# EFFECTS OF INTERNAL CONTROL SYSTEM ON CREDIT RISK AND FINANCIAL PERFORMANCE OF THE MOLDOVAN BANKS

**Associate Professor, Ph.D. Stela CIOBU**
Academy of Economic Studies of Moldova, Republic of Moldova
E-mail: stela.ciobu@gmail.com
**Ph.D. Student, Ion CARA**
Academy of Economic Studies of Moldova, Republic of Moldova
E-mail: ion.cara3@gmail.com

*Abstract: The research represents a microeconomic investigation of the control system in the Republic of Moldova's banking sector. The objective of this work is to examine the relationship between the internal control system, credit risk and financial performance of banks from the Republic of Moldova. The study is carried out based on the data of eleven banks that are part of the Moldovan banking system, for the period 2017 - 2021, being analyzed three different regression models. This study includes a strong quantitative research in which the dependent variables represented by the share of non-performing assets in total loans, return on equity and return on assets are used to test the relationship with the independent variables. Therefore, the independent variables considered are representative indicators of the five elements of the internal control (control environment, risk assessment, control activities, monitoring, information and communication systems), according to the Committee of Sponsoring Organizations of the Treadway Commission. The results identified the formation of relationships between the internal control system and credit risk, as well as its impact on the financial performance of the Moldovan Banks, thus accepting the alternative hypotheses of the study. Concomitantly, the results were compared with studies related to the subject investigated by other researchers.*

*Keywords: financial performance, credit risk, banking system, internal control.*
*JEL Classification: G21, M42.*

## 1. Introduction

The stability of the Republic of Moldova's banking system is essential for the well functioning and sustainable development of the country's economy. Currently, the highly competitive financial sector forces banks to make the most efficient use of their resources. This fact urges bank management and decision-makers to compare bank activities with the other competing banks' activities (Dogan, 2013). Based on the internal control objectives, the bank's stability and profitability depends to a large extent on its ability to manage its assets, the amount of equity and the probability of incurring losses (Amissah, 2017). Banks' equity capital is often insufficient to operate efficiently, especially to make a profit. Given the high level of interbank lending, ensuring a sufficient level of profitability of banking activities becomes particularly relevant. In the context of the many challenges faced by the Moldovan banking system over the past few years, it has continued to record a satisfactory financial performance, and has maintained strong profitability and solvency positions. However, the subject addressed is of major importance and topical relevance to the Republic of Moldova, as the banking internal control system requires continuous development. A poorly developed internal control system may affect banks' ability to detect fraudulent activities and subsequently lead to a decline in their performance (Adeyemi, and Adenugba, 2011). However, the appropriate internal control management models and practices will significantly mitigate potential risks. Therefore, could be avoided various problems such as: loss of investor funds, loss of employee welfare, customer dissatisfaction, disputes over company growth, reputational damage and insolvency (Gamage, Lock and Fernando, 2014). Financial performance, however, represents a measure of the bank's strategic risk management, which also characterizes the implementation of bank's the plans that have been developed to achieve its strategic objectives (Yushkova, 2017). It should be noted that there has not been identified any

research on the impact of the internal control system on the financial performance of the Republic of Moldova's banking sector, which is to be investigated primarily in this study. However, the scope of the research does not provide findings that could be generalized. In addition, the study provides suggestions on how the financial performance of banks could be improved. Thus, the purpose of this paper is to examine the relationship between the internal control system, credit risk and financial performance of banks in the Republic of Moldova through the financial indicators: return on assets (ROA) and return on equity (ROE). Limitations of the research include methodology and data, affected by the fact that only a part of banks have published detailed aspects of the internal control system which complicates the creation of comprehensive databases. Another aspect that limits the study is the period used, which covers five years (2017-2021), thus the paper cannot be used to generalize the effects of internal control systems on financial performance and credit risk of banks. Nevertheless, the application of the study can contribute to the literature related to the financial performance and credit risk of the Moldova's banking system from a theoretical and practical point of view.

## 2. Literature approach and research hypotheses

The banking efficiency is largely determined by the proper organisation of internal control, which, according to the COSO definition, represents a structured system designed and controlled by the entity's governing bodies whose purpose is to increase the efficiency and effectiveness of activities, ensuring compliance of activities with the regulatory framework and improving the reliability of financial reporting. The internal control system is vitally important for the institution to achieve its ultimate objectives and enables banks to foresee potential problems that may cause financial losses and thus prevent or minimise any future losses (Gundogdu, 2013). The National Bank of the Republic of Moldova defines internal control activity in banks as „a system that ensures efficient operations, adequate risk control, prudent conduct of business, credibility of reported financial and non-financial information, both internally and externally, as well as compliance with the legal and regulatory framework, supervisory requirements and the bankțs internal rules and decisions." ( Regulation on Banking Activity Management Framework, approved by the Decision of the Executive Board of the National Bank of Moldova, no. 322/2018). According to Adeyemi and Adenugba (2011) the role of internal control is to ensure that financial, operational and compliance controls are properly carried out (Adeyemi and Adenugba, 2011).

An important internal control element is the bankțs risk management system, which is a set of methods and techniques of bank staff to ensure a positive financial result and bank performance in case of uncertainty in the operating environment, as well as to estimate the occurrence of risk events and take action to exclude or reduce negative effects (Lavrushina and Valentsova, 2016). According to Babatunde and Olaniran (2009) there are three levels of determinants of institutional performance. The first is related to external factors that cannot be controlled within the organisation and are economy wide. The internal factors that are directly controlled by organisations is the next level and include managerial efficiency, corporate governance structure, etc. Therefore, other factors such as scope of activity, size and leverage also affect the performance of entities (Babatunde and Olaniran, 2009; Sobhy, Ehab and Hussain, 2017). Defining performance, the time interval and the benchmark are important aspects that need attention, as there may be differences between previous and future performance. There are studies such as those by Santos și Brito (2012) that demonstrate that previously generated outperformance does not guarantee future outperformance (Santos and Brito, 2012).

Most of the existing studies on assessing the relationship between the internal control system and banks' financial performance is based on correlation methods, which consequently leads to inconclusive findings. Correlation analysis is not suitable to identify the magnitude of variables that influence or estimate the outcome of the other, but only to assess associations or relationships between variables (Fink, 2013). Similar studies had been carried out by various researchers (Tseng, 2017; Dineshkumar and Kogulacumar, 2013; Chebungwen and Kwasira, 2014; Muraleetharan, 2011) being based on analysis of participants in industries other than banks, which stated that there existed a relationship between internal control and financial performance. Likewise, Ejoh and Ejom (2014) demonstrated in their research that there is no significant relationship between financial performance and the internal control system (Ejoh and Ejom, 2014). The assessment of the impact of control on financial performance in banks had also been studied by Otoo, Asumah, Peprah-Amankona, and Andzie, (2021) addressing quantitative research on Ghanaian banks using primary data, stating that if management make appropriate decisions related to internal control management, bank performance will eventually increase (Otoo et al., 2021). Umar H. and Umar D. M. (2018), assessed the effects of the control system in Nigerian banks on their performance using primary data, finding a positive and significant link between elements of internal control and bank performance (Umaru and Muhamed, 2018). Qualitative research conducted by Niyonsenga and Abuya (2017) related to financial institutions, shown that internal control not only influences profitability and capital growth, but also contributes to the risk management process (Niyonsenga and Abuya, 2017). Assessing the impact of internal control on the financial performance of banks in Kenya had been also studied by Asiligwa and Rennox (2017), on primary data collected from 43 banks, demonstrating that banks achieve good financial efficiency if they implement and maintain their internal control system, including five components according to COSO (Asiligwa and Rennox, 2017). Koutoupis and Malisiovas (2019) in their research, had analyzed the impact of internal controls on profitability, credit risk and compliance based on primary data collected from 210 of the largest banks in the United States of America's banking system over a 5-year period. As a result, they demonstrated that the elements of internal control i.e. control environment, risk assessment, control activities, monitoring, reporting and communication affect as credit risk and financial performance as well as the compliance of banks (Koutoupis and Malisiovas, 2019). However, the relationship between internal control and credit risk based on the Spanish banking system was studied by Akwaa-Sekyi and Moreno (2016), which had identified that all elements of internal control have a strong impact on credit risk. The same researchers also found that internal control has a significant impact on credit risk in European banks, using variables such as return on assets, bank size, inflation, interest rates and GDP growth (Akwaa-Sekyi and Moreno, 2016; Pham, 2021). To examine the impact of correlations between financial performance and internal control on the Jordan's banking sector, Pakurár, Haddad, Nagy, Popp and Oláh (2019) identified a significant link between internal control and financial performance (Hanoon, Rapani and Khalid, 2020; Pakurár et al., 2019).

Taking into considerations the literature approach and the researches taken on the subject, the null form of the working hypotheses established for this study has been formulated as follows:

$H_01$: *The internal control system does not have a significant impact on the financial performance of banks in the Republic of Moldova;*

$H_02$: *The internal control system does not have a significant impact on the credit risk of banks in the Republic of Moldova.*

### 3. Methodology of research

The research methodology used is predominantly quantitative, based on deductive statistical analysis to test the formulated hypotheses and identify cause-effect relationships. The information support of the study consists exclusively of secondary data: published information and annual reports of the eleven licensed banks from the Republic of Moldova, statistical data from the official website of the National Bank of Moldova observed during the period 2017 – 2021 yeasr, which represent a total number of 55 observations included in the analysis.

Furthermore, information resources from the normative acts of the Republic of Moldova and results of scientific research have been used. The study contains resource constraints due to difficulties in accessing data. The data are organized into panel data as both time series and cross-sectional were included, and this method „reduces the multicollinearity of the explanatory variables and also increases the efficiency of the econometric estimates" (Hsiao, C., 2003).

The assessment of the impact of the internal control system on financial performance was performed by developing a multiple regression equation using the least squares method. In order to collect the data, centralize the indicators and perform the calculations, Excel spreadsheet software was used, however, the analysis of the relationships between the variables studied and the statistical tests were performed using the econometric analysis program EViews 12 Student Version.

### 3.1 Description of variables

The dependent variable used in this study, which reflects credit risk, is represented by the rate of non-performing loans in the bank's total loan portfolio (fig. nr.1), similar to representations found the researches of Koutoupis and Malisiovas (2019) and Akwaa-Sekyi and Moreno (2016). At the same time, the dependent variables reflecting relevant financial performance indicators to be explained in the models are return on assets (fig. 2) and return on equity (fig. 3). According Capraru, Petria și Ihnatov (2015), banks' financial performance is generally quantified using return on assets and return on equity. Return on assets as a proxy for profitability has also been used by Naceur (2003) și Ozili (2015) in order to assess the profitability of the banking sector in Tunisia and Nigeria but Sergi, Choudhry, Davidovic and Fidanoski (2018), in the analysis of the banking sector in Croatia. Whilst attempting to define the factors affecting the effectiveness of internal controls Wang și Wang (2015) demonstrated the relationship of ROA dependence on the asset size of a United States bank holding company. Aladwan (2015) identified that while asset volumes are increasing, profitability is decreasing in Jordan's banking sector.

The use of ROA is appropriate as it assesses the efficiency of the use of assets in terms of the profit achieved, calculated as the ratio of net profit to total assets. ROE, however, is one of the main and most important indicators of efficient investment of shareholders' money, being calculated as the ratio of net profit earned to shareholders' equity. At the same time, this indicator can assess the risk level of a bank's loan portfolio which is determined by the borrower's credit risk level (Borovykh, 2018). Xu and Gao (2015) prooved that the asset size of organisations negatively affects ROE and positively affects the reliability target.

Following an in-depth study of the literature, it was considered appropriate to use the independent variables comprising the elements of internal control (control environment, risk assessment, control activities, monitoring, reporting and communication) according to the COSO model and their representative indicators. The description of the variables used in the analysis as well as their symbol, calculation and definition are explained in Table 1.

## Table 1. Description of varibles

| Variable type | Internal control elements | Acronym | Definition | Representative indicators |
|---|---|---|---|---|
| **Dependent variables** | | CR_RISK | Credit risk | Non-performing loans / Total loans |
| | | ROE | Return on equity | Net profit / Shareholder's equity |
| | | ROA | Return on assets | Net profit / Total assets |
| **Independent variables** | **Control environment** | DIM_CB | Size of the Bank Board | Total number of Bank Board members at the end of the financial year. |
| | | PD_IND | Bank Board Independence | Share of independent members in the total number of Bank Board members. |
| | **Risk assessment** | ANV_TA | Asset utilization efficiency | Non-income producing assets / Total assets |
| | | CAP_ADEQ | Capital adequacy ratio | (Tier I capital + Tier II capital) / Risk Weighted Assets |
| | **Control activities** | CR_TA | Ensuring credit limits | Loans/Total assets |
| | | CR_DEP | Compliance and prudence | Loans/Deposits |
| | **Monitoring** | AUD | Using one of the top 6 audit entities | Binary variable that takes the value "1" when the audit of the financial statements has been performed by one of the top 6 audit entities and the value "0" otherwise. |
| | **Communication and information systems** | FRF | Reliability of financial reporting | Binary variable that takes the value "1" when the bank has adhered to international standards and submitted financial reports on time and the value "0" otherwise. |
| **Control variables** | | DIM_B | Bank size | Variable quantified by logarithm of total assets. |

*Source: Developed by the authors, based on review of scientific literature*

In order to highlight the dependence between variables expressing internal control (dependent variables) and those expressing financial performance (independent variables), the following form of multiple regression models were used:

### Figure 1. Model 1 (Dependent variable - credit risk)

$$CR\_RISK_{it} = \beta_0 + \beta_1 \times DIM\_CB_{it} + \beta_2 \times PD_{IND_{it}} + \beta_3 \times ANV_{TA_{it}} + \beta_4 \times CAP_{ADEQ_{it}} + \beta_5 \times CR_{TA_{it}} + \beta_6 \times CR_{DEP_{it}} + \beta_7 \times AUD_{it} + \beta_8 \times FRF_{it} + \beta_9 \times \ln(DIM\_B_{it}) + \varepsilon_{it}$$

(1)

### Figure 2. Model 2 (Dependent variable - ROA)

$$ROA_{it} = \beta_0 + \beta_1 \times DIM_{CB_{it}} + \beta_2 * PD_{IND_{it}} + \beta_3 \times ANV_{TA_{it}} + \beta_4 \times CAP_{ADEQ_{it}} + \beta_5 \times CR_{TA_{it}} + \beta_6 \times CR_{DEP_{it}} + \beta_7 \times AUD_{it} + \beta_8 \times FRF_{it} + \beta_9 \times \ln(DIM_{B_{it}}) + \varepsilon_{it}$$

(2)

### Figure 3. Model 3 (Dependent variable - ROE)

$$ROE_{it} = \beta_0 + \beta_1 \times DIM\_CB_{it} + \beta_2 \times PD_{IND_{it}} + \beta_3 \times ANV_{TA_{it}} + \beta_4 \times CAP_{ADEQ_{it}} + \beta_5 \times CR_{TA_{it}} + \beta_6 \times CR_{DEP_{it}} + \beta_7 \times AUD_{it} + \beta_8 \times FRF_{it} + \beta_9 \times \ln(DIM\_B_{it}) + \varepsilon_{it}$$

(3)

The models consider the following equation:

### Figure 3. The regression equation

$$Y_{it} = \beta_0 + \beta_1 \times X_{1i} + \beta_2 \times X_{2i} + \beta_n \times X_{nt} + \varepsilon_{it} \tag{4}$$

where, $Y_{it}$ is the dependent variable; $\beta_0$ is the constant variable; $\beta_1$, $\beta_1...\beta_n$ are the coefficients of the independent variables; $X_{1i}$, $X_{2i}$,…, $X_{nt}$ denote the independent variables; $\varepsilon_{it}$ is the stochastic error term for banks, which shows the risk that other factors which not included in the econometric model influence banks' financial performance; i denotes the unit in the cross-sectional series and t denotes the size of the time series.

### 4. Research results

This section of the paper presents the analysis and discussion of the data obtained from the data collection process.

### 4.1 Descriptive statistics

In order to ensure the validity of the results, has been conducted a descriptive individual-level analysis and an overview of the dependent, independent and control variables used in the study over the period 2017 - 2021.

According to the results in Table 2, the average credit risk was 10.6%, with a standard deviation of approximately 7.6%. The minimum value of the indicator is 2,1%, while the maximum recorded 34.1%, which indicates that there is a significant difference in credit risk in Moldovan banks. The reason for this difference stems from the fact that banks have made efforts to reduce the share of non-performing loans from their loan portfolio. The average ROE was 9.1%, with a standard deviation of approximately 6.1%. The minimum value of the indicator is -8.7%, and the maximum constitutes 23.1%, which indicates that there is a significant difference in the ROE of banks in the Republic of Moldova. This difference may be due to the fact that banks have financially outperformed. The average ROA was 1.6%, with a standard deviation of approximately 0.9%. The minimum value of the indicator is -2.2%, and the maximum is 3.7%, which indicates that there is a significant difference in the return on investment of banks in the Republic of Moldova. This difference may result from the banks' asset size and financial performance and thus reflects the bank's profitability (Bani-Khaled, 2021).

### Table 2. Descriptive statistics

| Variabile | Mean | Median | Maximum | Minimum | Std. deviation | Skewness | Kurtosis | Jarque-Bera |
|---|---|---|---|---|---|---|---|---|
| CR_RISK | 0,106 | 0,081 | 0,341 | 0,021 | 0,076 | 1,671 | 5,268 | 37,377 |
| ROE | 0,091 | 0,083 | 0,231 | -0,087 | 0,061 | -0,069 | 3,383 | 0,380 |
| ROA | 0,016 | 0,017 | 0,037 | -0,022 | 0,009 | -1,193 | 6,961 | 49,013 |
| DIM_CB | 5,146 | 5,000 | 8,000 | 2,000 | 1,458 | -0,255 | 2,527 | 1,107 |
| PD_IND | 0,869 | 1,000 | 1,333 | 0,250 | 0,244 | -1,058 | 3,238 | 10,393 |
| ANV_TA | 0,215 | 0,217 | 0,414 | 0,094 | 0,074 | 0,572 | 3,148 | 3,054 |
| CAP_ADEQ | 0,353 | 0,328 | 0,981 | 0,189 | 0,147 | 1,681 | 7,316 | 68,581 |
| CR_TA | 0,428 | 0,421 | 0,665 | 0,188 | 0,105 | 0,074 | 2,736 | 0,211 |
| CR_DEP | 0,618 | 0,590 | 1,230 | 0,260 | 0,217 | 1,207 | 4,534 | 18,747 |
| AUD | 0,691 | 1,000 | 1,000 | 0,000 | 0,466 | -0,826 | 1,683 | 10,235 |
| FRF | 0,946 | 1,000 | 1,000 | 0,000 | 0,229 | -3,923 | 16,391 | 552,025 |
| LOG(DIM_B) | 22,371 | 22,101 | 24,340 | 20,461 | 1,037 | 0,219 | 1,823 | 3,614 |

*Source: Prepared by the authors based on results obtained using the econometric analysis program EViews 12 Student Version.*

With regard to the independent variables, it should be noted that, from the perspective of the control environment, the average number of bank board members is

about 5, while it is characterised by a high degree of independence, with an average value of 86.9%. According to Albouy and Aissa (2009), bank board size exceeding nine members is considered large (El Idrissi and Alami, 2021). The risk assessment component is described by the efficiency of asset utilisation and the capital adequacy ratio. Therefore, an average share of non-income producing assets in total assets of 21.5%, with a standard deviation of 7.4%. Thus, a high degree of this indicator indicates that the efficiency of asset utilisation is low, but the difference between the maximum value recorded (41.4%) and the minimum (9.4%) could be explained by the changes in the shareholder structure and governing bodies of banks, respectively. The minimum value of the indicator for bank capitalisation was 18.9% and the largest 98.1%. However, the average of 35.3 % indicates a good capitalization and a ratio that is above 10% i.e. is the minimum requirement for the risk-weighted capital adequacy ratio under the new Basel III calculation. Therefore, it can be mentioned that there is no possibility of executing operations with increased risk of financial losses and the banking system of the Republic of Moldova is overcapitalized having the possibility to meet its payment obligations. Another variable that is a representative element of control activities is the ratio of loans to total assets, which is defined by the provision of credit limits. This, over the years 2017-2021 have recorded a rate of 42.8%, fluctuating between 18.8% and 66.5%, thus, higher values indicate higher exposure to credit risk. The standard deviation clearly shows some volatility related to this variable differs from each other at 10.5%. The study records an average value of 61.8, the minmum amount of 26.0 and the maximum of 123.0 related to the loans to deposits ratio. This shows both the likelihood of liquidity problems arising from delays in credit management and the degree of dependence of credit on deposits. The standard deviation also manifests that the degree of absorption of loan deposits are different from bank to bank by 21.7%.

Analysing the binary variable expressing the use of one of the top 6 audit entities as the variable of the monitoring component, the average use of their services is 69.0%. The use of this variable should denote the quality of the audit, which in turn would influence the reduction of bank risks and the improvement of the internal control system.

From the point of view of the information and communication element, the banks from the Republic of Moldova show a high degree of reliability of financial reports, adhering to international standards, therefore, about 94.6% of them submitted financial reports on time. Moreover, the distribution of the variables used in the econometric analysis shows positive skewness, since positive values of the skewness indicator are observed, with the exception of the variables representing financial performance (ROA, ROE), control environment (DIM_CB și PD_IND) and information and communication systems (AUD și FRF). The fact that the variables represent positive skewness has shown an increasing trend. Analysing the statistical information related to kurtosis, it can be seen that the variables CR_RISK, ROA, ROE, PD_IND, ANV_TA, CAP_ADEQ, CR_DEP și FRF have a coefficient greater than 3, implying a leptokurtic distribution (the distribution is more skewed than the normal distribution), i.e. the probability of occurrence of an extreme event is greater than the probability of occurrence of that event implied by a normal distribution. The other variables have a flattening distribution (the distribution is flatter than the normal distribution) because the value of the flattening coefficient is less than 3 (Manta, Badircea and Pirvu, 2018).

Following the analysis of the Jarque-Bera test results, it is observed that all variables have a probability greater than 0,05, which means that the series are normally distributed.

**4.1 Analysis of relationships between financial performance variables, credit risk and internal control system of banks from the Republic of Moldova**

The correlation analysis conducted aims to explain the positive or negative relationship between the dependent variables and the independent variables in the study, the results of which are presented in Table 3. The diagonal of the matrix represents a set of 1, being symmetric, since the correlation between the same variable is always 1.

**Tabel 3. Correlation matrix of variables**

| Variabile | CR_RISK | ROE | ROA | DIM_CB | PD_IND | ANV_TA | CAP_ADEQ | CR_TA | CR_DEP | AUD | FRF | DIM_B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CR_RISK | 1,000 | -0,007 | -0,029 | 0,182 | 0,244 | 0,598 | 0,261 | -0,500 | -0,406 | -0,373 | 0,079 | 0,160 |
| ROE | -0,007 | 1,000 | 0,935 | 0,280 | 0,037 | -0,208 | -0,654 | 0,402 | 0,199 | -0,119 | -0,012 | 0,626 |
| ROA | -0,029 | 0,935 | 1,000 | 0,171 | -0,063 | -0,148 | -0,512 | 0,319 | 0,142 | -0,270 | -0,035 | 0,450 |
| DIM_CB | 0,182 | 0,280 | 0,171 | 1,000 | -0,100 | 0,217 | -0,293 | -0,023 | -0,126 | -0,069 | 0,080 | 0,599 |
| PD_IND | 0,244 | 0,037 | -0,063 | -0,100 | 1,000 | -0,161 | 0,139 | -0,079 | 0,025 | 0,225 | 0,002 | 0,086 |
| ANV_TA | 0,598 | -0,208 | -0,148 | 0,217 | -0,161 | 1,000 | 0,208 | -0,510 | -0,347 | -0,416 | 0,071 | -0,169 |
| CAP_ADEQ | 0,261 | -0,654 | -0,512 | -0,293 | 0,139 | 0,208 | 1,000 | -0,499 | -0,234 | -0,106 | 0,080 | -0,512 |
| CR_TA | -0,500 | 0,402 | 0,319 | -0,023 | -0,079 | -0,510 | -0,499 | 1,000 | 0,599 | 0,314 | -0,174 | 0,092 |
| CR_DEP | -0,406 | 0,199 | 0,142 | -0,126 | 0,025 | -0,347 | -0,234 | 0,599 | 1,000 | 0,291 | -0,196 | -0,149 |
| AUD | -0,373 | -0,119 | -0,270 | -0,069 | 0,225 | -0,416 | -0,106 | 0,314 | 0,291 | 1,000 | 0,013 | 0,084 |
| FRF | 0,079 | -0,012 | -0,035 | 0,080 | 0,002 | 0,071 | 0,080 | -0,174 | -0,196 | 0,013 | 1,000 | 0,093 |
| DIM_B | 0,160 | 0,626 | 0,450 | 0,599 | 0,086 | -0,169 | -0,512 | 0,092 | -0,149 | 0,084 | 0,093 | 1,000 |

*Source: Prepared by the authors based on results obtained using the econometric analysis program EViews 12 Student Version.*

The credit risk variable shows the strongest correlation with the risk assessment component (asset utilization efficiency of 0,598 and capital adequacy ratio of 0,261); there is also a positive correlation with the control environment (bank board size of 0,182 and share of independent members in the total number of bank board members of 0,244); a non-significant positive credit risk relationship of 0,079 is recorded for communication and information systems. On the other hand, credit risk shows a negative correlation with control activities (loans to total assets ratio of -0,5 and loans to deposits ratio of -0,406). The financial performance indicator ROE shows a significant positive correlation with bank size of 0,626 and ROA of 0,450. The direction of the relationships of the performance indicators (ROE and ROA) with the independent variables is the same, being positively correlated with the representative indicators of the internal control components: control environment and control activities. The results indicate that, in for the banking system of Moldova, for the period 2017-2021, an increase in these indicators generates an increase in the level of financial performance.

A moderate negative correlation was identified with the monitoring component and a non-significant positive relationship was recorded with communication and information systems. High correlation coefficients (e.g. greater than 0,8) indicate high collinearity, which can cause problems in econometric estimations. Therefore, the correlation matrix analysed indicates that most of the correlations between variables are low, indicating that there is no multicollinearity problem and the data can be processed further.

**4.2 Analysis of the internal control system effects on credit risk and financial performance of banks in the Republic of Moldova**

The least squares regression analysis was tested by considering three dependent variables (Credit Risk, ROA and ROE) presented in Table 4. $R^2$ of Model 1, Model 2 and Model 3 are 0,641, 0,507 and 0,820 respectively reflecting that there is a strong positive relationship between internal control system, credit risk and banks' financial performance. $R^2$ is a signal of the goodness of fit of the data, and the higher the $R^2$ value, the higher the fit of the data to the regression model. Tbherefor, $R^2$ of 0,641 implies that the specified model fits the data well. Thus, the results indicate that independent variables consisting of representative indicators of internal control could explain changes in credit risk with 64.1%, ROA with 50.7% and ROE with 82.0%. This has also demonstrated that the alternative hypotheses of the study were accepted. Also, for all three models, the probability of the F-statistic test is zero, indicating that the models are statistically significant at the 1% threshold and have no omitted specifications.

**Tabel 4. Estimated regression of credit risk and financial performance (ROA and ROE)**

| Variabile | Model 1 (CR_RISK dependent variable) | | | Model 2 (ROA dependent variable) | | | Model 3 (ROE dependent variable) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coef | Std. error | t-Statistic | Coef | Std. error | t-Statistic | Coef | Std. error | t-Statistic |
| C | -0,873 | 0,247 | -3,537 | -0,066 | 0,035 | -1,876 | -0,627 | 0,188 | -3,327 |
| DIM_CB | -0,007 | 0,007 | -1,117 | -0,001 | 0,001 | -1,214 | -0,006 | 0,005 | -1,267 |
| PD_IND | 0,098 | 0,033 | 2,991 | 0,002 | 0,005 | 0,440 | 0,029 | 0,025 | 1,174 |
| ANV_TA | 0,659 | 0,140 | 4,699 | 0,001 | 0,020 | 0,032 | 0,017 | 0,107 | 0,154 |
| CAP_ADEQ | 0,157 | 0,075 | 2,101 | -0,014 | 0,011 | -1,294 | -0,136 | 0,057 | -2,387 |
| CR_TA | 0,130 | 0,291 | 0,447 | 0,039 | 0,041 | 0,938 | 0,158 | 0,222 | 0,713 |
| CR_DEP | -0,063 | 0,120 | -0,526 | 0,006 | 0,017 | -0,340 | 0,012 | 0,091 | 0,129 |
| AUD | -0,032 | 0,017 | -1,924 | -0,009 | 0,002 | -3,766 | -0,043 | 0,013 | -3,359 |
| FRF | -0,008 | 0,031 | -0,264 | 0,001 | 0,004 | 0,127 | 0,009 | 0,023 | 0,383 |
| LOG(DIM_B) | 0,033 | 0,011 | 3,094 | 0,004 | 0,002 | 2,407 | 0,032 | 0,008 | 3,882 |
| $R^2$ | 0,641 | | | 0,507 | | | 0,673 | | |
| Adjusted $R^2$ | 0,570 | | | 0,409 | | | 0,607 | | |
| F-statistic | 8,939 | | | 5,147 | | | 10,279 | | |
| Prob(F-stat) | 0,000 | | | 0,000 | | | 0,000 | | |

*Source: Prepared by the authors based on results obtained using the econometric analysis program EViews 12 Student Version.*

According to the table above, an inverse relationship between credit risk and control environment is observed from the perspective of bank board size. However, the risk assessment element has a considerable effect on credit risk, especially from the perspective of asset utilisation efficiency. Thus, holding all other factors constant, a 1% increase in the share of non-income producing assets in total assets leads to a 0.66% increase in credit risk, while a 1% increase in the capital adequacy ratio leads to a 0.16% increase in credit risk. The increase of the share of independent bank board members by 1%, increases credit risk by about 0.10%. Control activities, in terms of the share of loans in total assets, also show a direct relationship with the dependent variable, contrary to the results of the research carried out by Akwaa-Sekyi and Moreno (2016) [4]. Therefore, an increase e of their share by 1% would increase credit risk by 0.13%. Therefor, lowering the deposit coverage of loans by 1% would increase the credit risk by 0,06%. The internal control elements that have an inverse relationship with the credit risk of the banks analysed over the period 2017-2021 are monitoring and communication and information systems, thus, the model suggests that the use of one of the top six audit entities leads to an decrease in credit risk by 0.03% and timely financial reporting by 0.008% respectively, while the

other variables remain constant. Thus the results are similar to those obtained by Zhang, Zhou and Zhou (2007) and García-Sánchez, García-Meca and Cuadrado-Ballesteros (2017) in their researches. The control environment, likewise has an inverse relationship with credit risk, where an increase in the number of bank board members leads to a decrease in credit risk, similar to the conclusion of Koutoupis and Malisiovas (2019). In the meanwhile, the positive relationship between banks' financial performance (ROA and ROE) and the control environment is observed in terms of the share of independence of bank board members. Thus, if the other factors remain constant, increasing the share of independent members by 1% increases ROA by 0.002% and ROE by 0.029% illustrating a higher safety in placing resources in banks, while increasing the number of bank board members leads to a decrease of ROA by 0.001% and ROE by 0.006%. Different researchers, however, show negative effects of the share of independent members in the bank's board on financial performance, thus, according to them, financial performance will decrease if the number of independent members increases (Coles, McWilliams and Sen, 2001; Erickson et al., 2005).

Risk assessment from an asset utilization efficiency perspective shows a positive relationship with both financial performance proxies, while a 1% decrease in capital adequacy ratio increases ROA by 0.014% and ROE by 0.136%. Similar to risk assesment, control activities, in terms of the share of loans in total assets, also have a direct relationship with banks' financial performance. Thus, increasing their share by 1% would increase ROA and ROE by 0.039% and 0.158%, respectively. Moreover, decreasing the loan-to-deposit ratio by 1% would increase ROA by 0.006% and decrease ROE by 0.012%. Therefore, the monitoring component of internal control shows a positive relationship with financial performance and the communication and information systems show an inverse relationship with it. Khandwalla (1972) found that the sophistication of the organisation's internal control (monitoring) system is strongly correlated with the intensity of competition, from which it follows that an appropriate match between competition in the banking system and the risk management system could have an impact on the relationship between the risk management system and financial performance [24, 40]. Therefore, the aggregate impact of internal control elements on bank performance is similar to the research results Hanoon, Rapani, Khalid, Aljajawy, and Al-waeli (2021) [22] where the impact of internal control elements based on primary data in the Iraqi banking system was assessed.

## 5. Conclusions

The results of the study illustrate that the aggregate influence of internal control elements is positive in terms of credit risk and financial indicators ROA and ROE. Thus, based on the research conducted, it was concluded that in the case of the banking sector in the Republic of Moldova, an effective internal control system implies better financial performance and lower credit risk. According to the results obtained, by testing the null hypothesis $H_01$, the alternative hypothesis was accepted, which states that the internal control system exerts a significant impact on the financial performance of banks in the Republic of Moldova. Also, by testing the null hypothesis $H_02$, the alternative hypothesis was accepted, according to which the internal control system has a significant impact on the credit risk of banks in the Republic of Moldova. The control environment showed a negative relationship on both financial performance and credit risk. On the other hand, it was observed that risk assessment has a positive relationship with credit risk, which implies that increasing the value of the item's proxy variables affects the increase in credit risk and vice versa. As well, credit risk assessment also has a positive relationship with financial performance indicators, in terms of bank board independence and efficiency of

asset utilization, with a negative relationship only with capital adequacy ratio. Based on the results obtained, it is recommended that banks from the Republic of Moldova adopt advanced risk assessment procedures, which will contribute both to the efficiency of risk assessment and to the increase of financial performance. While carrying out their activities, banks should organise an effective internal control system that not only ensures the bank's compliance with legal and regulatory requirements but, most importantly, helps to assess, manage and control the risks related to the transactions they carry out. Control activities and communication and information systems, although negatively related to credit risk, have shown a positive relationship with financial performance. It is therefore recommended that banks strengthen their communication and information systems by providing qualitative information to support the other elements of internal control, which will lead to the other elements of internal control becoming more effective and improving performance. Particular attention needs to be paid to monitoring, which reflected a positive relationship with all the dependent variables of the study. In this context, it is recommended to organise independent process reviews as well as continuous assessment of control activities through regular internal reviews. Limitations of the research include methodology and data, affected by the fact that only a proportion of banks publish detailed aspects of their internal control system which complicates the creation of comprehensive databases. Another aspect that limits the study is the time period, which covers five years (2017-2021), thus the paper cannot be used to generalize the financial performance and effect on credit risk of banks. Anyway, the application of the study can contribute to the literature related to the financial performance and credit risk of the Republic of Moldova's banking system from a theoretical and practical point of view.

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