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Operational Risk and Bank Profitability: Evidence from The Banks of Uzbekistan

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Abstract: Banking sector is rather important in the financial stability and the economic development of Uzbekistan where commercial banks have more and more problems associated with risk management as well as financial performance. The increase in size of the banking operations as well as the aspect of financial intermediation in recent years has made the question of management of operations risk and its correlation to bank profitability to be of importance. Regardless of a lot of international researches on the banking risks and banking profitability, there is a paucity of empirical studies that analyze the relationship between the operational risk and the financial performance of banking systems in emerging banking system, more so in Uzbekistan. The research proposal is to evaluate the amount of operational risk in the commercial banks in Uzbekistan and examine the correlation between the important financial indicators and the profitability of the bank. The level of operational risk was determined using financial data of 35 commercial banks and applying the Basic Indicator Approach (BIA) as prescribed by Basel II, and the Ordinary Least Squares (OLS) regression model was utilized to determine the relationship between the operating expenses, non-performing loans (NPL) and capital adequacy ratio (CAR) and the return on assets (ROA). Empirical findings indicate that the percentage of non-performing loans exerts the most effective and significant negative impact on the profitability of banks and the effects of operating expenses and capital adequacy are statistically insignificant. The paper presents empirical data concerning the relationship between the operational risk indicators and bank profitability in the banking market of Uzbekistan based on the data related to national regulation. The results suggest that credit risk management and efficiency in operations should be reinforced to have sustainable financial performance in commercial banks.

Keywords: Operational Risk, Bank Profitability, Non-Performing Loans, NPL, Capital Adequacy, CAR, ROA

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1. Introduction

The banking sector plays an important role in ensuring financial stability and supporting economic development in Uzbekistan. As of 2025, the banking system consists of 35 commercial banks operating with state, private, and foreign capital. The state has traditionally been an overwhelming presence in banking notably through giant state-owned banks that fund key economic projects. Yet in this context reforms to liberalise the financial sector in recent years have framed a reduction of state involvement with these entities, emphasising the need for competition and the establishment of a more efficient and market-determined banking system.

The growth of the banking sector in terms of assets and lending activity is accompanied by a number of risks, which enhances the importance of the functioning of effective risk management systems.

Nonetheless, the banking sector continues to grapple with a last set of structural challenges, despite these reforms. Challenges of somewhat more elevated NPL share, less access to financial services in certain sectors of the economy and modernizing risk management practices. In this regard, banking risks assessment and management has significantly taken attention as one of the most effective ways to maintain financial stability and sustainable development of banking system.

While there are many different types of banking risks, the new kid on the block is specifically operational risk, which has received increasing interest in recent years. Operational risk is a risk that all businesses face in their day-to-day operations the risk of loss deriving from inadequate or failed internal processes, human factors and systems, or from external events. After the adoption of the Basel II regulatory framework, international standards in terms of risk measurement and capital adequacy have appeared in banks, so the aforementioned importance of operational risk management has grown rapidly [1].

Basel II was introduced with three different approaches of functional for the credit risk capital requirements: Basic Indicator Approach (BIA) Standardized Approach (SA) Advanced Measurement Approach (AMA) for the capital requirements for the operational risk. Out of all those methods, the Basic Indicator Approach is the most simple approach, which is practical especially for banks that are still on the early stage of developing advanced risk management system.

In the banking system of Uzbekistan, operational risk is assessed in accordance with the national regulatory framework, which largely corresponds to the principles of the Basic Indicator Approach recommended by the Basel Committee on Banking Supervision. Thus, the analysis of operational risk indicators and its relation to the financial performance of the banks is key in the improvement of risk management practices [2].

This research aims to be a study of operational risk exposure for the commercial banks of Uzbekistan and to assess the correlation between main financial inclusion indicators with profitability of banks. Based on financial data from 35 commercial banks, the study used different operational risk estimation techniques and an Ordinary Least Squares (OLS) econometric model to assess the effects of operating costs, non-performing loans, and capital adequacy ratio on the profitability of banks.

2. Literature Review

Operational risk management has become a critical element of banking regulation following the introduction of the Basel II framework. Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people, systems, or external events. The Basel Committee on Banking Supervision introduced several approaches to measure operational risk capital requirements, including the Basic Indicator Approach (BIA), the Standardized Approach (SA), and the Advanced Measurement Approach (AMA). These approaches focus on enhancing banks' risk management infrastructure and increasing financial stability [3].

Substantial empirical work has been devoted to explaining the determinants of bank profitability. Indicators are widely used for measuring the profitability of banks such as return on assets (ROA) and return on equity (ROE), which indicate how efficiently banks utilize their resources. Prior studies indicate that both endogenous and some external factors like operating efficiency affect bank profitability also. On credit risk, capital adequacy, and macroeconomic conditions [4].

Operating efficiency also plays an important role in determining bank performance. The ratio of operating expenses to total assets or income is commonly used as a measure of cost efficiency in banking operations. Higher operating expenses generally reduce

profitability because they increase the cost of financial intermediation and weaken operational performance.

Another important determinant of bank profitability is capital adequacy. CAR shows the capacity of banks to absorb losses in case of any probable loss so that they remain financially secure. More specifically, while capital adequacy has been shown through several empirical studies to be a significant determinant of bank profitability, the type of capital may in fact determine how this relationship materializes, with banks in emerging markets characterized by high market ton risk-lover bank risk strategies and profitability potentially having a negative relationship in defined market conditions.

While there is a large international literature on banking risk and profitability, few empirical studies link banking risk and profitability in emerging banking systems. Therefore, analysing operational risk indicators and their relationship with profitability in the banking sector of Uzbekistan contributes to the existing literature and provides additional insights into risk management practices in developing financial markets.

Several empirical studies also examine the relationship between bank capital, risk, and efficiency in the banking sector. Berger emphasizes that capital structure and profitability are closely related in banking institutions. Similarly, Altunbas et al. analyse the relationship between capital, risk and efficiency in European banks and find that risk management practices significantly influence bank performance. Other studies also highlight that both bank-specific and macroeconomic factors determine bank profitability [5].

3. Materials and Methods

The research design will help assess the connection between operational risk and profitability of commercial banks in Uzbekistan through quantitative and empirical research. The study is premised on secondary financial data acquired through the annual financial statements of 35 commercial banks in Uzbekistan in addition to statistical data availed by the Central Bank of the Republic of Uzbekistan and publicly published bank reports. It uses the concepts of the Basic Indicator Approach (BIA) recommended under Basel II regulatory framework in an effort to estimate the level of operational risks in banking sector. Under this approach, it is assumed that the capital to be used as operational risk capital is computed based on the average gross income of banks in the prior three years with only positive values of the income counted and any negative value is not computed in the period. This simplified approach is aligned with the national regulatory traditions applied in Uzbekistan to supervise the banking sector and risk reporting. An econometric model is constructed to explore the connection between the indicators of operational risk and the bank profitability by using Ordinary Least Squares (OLS) regression method, which has also been extensively used in empirical banking studies. The dependent variable in the regression model will be the profits made on the assets (ROA) of the bank, a measure of bank profitability, whereas the non-performing loans (NPL) and the share of non-operating expenses operating expenses in total assets (ROA) as the proxy measure of credit and operational risk, respectively, will form the independent variables. Such variables are chosen according to their theoretical significance and practical significance to the banking performance research. The regression analysis is done to determine the extent, direction and statistical significance of the relationships between these variables. The reliability of a model is determined based on the statistical values like the R-Squared, F-statistics, standard errors and p-values, through which the study will be able to gauge the explanatory strength and general legitimacy of the empirical findings.

4. Results

Traditionally, the state has dominated the banking system, particularly through large banks aimed at financing major state projects. The reforms initiated under the "National Development Strategy 2030" have so far been proceeding to privatise these

banks, lessen the pervasiveness of the state and establish a more competitive banking environment. The aim of such reforms is to rationalize the banking system, increase private sector participation and bring the system in consonance with international best practices of banking [6].

However, serious issues in the banking sector live on including high non-performing loan (NPL) ratios, limited financial access, and obsolete risk management standards. This calls for the banks to further strengthen their internal systems for proper management of the operational, credit and market risks.

Under Basel II, there are three approaches to operational risk, the Basic Indicator Approach, the Standardized Approach, and the Advanced Measurement Approach. In a practical aspect and a simplified manner, this study uses the principles of Basic Indicator Approach (BIA) to estimate operational risk needs.

Basic indicator approach (BIA): this is the simple type of operational risk measurement where the bank average gross income serves as the starting point of the calculation.

It may not have a single direct financial statistic by which to view it in full, yet operational risk is one of the greatest consequences of bank inefficiency. Increased operating costs as a result of failures in internal processes, system disruptions or human errors. Therefore, the ratio of operating expenses to total assets is used in the regression model as a proxy variable that indirectly captures the potential impact of operational risk on bank profitability [7].

$$K_{BIA} = \left[\sum (GI_{1...n} \times a) \right] \div n \quad (1)$$

Where:

KBI - capital level according to the key indicator approach.

GI - Gross Annual Income (used only if positive, (interest income - interest expense) + (non-interest income - non-interest expense));

n - number of years considered for operational risk assessment (3 years);

a - The rate set by the Basel Committee (15%).

In the recommendations of the Central Bank of the Republic of Uzbekistan on the forms of bank supervisory reports to be submitted by banks to the Central Bank and on how to complete them, the value of operational risks is shown by the following formula:

$$OR = \left(\frac{100}{K1} \right) \times (GI_{3yil} \times 15\%), \quad (2)$$

Here, K1=13 - Current minimum capital requirements

In this methodology, the bank's average gross income over the past three years is calculated based only on positive results. If the income is negative or zero, that year is excluded from the calculation, and the denominator is also set equal to the number of positive years. Therefore, the operational risk value is calculated only for periods that show a profit [8].

This approach is a simplified national methodology for the banking system of Uzbekistan, and it complies with the principles of the Basic Indicator Approach (BIA) set forth in the Basel II recommendations.

The calculation results show a direct correlation between banks' revenue and the amount of operational risk in large banks. Conversely, private and mid-sized commercial banks have relatively low operational risk indicators, which stems from differences in their risk structures and the ratio of operational expenses.

The table below shows the operational risk amounts of commercial banks operating in the Republic of Uzbekistan, calculated based on the formula recommended by the Central Bank [9].

Data And Empirical Analysis

Table 1. Operational risk amounts in commercial banks of the Republic of Uzbekistan

No	Bank names	Operational Risk Amount (bln., UZS)		
		2022	2023	2024
1	NBU	10,874	10,199	12,765
2	Agrobank	4,643	4,542	5,991
3	PSB	5,227	5,115	6,896
4	Ipoteka-bank	4,960	4,758	5,611
5	Kapitalbank	2,911	2,941	4,191
6	Asaka bank	2,825	2,710	2,762
7	Halq banki	4,554	4,130	5,444
8	Hamkorbank	2,382	2,458	3,379
9	Ipak Yuli bank	2,000	1,968	2,525
10	BDB	1,690	1,597	1,919
11	MKbank	1,486	1,372	1,491
12	TBC bank	156	243	725
13	Davr-bank	511	566	783
14	Aloqabank	1,088	1,172	1,486
15	InFinbank	777	766	934
16	OFB	973	1,022	1,447
17	Trustbank	1,561	1,468	1,769
18	Anorbank	321	350	661
19	Turonbank	856	773	855
20	Aziya Alyans bank	713	669	891
21	Tenge bank	405	409	526
22	KDB Bank Uzbekiston	447	497	718
23	Universal bank	392	320	443
24	Ziraat bank Uzbekiston	197	183	238
25	Garant bank	171	165	160
26	Oktobank	108	150	301
27	Hayotbank	-	13	42
28	AVO bank	-	-	88
29	Madad Invest bank	88	77	88
30	Poytakht bank	59	54	59
31	Yangibank	-	10	21
32	Apexbank	-	-	-
33	Uzumbank	118	143	200
34	Eron Soderot bank	-	26	40
35	Smartbank	-	13	32

Bank operations have encountered numerous risks. It is important to maintain the accuracy and stability of processes [10].

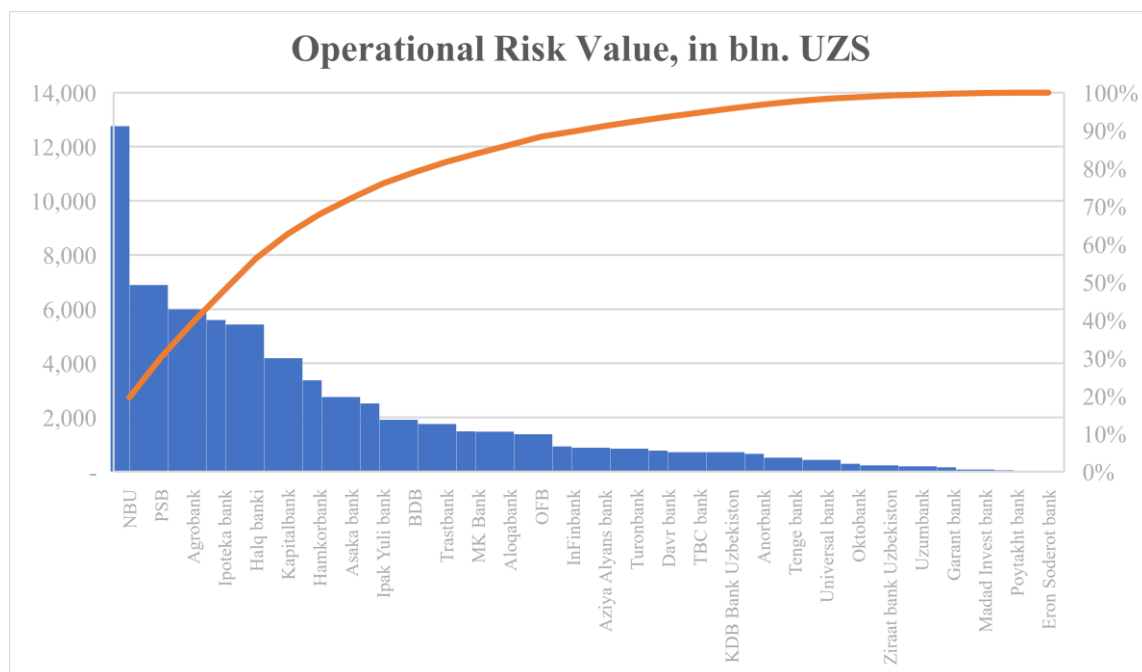


Figure 1. Operational risk value chart for commercial banks as of January 1, 2025

The chart illustrates the distribution of operational risk across commercial banks operating in Uzbekistan as of January 1, 2025. The results show that large state-owned banks demonstrate significantly higher operational risk levels compared to private and smaller banks. This can be explained by the larger scale of operations, broader client base, and more complex organizational structures of large banks.

Simultaneously, new and small commercial banks focus low values of operational risk due to the smaller size of assets and limited operational activities. The results suggest that the operational risk is related to the size of the banking business and the amount of financial transactions.

This part of research empirically analyzed the influence of operating expenses, credit quality and capital adequacy indicators on the profitability of commercial banks of Uzbekistan. The primary data derives from the annual financial statements of 35 existing commercial banks. Data were extracted from the Central Bank of the Republic of Uzbekistan, the Association of Banks and the banks annual reports available to the public. [11].

This analysis aims to uncover the determinants of banks return on assets (ROA) and estimate their economic significance.

The following linear regressed model was created to hit this target:

$$ROA_i = \beta_0 + \beta_1 Opex_Assets + \beta_2 NPL_i + \beta_3 CAR_i + \varepsilon_i \quad (3)$$

Where:

ROA_i – Return on Assets of bank i ,

$OpexAssets$ - Ratio of operating expenses to Total Assets

NPL_i - Share of non-performing loans,

CAR_i - capital adequacy ratio,

ε_i - random error.

The model was estimated using the Ordinary Least Squares (OLS) regression method, which is widely applied in empirical banking studies. The research methodology is based on the classic approach widely used in international practice.

Table 2. Variables and their expected impact

Variable	Definition	Expected sign	Economic content
Opex_Assets	Operational expenses / Assets	(-) negative	Increasing expenses reduce profitability
NPL	Share of non-performing loans	(-) negative	Profits will decrease if credit quality deteriorates
CAR	Capital Adequacy Ratio	(+) positive	If capital stability increases, bank profits will increase

This result can be explained by the fact that banks with high capital adequacy choose a cautious strategy, i.e., they limit risky but high-yield operations [12].

Table 3. Key indicators of commercial banks of the Republic of Uzbekistan (as of December 31, 2024)

No	Bank	ROA	Opex_Assets	NPL	CAR
1	NBU	0.013	0.02	0.04	0.19
2	Agrobank	0.001	0.03	0.04	0.14
3	PSB	0.016	0.02	0.04	0.16
4	Asaka bank	0.001	0.02	0.05	0.15
5	Halq banki	0.006	0.04	0.04	0.19
6	BDB	-0.075	0.03	0.06	0.18
7	MK Bank	-0.080	0.04	0.07	0.15
8	Aloqa bank	0.010	0.03	0.03	0.14
9	Turon bank	0.001	0.03	0.02	0.14
10	Ipoteka-bank	-0.005	0.03	0.07	0.16
11	Kapital bank	0.026	0.04	0.05	0.16
12	Hamkorbank	0.057	0.05	0.01	0.17
13	Ipak yuli bank	0.045	0.05	0.01	0.16
14	OFB	0.060	0.02	0.02	0.20
15	TBC	0.048	0.05	0.05	0.23
16	Anor bank	0.026	0.05	0.04	0.14
17	Invest Finance bank	0.022	0.05	0.03	0.15
18	Davr bank	0.050	0.03	0.04	0.15
19	Trastbank	0.079	0.06	0.04	0.25
20	Asia Alliance bank	0.051	0.05	0.01	0.17
21	Tenge bank	0.005	0.04	0.04	0.20
22	KDB Bank Uzbekiston	0.055	0.02	-	0.37
23	Hayot bank	-0.022	0.04	0.02	0.25
24	Ziraat Bank Uzbekistan	0.021	0.02	0.04	0.19
25	Universal bank	0.054	0.06	0.01	0.17
26	Garant bank	-0.035	0.08	0.15	0.23
27	AVO bank	-0.250	0.18	0.10	0.82
28	Apex bank	-0.097	0.06	-	0.48

29	Oktobank	0.054	0.08	-	0.48
30	Madad Invest bank	0.014	0.04	0.05	0.60
31	Poytakht bank	0.044	0.08	0.06	0.28
32	Yangi bank	-0.110	0.13	0.10	0.48
33	Smart bank	0.005	0.06	0.01	0.85
34	Uzum bank	0.111	0.15	-	0.85
35	Eron Soderot bank	0.047	0.02	0.04	0.64

For banks for which the NPL indicator was not available, missing NPL values were replaced using the sample mean due to limited data availability. As a result of the economic analysis of the empirical results, the empirical model constructed based on data from 35 commercial banks in Uzbekistan was evaluated as follows:

$$ROA_i = 0.0506 - 0.1556Opex_Assets - 0.8013NPL_i - 0.0097CAR_i + \varepsilon_i \quad (4)$$

The results were calculated using Ordinary Least Squares (OLS). The table below presents the model coefficients, statistical indicators, and their economic interpretations [13].

Table 4. Empirical model results on the relationship between return on assets (ROA) and operating expenses, non-performing loans, and capital adequacy in commercial banks

Variable	Coefficient	Std. Error	t-statistic	P-value
OpexAssets	-0.1556	0.3536	-0.44	0.659
NPL	-0.8013	0.2013	-3.98	0.000
CAR	-0.0097	0.0539	-0.18	0.855
Constant	0.0506	0.0160	3.16	0.003

Observations = 35

R-squared = 0.4513

F-statistic = 8.498

Prob > F = 0.000

Standard error of regression = 0.051

The standard error of the regression is 0.051, indicating that the average deviation between the predicted and actual values of ROA is approximately 5.1 percent.

Table 5. General specifications of the model

Indicator	Value	Izoh
R ²	0.4513	The model explains 45.1 percent of the variation in ROA.
F-statistic	8.4984	The model is statistically significant overall (p < 0.01).
Degrees of freedom (df)	31	For 35 observations and 3 independent variables
Standard error of y	0.0510	The model's average error is low.
Regression Sum of Squares / Residual Sum of Squares	0.0663 / 0.0806	The observed dispersion is relatively high.

The overall regression model is significant ($F = 8.49$, $p < 0.01$) and the explanatory variables explain about 45% of the variance in bank profitability ($R^2 = 0.451$).

According to the calculated results explaining the share of non-performing loans (NPL), which has the strongest and most significant effect on the ROA of banks

As $\beta_2 = -0.8013$, a one-percentage-point increase in the non-performing loans ratio is associated with an average decline of around 0.8 percentage points of bank ROA. Since the P-value is $0.0004 < 0.01$, this effect is significant at the 99% confidence level.

This result confirms that profit margins decline rapidly in banks with low credit quality.

Although the operating expenses (OpexAssets) came out with a negative sign ($\beta_1 = -0.1556$), this effect is statistically insignificant ($p = 0.6595$). This indicates that differences in operational efficiency between banks are not yet significant.

The Capital Adequacy Ratio (CAR) coefficient is also statistically unreliable, as it is negative ($\beta_3 = -0.0097$) and $p = 0.8555$. Overall, the result suggests capital large banks are inherently less risky, but they also tend to earn lower profits.

The model's standard error of y is 0.051, meaning that on average the distance between the levels of profitability (ROA) predicted by the regression equation and the actual level is 5.1%. This implies that the bank cross-section has a high enough fit for the empirical model [14].

From all the empirical results, we are able to draw the conclusions:

Loan quality (NPL) is the strongest and statistically significant negative factor affecting bank profitability.

The impact of operating expenses (Opex_Assets) and capital adequacy (CAR) is negative but statistically insignificant.

The model's R-squared ($R^2 = 0.451$) indicates that the model explains 45 percent of the variation in profitability. Since macroeconomic factors, interest rates, and market conditions also influence bank profitability, it is therefore expected that the coefficient of determination (R^2) is relatively moderate rather than close to one.

The absence of strong multicollinearity among the independent variables in the model was examined using correlation analysis.

5. Discussion

The empirical results of the study provide important insights into the relationship between banking risks and profitability in the commercial banking sector of Uzbekistan. The findings show that credit risk, represented by the share of non-performing loans, has the most significant negative impact on bank profitability. This result is consistent with previous empirical studies that highlight the role of risk factors and banking structure in determining bank profitability. Declined quality of loan book leads to increased provisioning costs and make it difficult for banks to generate sustainable profits.

The findings further suggest that operating expenses and capital adequacy do not play a statistically significant role in profitability within the 32 banks in the sample. This may be due to structural features of the Uzbek banking sector; differences in operational efficiency between banks are still transmitted to financial performance only to a limited extent. Banks with higher capital buffers may pursue more cautious lending strategies, which will help limit profitability in the short run.

At a high level, this analysis implies that bigger banks will generally have higher operational risk (and thus operational risk capital) driven by their more complicated operations and larger systems of highest transactions. These results emphasise the need for strengthening internal control systems, the need for operational risk monitoring

mechanisms and the overall risk management practices so that there would be a sustainable development of banking sector [15].

6. Conclusion

This study examined operational risk assessment and its relationship with profitability in commercial banks of Uzbekistan using financial data from 35 banks. Operational risk levels were calculated based on the Basic Indicator Approach (BIA) recommended by the Basel II framework and adapted to the regulatory requirements of the Central Bank of Uzbekistan.

The results show that larger banks tend to demonstrate higher operational risk levels due to the scale and complexity of their operations. Credit risk (measured as the share of non-performing loans) has the strongest statistically significant and negative impact on bank profitability based on the regression analysis. On the other hand, operating expenses and capital adequacy exerted an insignificant impact on profitability.

In conclusion, the results emphasize the need for adequate credit risk management practices as well as appropriate operational risk monitoring settings for sustainable banking sector financial performance.

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