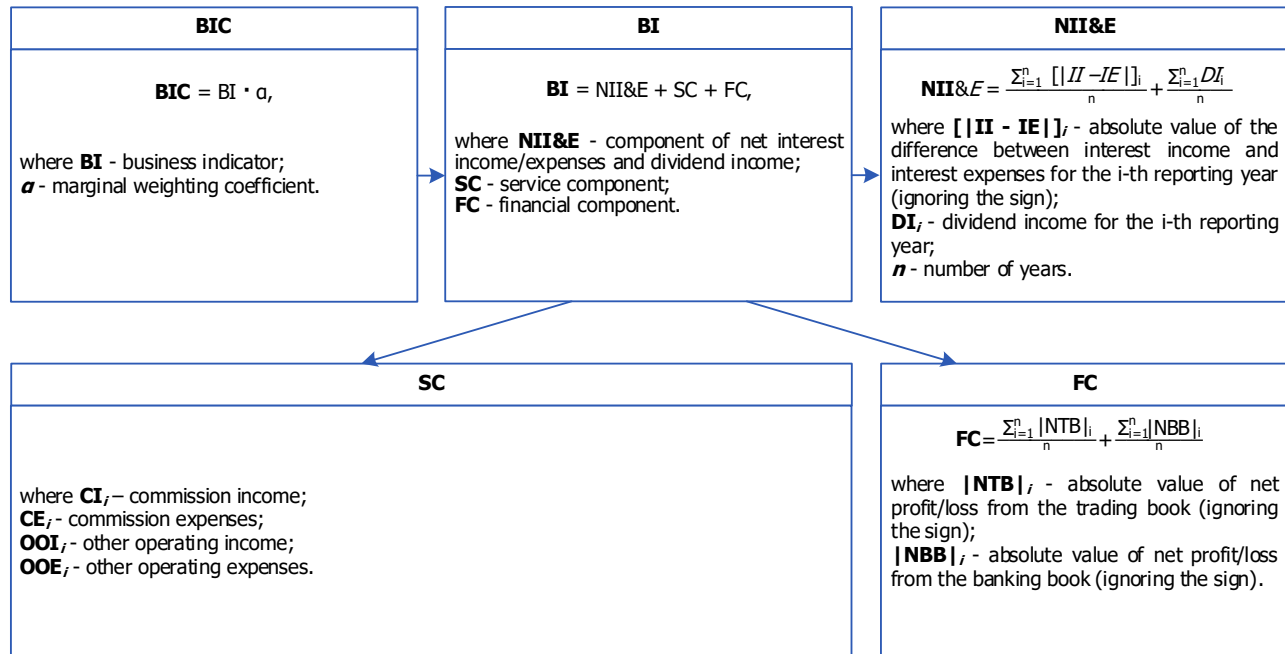


Figure 2. Algorithm for calculating the elements of the formula for determining the minimum amount of the bank's operational risk.
(Source: [25])

Banks' inclusion of income and expenses in the calculation of the NBU's CAR, SC, and FC is regulated by Regulation 156. In addition, it is worth noting that, taking into account the test period established for banks and the mandatory determination of the minimum amount of a bank's operational risk starting in 2022, the National Bank of Ukraine has also established certain requirements for the specifics of determining the FC component in 2020-2023.

RESULTS

For the purpose of comparative comparability of the results, 5 banks were selected; state-owned, private from the commercial banking sector, with exclusively Ukrainian capital, with foreign capital, and with a predominant strategic direction in corporate finance, retail and payment banking. These are the following banks: Privatbank, Raiffeisen Bank Aval, FUIB, Oschadbank, and Ukreximbank. The determination of the minimum amount of capital to cover operational risk and the analytical and comparative assessment were based on the annual separate financial statements of these banks, audited and confirmed by an external auditor and officially published. For the purpose of an in-depth comparative analysis, the research period was four years, 2017-2020. This decision was made due to: 1) the inclusion in the calculations of the regulatory capital indicator excluding operational risk (this indicator was available in the reporting only until 2021 inclusive); 2) the increase in losses in the banking system due to the effects of the coronavirus crisis (second half of 2020-2021) and Russia's military invasion of Ukraine (2022). In order to ensure a unified approach to comparative analysis and comparability of data, the study was conducted based on the annual separate financial statements of the 5 selected banking institutions, without taking into account the factor of their belonging to banking groups, which, in particular, include financial institutions, including those with foreign capital, which could significantly affect the calculated results. In order to provide a realistic assessment of possible capital allocations by Ukrainian banks to cover operational risk, the study analysed all selected banks from the perspective of individual financial institutions operating in Ukraine taking into account the respective regulatory capital available to them. This was done in order to assess the individual capabilities and ability of Ukrainian banks to cover potential losses (damages) from operational risk and to comply with the rather new requirements of the national regulator regarding capital allocations for operational risk.

The determination of the minimum amount of capital to cover operational risk and the corresponding analytical assessment was carried out in three stages: 1) assessment of the actual performance indicators of the selected banks based on the annual financial statements of the banks confirmed by the external auditor; 2) calculation of interim data to determine the minimum amount of capital to cover operational risk by selected banks; 3) direct calculation of the amount of capital to cover operational risk using approaches in accordance with international and national requirements by selected banks.

In the first stage, the data set on the key performance indicators of the banks in the analysed sample for 2017-2022 was compiled (Table 4).

Table 4. Total assets of banks in the selected sample for 2017-2022, UAH million. (Source: [26, 27, 28, 29, 30])

Bank	2017	2018	2019	2020	2021	2022	Increase from 2017 to 2022, %
Privatbank	253 675	278 048	309 723	382 525	407 256	549 674	117
Raiffeisen Bank Aval	56 274	64 357	82 786	107 287	131 736	176 548	214
FUIB	46 464	46 095	55 437	75 264	104 648	111 974	141
Oschadbank	233 843	217 752	249 101	233 539	236 887	272 202	16
Ukreximbank	170 592	161 625	140 338	192 835	192 086	234 155	37

In the second stage, intermediate data were calculated to determine the minimum amount of capital to cover operational risk by selected banks, including the assets and profitability of the banks in the sample based on the annual financial statements confirmed by the external auditor (Figure 3).

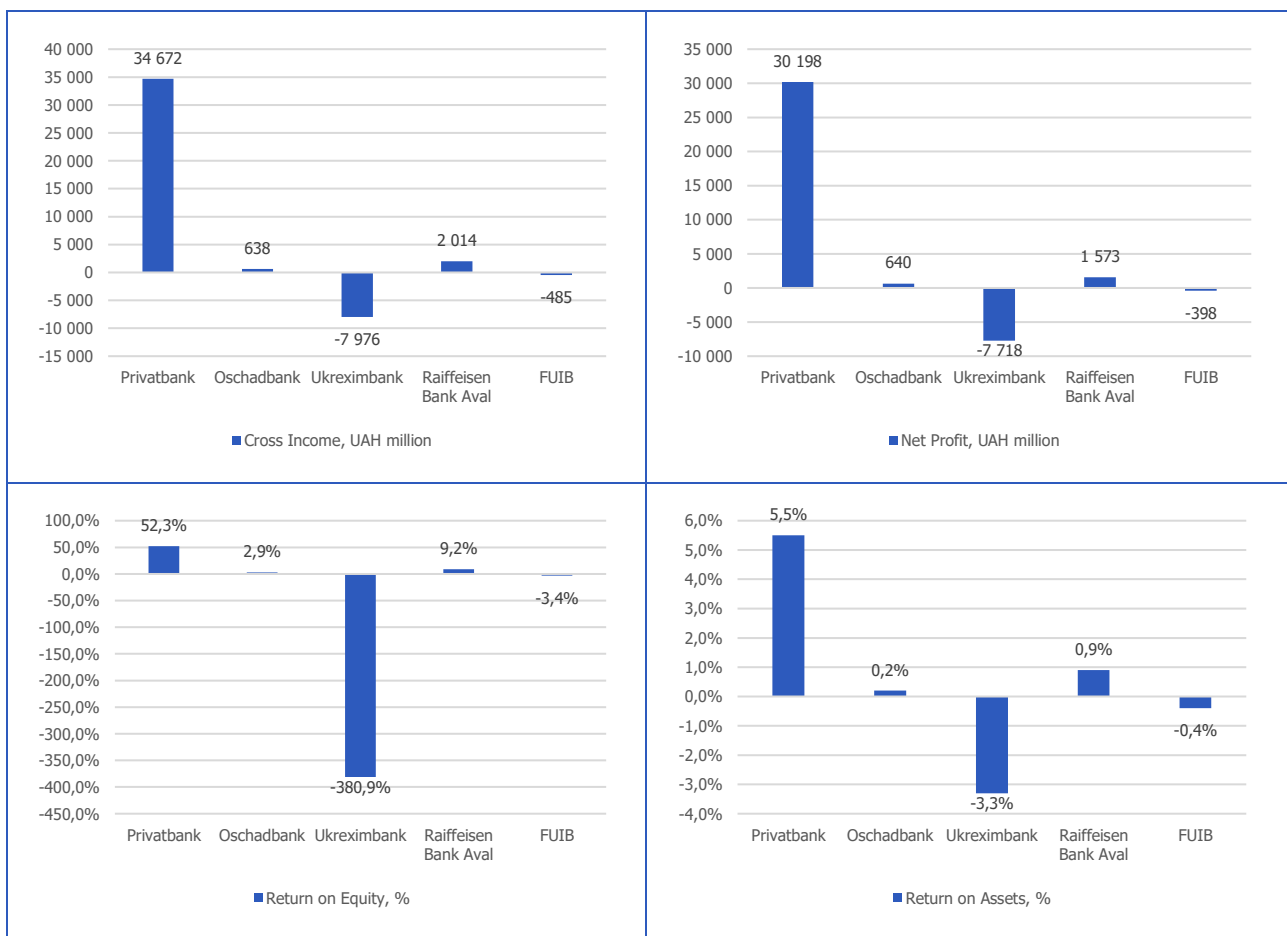


Figure 3. Profitability indicators of banks from the selected sample as of 01.01.2023. (Source: [26-30])

The third stage involves calculating the amount of capital to cover operational risk using approaches in accordance with international and national requirements for the selected banks. The results of the calculation of the minimum amount of capital (reserve) to cover the operational risk of banks from the selected sample according to international and national approaches are presented in Table 5.

Table 5. The minimum amount of capital (reserve) to cover the operational risk of banks in the selected sample according to international and national approaches. (Source: [26-30])

No.	Bank	Amount of reserve for covering operational risk			
		Basel approaches		National approaches	
		BIA	TSA	NBU (full 100%, from 30.12.22)	NBU (partial, 50%, from 31.12.21)
1	Privatbank	5 507.95	6 003.67	8 604.98	4 302.49
2	Raiffeisen Bank Aval	1 692.80	1 777.44	3 118.85	1 559.43
3	FUIB	1 059.40	1 070.00	1 816.97	908.49
4	Oschadbank	1 577.94	1 593.72	3 274.27	1 637.14
5	Ukreximbank	903.52	984.84	874.30	437.15

The results of a comparison of the capital burden of the minimum provision for banks' operational risk under the international and national approaches are shown in Table 6.

Table 6. A comparison of the capital burden of the minimum provision for operational risk of banks under international and national approaches. Note: * the comparative analysis takes into account the NBU's approach in accordance with Regulation 156, which provides for the consideration of operational risk using a coefficient of 1 (from 30.12.2022) in accordance with Resolution 121; ** The calculation takes into account the amount of the bank's regulatory capital according to the data of the separate annual financial statements for 2020, confirmed by the auditor and published on the official websites of the respective banks, before taking into account the amount of the provision for operational risk. (Source: [26-30])

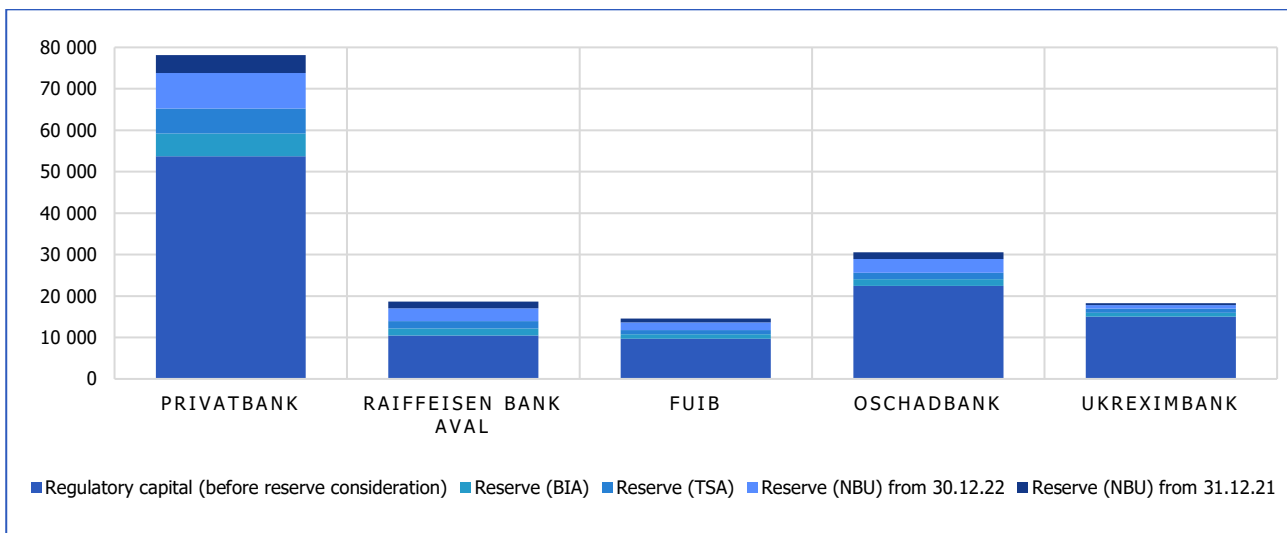
No. (ranking)	Bank	Difference between BIA and TSA		Difference between international and national approaches				Impact (strain) on capital**		
		Absol.	Relative	NBU * (100%) - BIA		NBU * (100%) - TSA		Relative		
		TSA - BIA	TSA - BIA	Absol.	Relative	Absol.	Relative	TSA - BIA	NBU * - BIA	NBU * - TSA
4	Oschadbank	15.78	1.00%	1 696.33	107.50%	1 680.55	105.45%	0.07%	7.55%	7.48%
2	Raiffeisen Bank Aval	84.64	5.00%	1 426.05	84.24%	1 341.41	75.47%	0.81%	13.62%	12.81%
3	FUIB	10.59	1.00%	757.57	71.51%	746.97	69.81%	0.11%	7.82%	7.71%
1	Privatbank	495.72	9.00%	3 097.03	56.23%	2 601.32	43.33%	0.92%	5.76%	4.84%
5	Ukreximbank	81.32	9.00%	-29.22	-3.23%	-110.54	-11.22%	0.54%	-0.19%	-0.73%

The impact of the operational risk provision on the banks' regulatory capital is shown in Table 7.

Table 7. The impact of the operational risk provision on regulatory capital. (Source: [26-30])

No.	Bank	Regulatory capital (before consideration)	Share of operational risk reserve in regulatory capital, %				Regulatory capital after accounting for operational risk reserve, UAH million			
			Basel approaches,		National approaches		Basel approaches		National approaches	
			BIA	TSA	NBU (from 30.12.22)	NBU (from 31.12.21)	BIA	TSA	NBU (from 30.12.22)	NBU (from 31.12.21)
1	Privatbank	53 723.00	10.25	11.18	16.02	8.01	48 215.05	47 719.33	45 118.02	49 420.51
2	Raiffeisen Bank Aval	10 474.03	16.16	16.97	29.78	14.89	8 781.24	8 696.60	7 355.18	8 914.61
3	FUIB	9 684.01	10.94	11.05	18.76	9.38	8 624.61	8 614.01	7 867.04	8 775.52
4	Oschadbank	22 475.89	7.02	7.09	14.57	7.28	20 897.95	20 882.17	19 201.62	20 838.75
5	Ukreximbank	15 049.60	6.00	6.54	5.81	2.90	14 146.08	14 064.76	14 175.30	14 612.45

The provision for operational risk in terms of international and national approaches in relation to the banks' regulatory capital is shown in Figure 4.


Figure 4. The provision for operational risk in terms of international and national approaches in relation to banks' regulatory capital. (Source: [26-30])

DISCUSSION

According to the first stage of the analysis, the bank with the largest total assets is Privatbank. The second place in the sample is occupied by the state-owned Oschadbank with assets of over UAH 270 billion, and the third place is held by the public sector bank Ukreximbank (almost UAH 235 billion). In the dynamics of 2017-2022, the volume of assets of all banks in the sample increased in general, in particular: Raiffeisen Bank Aval's assets increased by 214%, FUIB's assets by 141%, and Privatbank's assets by 117% in 2022 compared to 2017. A slight increase of 37% was recorded in the assets of Ukreximbank and 16% in the assets of Oschadbank in 2022 compared to 2017.

According to the second stage of the analysis, the highest return on assets is inherent in Privatbank, which is 5.5%. In terms of return on assets, the second and third places among the banks in the sample are occupied by Raiffeisen Bank Aval (ranked fourth in terms of assets in the sample of banks analysed) and Oschadbank (ranked second in terms of assets) with ROA of 0.9% and -0.2%, respectively. The lowest level of return on assets is characteristic of Ukreximbank, which is 100% state-owned, and FUIB, which is 100% privately owned. Expertly, given our knowledge of the asset structure of these state-owned banks and the amount of non-performing assets in their portfolios of active operations, we believe that this is due to the increase in non-performing assets in 2022-2023 and the deterioration of financial results.

FUIB's return on assets is below zero and amounts to -0.4%, while Ukreximbank's return on assets is negative due to significant losses in the financial year 2022 and amounts to -3.3%. Given that the level of gross income depends not only on the actions of the bank's management but also on the bank's competitive position, planning the required amount of capital is a complex process. In this way, operational risk differs from other risks, such as credit and market risks, for which the bank can more reliably estimate its future capital needs and, therefore, take timely care to ensure a minimum level of capital adequacy.

At the last stage of the analysis, when comparing the results of calculating the minimum amount of capital (reserve) to cover operational risk according to the international approaches of BIA and TSA (international approach) and national approaches in accordance with Regulation 156 (national approach), it was found that the largest amount of minimum expenses to cover operational risk was obtained by calculating according to the national approaches. The only exception is Ukreximbank, whose minimum capital to cover operational risk under the international approach is slightly higher than under the national approach (Table 6).

Comparing the impact (burden) on the capital of the minimum capital (provision) for operational risk of the banks in the selected sample under the international and national approaches, it can be concluded that the largest impact on the bank's capital will be caused by 100% inclusion of the provision for operational risk by banks calculated in accordance with the NBU's national approach. At the same time, the largest difference in the amount of the minimum capital to cover operational risk is observed under the international BIA approach (the easiest approach to apply) and the NBU's national approach. Thus, for state-owned Oschadbank, the difference is 107.5%, for commercial Raiffeisen Bank Aval with foreign capital – 84.24%, for commercial FUIB with Ukrainian capital – 71.51%, and for state-owned Privatbank – 56.23%.

At the same time, the capital burden on the provision for operational risk for the above banks is 7.48%, 12.81% (the highest for Raiffeisen Bank Aval), 7.71% and 4.84%, respectively, of the bank's regulatory capital in 2020. For the state-owned Ukreximbank, the difference in the application of national and international approaches to determining the amount of the operational risk provision is negative and amounts to 3.23% compared to the BIA approach. This, according to the results of the calculations, will lead to a reduction in the capital burden of at least 1% of the bank's regulatory capital before taking into account operational risk (namely, by 0.73%). We have reason to believe that this is due to the highest level of capital adequacy among the analysed sample of banks and the negative financial result (net loss) for 2020, in which other banks in the analysed sample made a net profit.

Thus, the formation of a minimum amount of capital to cover operational risk certainly places an additional burden on banks' regulatory capital. In practice, such a burden is even more significant than the burden caused by capital provisioning for market risk. At the same time, given the trends in the development of Ukraine's banking system, including the increase in banks' profitability, in particular in 2021 compared to 2020, as well as in 2023, it is worth predicting a gradual increase in the required level of capital to cover operational risk, and thus an increase in the burden on regulatory capital for banks.

Generally speaking, the disadvantage of applying the NBU's national approach (Regulation No.156) to calculating the operational risk allowance is a greater burden on the bank's capital, which leads to a reduction in the amount of regulatory capital, lower liquidity and capital adequacy of the bank. The advantage of applying the NBU's approach (Regulation 156) to calculating the operational risk allowance is that it will provide banks with greater financial security against potential losses, i.e., a higher capital allowance in case of losses, which will protect against liquidity losses. Another advantage of the NBU's approach (Regulation 156) is the gradual (phased) inclusion of the amount of the operational risk provision in the banks' regulatory capital in accordance with NBU Resolution No.121.

The use of phased-in ratios (from 31 December 2021 – 0.5; from 30 December 2022 – 1) ensures that banks gradually adapt to a reduction in regulatory capital by deducting a portion of capital to cover operational risk; 2) creates favourable conditions for banks to smoother transition to maintaining the required level of capital adequacy and adjust their operations to this end, for example, by increasing their revenue base. Determining the ratios to be taken into account when calculating the minimum amount of capital (reserve) to cover banks' operational risk under the AMA approach is the most difficult to apply and requires banks to use their own operational risk assessment methods.

Let's compare the results of the study with the bank sustainability rating (among the banks in the analysed sample) according to the Ministry of Finance of Ukraine as of 01.01.2023 (Table 8).

Table 8. Bank sustainability rating (among the banks in the analysed sample) at the end of 2022 according to the Ministry of Finance of Ukraine. (Source: [31])

Bank	Overall rating	Resilience	Depositors' loyalty	Analysts' rating	Deposits
Privatbank	4.04	3.5	4.5	4.33	1
Raiffeisen Bank Aval	4.34	4.1	4.9	3.89	3
FUIB	3.73	3.2	4.5	3.56	6
Oschadbank	3.61	2.9	4.2	4.11	2
Ukreximbank	3.60	3	4.5	3.33	8

This rating takes into account the most important indicators from open sources that affect the choice of a bank for a deposit, the amount of which, as is well known, affects the bank's capital, capital adequacy, liquidity, and, accordingly, the ability to cover the bank's operational risk, i.e. the deduction of the calculated minimum amount of capital to cover operational risk.

When comparing the stress resistance rating of the banks in the analysed sample with the burden of certain amounts of provisions for operational risk (according to the NBU's national approach, Regulation 156) on the capital of such banks, it is proved that the bank with the highest stress resistance rating according to the Ministry of Finance of Ukraine (Raiffeisen Bank Aval with a rating of 4.1) will receive the highest burden on regulatory capital. Capital allocations to cover Raiffeisen Bank Aval's operational risk will reduce its regulatory capital by 12.81% of the 2020 regulatory capital. PrivatBank with a stress-resistance rating of 3.5 corresponds to the lowest calculated value of the burden on its regulatory capital related to the deduction of capital for operational risk (4.84% of the amount of regulatory capital in 2020). Thus, the banks with the highest stress-resistance ratings should experience little impact on their capital adequacy and should be able to adequately meet the capital adequacy requirements after taking into account the operational risk provision calculated under the NBU's national approach.

CONCLUSIONS

Among a wide range of banking risks, operational risk is the most difficult to predict, and its realisation can lead to unexpected and very significant losses for a banking institution. The realisation of operational risk entails potential or actual losses, which in some cases may call into question the functioning of the bank. In this regard, it is important not to exceed the maximum risk capacity that the bank is able to accept, taking into account the level of its capital, adequacy and effectiveness of the risk management system, as well as regulatory restrictions. The assessment of capital allocations of five operating national banks to cover operational risk, conducted in the course of the study, proved that such estimates depend on the approaches to their determination. The basis for calculating operational risk under all approaches, with the exception of the alternative standardised approach, is the gross income of the bank. It is established that the calculation of the minimum required amount of capital for operational risk should take into account the specifics of the activities of domestic banks, taking into account the requirements of the national regulator. The disadvantage of applying such requirements is a much higher (compared to international approaches) burden on the bank's capital, which leads to a decrease in the amount of regulatory capital and a decrease in capital adequacy. The most significant difference in the amount of minimum capital to cover operational risk is observed between the international BIA approach and the national approach of NBU Regulation No.156. The biggest burden on banks' capital will be imposed by the 100% inclusion of the operational risk provision determined under the NBU's approach. Therefore, the priority task for banks is to minimise the cost of capital provisioning for operational risk, which can only be achieved if banks build and maintain effective operational risk management. Consolidated accumulation and exchange of information on operational risk events, in particular between Ukrainian banks, will simplify the assessment and increase the efficiency of a bank's operational risk management.

ADDITIONAL INFORMATION

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ПОРІВНЯЛЬНИЙ АНАЛІЗ МЕТОДІВ ОЦІНЮВАННЯ ВПЛИВУ ОПЕРАЦІЙНОГО РИЗИКУ НА КАПІТАЛ БАНКІВ

Метою дослідження є порівняння міжнародних та національних підходів до вимірювання впливу операційного ризику на капітал банку, визначення переваг і рівня складності кожного підходу, виявлення рівня навантаження на регулятивний капітал банків. Дослідження виявило значний вплив операційного ризику на достатність капіталу банків, підкресливши необхідність формування значних резервів капіталу для абсорбції ймовірних збитків. Детальний порівняльний аналіз банків, зокрема Приватбанку, Ощадбанку та Укрексімбанку, вказав на суттєвий вплив величини банківських активів на обсяг капіталу під операційний ризик. Дослідження виявило відмінності при вимірюванні впливу операційного ризику на регулятивний капітал банку залежно від використання міжнародних (BIA, TSA) чи національних підходів до оцінки ймовірних утрат. Отримані результати дослідження свідчать про суттєву різницю в оцінці резервів під операційний ризик за міжнародним та національним підходами. Ця різниця вказує на необхідність більш гармонізованого підходу до оцінки та управління операційним ризиком у банківському секторі. Національний підхід до оцінки резервів під операційний ризик формує більше навантаження на капітал банків порівняно з міжнародними підходами. Визначено, що найсуттєвіша різниця в оцінках мінімального капіталу на покриття операційного ризику спостерігається за міжнародним підходом BIA та національним підходом. Установлено, що пріоритетним завданням банків є мінімізація резервів за операційним ризиком із метою зниження навантаження на капітал банку, якої можливо досягти лише за побудови та підтримання банками системи ефективного операційного ризик-менеджменту.

Ключові слова: банки, ризик, операційний ризик, капітал, регулятивний капітал, управління ризиками, оцінка ризику, достатність капіталу, міжнародні стандарти, регулювання, резерви, збитки, стабільність, фінансова стійкість

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