Jasmina Džafić[1]
Mirza Mulić[2]
https://doi.org/10.62900/BHEF252102006

PORTFOLIO QUALITY AND PROFITABILITY IN THE MICROCREDIT SECTOR UNDER CRISIS CONDITIONS: PANEL EVIDENCE FROM BOSNIA AND HERZEGOVINA

ABSTRACT

The aim of this research is to empirically examine the impact of the COVID-19 pandemic on the profitability of the microcredit sector in Bosnia and Herzegovina, with a particular focus on changes in the quality of microcredit portfolios. The analysis is conducted on a sample of the largest microcredit institutions in B&H, covering approximately 80% of the market, using panel data from 2018 to 2024 through 28 quarterly reports. Portfolio quality is operationalized through the portfolio at risk rate (PAR>30), loan write-offs, and the loss reserve ratio, while profitability is measured by return on assets (ROA) and return on equity (ROE). The research employs basic and additional panel regression models, including income diversification indicators and the "COVID portfolio." The results show that all key portfolio quality variables had a negative impact on profitability, with statistically significant effects recorded for the loan write-off rate, PAR>30, and the pandemic period. Additionally, the analysis of a focused portfolio strategy shows that greater income diversification reduces profitability, while the ' COVID portfolio' further weakens the positive effects of a focused portfolio strategy. The results obtained confirm that the pandemic had a strong negative impact on the financial performance of the microcredit sector, highlighting the importance of credit risk management, strategic portfolio focus and the implementation of regulatory measures to preserve the stability of institutions under crisis conditions.

Keywords: *microfinance institutions, portfolio quality, profitability, COVID-19 pandemic, credit risk.*

JEL: G21, G32, C23

1 Associate Professor, University of Zenica, Faculty of Economics, Fakultetska bb, 72 000 Zenica, email: jasmina.dzafic@unze.ba, https://orcid.org/0009-0001-1889-0027

2 MA, University of Zenica, Faculty of Economics, Fakultetska bb, 72 000 Zenica, EKI Microcredit Company/ Microcredit Foundation, email: mirza.mulic@dl.unze.ba, https://orcid.org/0009-0008-8640-1177

1. INTRODUCTION

Microfinance institutions (MFIs) play a significant role in the financial systems of developing and transition countries, as they provide access to financial services for populations and businesses that are often excluded from the formal banking system. The stability and sustainability of the microfinance sector largely depend on the quality of loan portfolios and the ability of institutions to manage credit risk, especially during economic disruption.

Unlike previous economic and financial crises, which were mostly financial in origin and gradually spilled over into the real sector, the COVID-19 pandemic represents a specific form of exogenous shock that has simultaneously hit the real economy, the labor market, and the financial sector. Restrictions on movement, business interruptions, and the decline in household and small business income have directly affected the ability of microcredit beneficiaries to meet their obligations, leading to deterioration in the quality of microcredit portfolios.

In order to mitigate the negative effects of the pandemic, microfinance institutions, with the consent and supervision of regulatory authorities, have implemented a number of crisis measures, including repayment deferrals (moratoria), rescheduling and refinancing existing liabilities, reducing interest rates, and providing special credit lines. Although these measures have played an important role in preserving client liquidity and system stability in the short term, they have also led to changes in portfolio structure and a potential increase in credit risk in the medium and long term.

In Bosnia and Herzegovina, the microfinance sector recorded relatively stable growth and a satisfactory level of portfolio quality in the period before the pandemic, which is the result of an improved regulatory framework and increased supervision over the operations of microcredit organizations. However, the COVID-19 pandemic has led to significant changes in the business environment, resulting in an increase in loan repayment delays, an increase in write-offs, and changes in the structure of loan placements. In such conditions, the issue of the impact of the deterioration in microcredit portfolio quality on the profitability of microfinance institutions gains particular importance.

Given that profitability is a key prerequisite for the long-term sustainability of microfinance institutions, as well as their ability to continue fulfilling their developmental and social role, analyzing the relationship between portfolio quality and profitability in the context of a pandemic is an important research question. It is particularly important to examine this relationship in the context of Bosnia and Herzegovina, given the specificities of the domestic microfinance market, the high degree of sector concentration, and the significant share of microfinance in financing micro and small enterprises.

Accordingly, this research empirically examines the effect of changes in microcredit portfolio quality during the COVID-19 pandemic on the profitability of microfinance institutions in Bosnia and Herzegovina, using panel regression analysis and financial indicators of profitability and credit risk.

2. REVIEW OF PREVIOUS RESEARCH

The empirical literature on the impact of the COVID-19 pandemic on microfinance institutions indicates negative effects on the financial stability, loan portfolio quality, and profitability of microfinance institutions (MFIs), with regional differences in the intensity of these effects. Global analyses show that microfinance institutions in Latin America, the Caribbean, and the Middle East and North Africa were more strongly affected by increased credit risk, a decline in receivables collection, and a decrease in the number of active clients, whereas MFIs in Europe and Central Asia recorded relatively milder negative effects, which is partly attributed to a stronger regulatory framework and greater access to government support (Campos, Foschi, and Dunkel, 2020).

Zheng and Zhang (2020), analyzing data from 73 microfinance institutions across 11 Asian countries, examined the impact of the COVID-19 pandemic on the financial and social efficiency of MFIs using the DEA method. Their results indicate that higher interest rates are associated with lower financial efficiency during the pandemic, as they increase the likelihood of default in extraordinary circumstances. At the same time, the authors point out that demand for microcredit in crisis periods may increase, but such growth is often accompanied by deterioration in portfolio quality, which negatively affects the long-term profitability of institutions.

The relationship between portfolio quality and the profitability of microfinance institutions has been discussed in detail in a number of empirical studies prior to the pandemic, but crisis conditions have further emphasized the importance of this relationship. Indicators such as portfolio at risk (PAR>30), loan write-offs, and loss provisions are recognized in the literature as key determinants of financial performance, measured by return on assets (ROA) and return on equity (ROE). Research confirms that the growth in non-performing loans has a direct negative impact on MFI profitability through increased provisioning costs and reduced interest income (Cull, Demirgüç-Kunt, and Morduch, 2018; Churchill and Marr, 2017).

During the COVID-19 pandemic, this negative relationship became even more pronounced. Duho et al. (2021), analyzing the Ghanaian microfinance sector using panel data, examined the relationship between revenue diversification and profitability measured by ROA and ROE. Their results indicate a statistically significant negative association between revenue diversification and profitability, suggesting that a focused business strategy based on core lending activities can have a more favorable effect

on the financial performance of microfinance institutions under crisis conditions. These findings are particularly relevant in the context of a pandemic, when increased complexity in business models can further burden risk management.

Afrah and Abdullahi (2021) discussed the impact of the COVID-19 pandemic on microfinance institutions and small enterprises in Somalia, using primary data collected through questionnaires and interviews. Their findings confirm the strong negative impact of the pandemic on clients' ability to repay loan obligations, which was directly reflected in the deterioration of portfolio quality and a decline in MFI profitability. The authors emphasize that regulatory measures, such as moratoriums and rescheduling, had a short-term stabilizing effect but did not completely prevent the growth of credit risk.

Similar conclusions have been confirmed in studies focusing on countries with high levels of poverty, such as Nigeria. Nwadiubu and Onwuka (2021) indicate that the pandemic further limited access to formal financial services, especially in rural areas, forcing households to rely on informal sources of financing at high costs. At the same time, microfinance institutions faced an increase in loan arrears and a decrease in profitability, despite government support measures.

An analysis of the microfinance sector in Nepal (Shrestha, 2020) shows that the lockdown measures led to a decline in lending activity, an increase in portfolios at risk, and a deterioration in the financial performance of microfinance institutions. Although regulatory relief temporarily preserved the sector's liquidity, the author points out that long-term risks to the sustainability of microfinance institutions remain significant, particularly in terms of an increase in loan write-offs after the end of crisis measures.

Empirical evidence from Pakistan (Kashif et al., 2020) further confirms the strong negative impact of the pandemic on clients' ability to repay loans, with a significant drop in repayment rates during the lockdown period. The authors indicate that moratoriums and rescheduling led to a temporary improvement in collection indicators but at the same time concealed the real level of credit risk. Similarly, research in Cambodia suggests that the pandemic deepened the problem of over-indebtedness among microfinance clients, questioning the long-term sustainability of the microfinance model based on intensive lending (Brickell et al., 2020).

In Europe, research by the Microfinance Center (Dąbrowska, Koryński, & Pytkowska, 2020) shows that European microfinance institutions demonstrated relatively greater resilience to the pandemic shock compared to institutions in developing countries. However, the authors emphasize that the resilience of the sector is largely the result of strong regulatory support, while MFI clients remained highly vulnerable, which may have negative implications for portfolio quality and the profitability of institutions in the long term.

A review of the relevant literature indicates that the negative effects of the COVID-19 pandemic on microfinance institutions are widely documented, particularly in terms of the deterioration of loan portfolio quality and the reduction in profitability. However, most existing empirical research focuses on individual aspects of business or specific regional contexts, while fewer studies simultaneously analyze the impact of different indicators of portfolio quality (portfolio at risk, loan write-offs, provisions), crisis measures (moratoria, rescheduling), and business strategy on the profitability of microfinance institutions, as measured by ROA and ROE.

In this sense, this research contributes to the existing literature through an empirical analysis of the microfinance sector in Bosnia and Herzegovina, using panel data for leading microfinance institutions during the pre-pandemic and pandemic years. This allows for a comprehensive overview of the impact of changes in microcredit portfolio quality during the COVID-19 pandemic on the profitability of the sector, while taking into account the specificities of the domestic regulatory and market environment.

3. METHODOLOGY, ANALYSIS OF RESEARCH RESULTS, AND DISCUSSION

The microcredit sector in Bosnia and Herzegovina prior to the COVID-19 pandemic was characterized by stable growth, satisfactory profitability, and high-quality loan portfolios, largely a result of improved internal control mechanisms, as well as continuous supervision and regulatory activities by banking agencies. Such an environment enabled microcredit institutions (MCIs) to operate with relative stability and manage credit risk efficiently.

However, the outbreak of the COVID-19 pandemic in 2020 and 2021 led to significant changes in the operating conditions of microcredit institutions, especially in terms of the structure and quality of loan portfolios. In order to mitigate the negative economic consequences of the pandemic, microcredit institutions, with the consent of regulatory authorities, implemented a number of extraordinary measures, including deferral of loan repayments (moratoria), restructuring and refinancing of loan obligations, introduction of special credit lines, and adjustment of interest rates. Although these measures were aimed at preserving client liquidity and the stability of the real sector, questions arose regarding their long-term impact on the financial performance of microcredit institutions.

Based on the above, the main objective of this research is to empirically examine the impact of changes in the quality of microcredit portfolios, caused by operation under COVID-19 pandemic conditions, on the profitability of the microcredit sector in Bosnia and Herzegovina. In accordance with this objective, the main research hypothesis is defined:

*H1**: Multiple aspects of changes in the quality of microcredit portfolios under conditions influenced by the COVID-19 pandemic had a negative impact on the profitability of the microcredit sector.*

In order to test the main hypothesis, the research employs two dependent variables that represent the most commonly used indicators of profitability of microcredit institutions, namely return on assets (ROA) and return on equity (ROE). The quality of the microcredit portfolio is operationalized through key credit risk indicators that are commonly applied in the practice of microcredit institutions, namely the loss reserve ratio, the portfolio at risk rate over 30 days (PAR>30), and the loan write-off rate. Additionally, the impact of the COVID-19 pandemic is captured through a dummy variable that differentiates business periods affected by the pandemic from other observed periods.

Based on the defined dependent and independent variables, a basic research panel model of the following form was specified:

$$Y_{it} = \alpha + \beta_1 X_{it1} + \beta_2 X_{it2} + \beta_3 X_{it3} + \beta_4 \text{dummy}_{it4} + \varepsilon_{it}$$

Where:

- Y_{it} (dependent variable) – indicators of profitability.
- X_{it1-3} – independent variables, indicators of portfolio quality.
- Dummyi_{t4} – impact of the pandemic.
- β_{1-4} – regression coefficients for the variables to be estimated in the model.
- α – intercept term.
- εit – random error of the model.

A detailed description of the variables used in the basic research model is presented in Table 1.

Table 1: Variables of the basic research model

Variable	Type of Variable	Code	Calculation
Return on Assets	Dependent variable	ROA	Net income / average assets
Return on Equity	Dependent variable	ROE	Net income / average equity
Loss Reserve Ratio	Independent variable	LRR	Loss reserves / total portfolio at the reporting date
Portfolio at Risk over 30 days	Independent variable	PAR>30	Portfolio overdue over 30 days / total portfolio at the reporting date
Loan Write-off Rate	Independent variable	LWR	Loan write-offs / average portfolio during the reporting period
COVID-19	Dummy variable	dummy_ co19	dummy(0,1) = {1 for pandemic period; 0 otherwise}

Source: Authors' research

Considering that a unique sample is used in the analysis, comprising the five largest microcredit institutions in Bosnia and Herzegovina, which together cover approximately 80% of the total market, and that the observation period spans from 2018 to 2024 based on quarterly reports, the empirical analysis is conducted using panel regression methods. The same sample is consistently applied across all specified regression models, including the basic and supplementary models, ensuring comparability of results and methodological consistency of the research.

3.1. EMPIRICAL FINDINGS RELATED TO THE CENTRAL RESEARCH HYPOTHESIS

The following table presents the results of descriptive statistics and correlation analysis of the model variables.

Table 2: Descriptive statistics results of the basic model

Variable	Obs	Mean	Std.Dev.	Min	Max
ROA	140	0.0285424	0.0217973	-0.0368	0.0598
ROE	140	0.0725435	0.0591858	-0.1447	0.169
LRR	140	0.0226934	0.0446514	0.00256	0.2712004
PAR>30	140	0.0381877	0.0528767	0.0026541	0.33546
LWR	140	0.0272304	0.0410768	0.00103	0.19845
Dummy_co19	140	0.5294118	0.5020964	0	1

Source: Authors' research

The results of the descriptive statistics indicate that the analysis was conducted on a balanced panel sample comprising 140 observations, corresponding to five microcredit institutions over a period of 28 quarters. The observed differences between the minimum and maximum values of the variables point to significant changes in the operations of the microcredit sector, which were particularly pronounced during the COVID-19 pandemic period.

Based on the correlation analysis results, it is evident that all independent variables are statistically significantly and negatively correlated with the dependent variables. The correlation is stronger between the dependent variable ROA and the independent variables compared to the dependent variable ROE. The strongest correlation is between the write-off rate variable and the dependent variables, and the lowest with the dummy variable. Among the independent variables of the model, there is a high

correlation between the write-off rate, loan loss reserves and PAR>30. These values confirm the justification for examining the influence of the independent variables on the dependent variables of the model.

Three panel models were considered in the analysis: the POLS model, the model with fixed and the model with random individual effects. In order to select an adequate panel model, the F-test and the Hausman test were conducted. The results of the F-test were used to examine the existence of individual effects, while the Hausman test was applied to choose between the models with fixed and random individual effects. Based on the results obtained, for each of the analyzed regression models, the panel approach that statistically best fits the data structure was selected. This ensured the methodological justification of the estimates and the reliability of the obtained empirical results.

Table 3: Results of the model with random individual effects, dependent variable ROA

Number of obs = 140
Wald chi2 (4) = 142.66
Prob > chi2 = 0.0000
R-squared = 0.5957 (overall)

ROA	β-koef	Std. err.	t	P > t
LRR	-.02339	.06233	-0.38	0.707
PAR>30	-.08549	.05112	-1.64	0.094
LWR	-.24472	.08682	-2.82	0.005
dummy_co19	-.00871	.00321	-2.71	0.007
Const.	.04361	.00355	12.28	0.000

Source: Authors' research

The results of the regression analysis indicate that all independent variables have a negative impact on profitability measured by return on assets (ROA). A statistically significant effect at the 5% level was observed for the loan write-off rate and the dummy variable representing the impact of the pandemic, while the effect of the PAR>30 variable was significant at the 10% level. The model as a whole is statistically significant, and its explanatory power is high, given that the coefficient of determination is 0.5957.

The following presents the results of the multiple-panel regression analysis with return on equity (ROE) as the dependent variable, for which the fixed-effects model was selected as appropriate.

Table 4: Fixed-Effects model results, dependent variable ROE

Number of obs = 140
F (2, 82) = 27.06
Prob > F = 0.0000
R-squared = 0.5285 (overall)

ROE	β-koef	Std. err.	t	P > t
LRR	-.00206	.19207	-0.01	0.991
PAR>30	-.48270	.15491	-3.12	0.003
LWR	-.46606	.26450	-1.76	0.082
dummy_co19	-.01149	.00971	-1.18	0.240
Const.	.10979	.00635	17.30	0.000

Source: Authors' research

According to the results of this model, all independent variables have a negative impact on the dependent variable ROE, with a statistically significant effect at the 0.05 level for the PAR>30 variable, while the loan write-off rate is significant at the 0.1 level. Based on the obtained p-value of the model's F-statistic, it can be concluded that the model itself is statistically significant at the defined 0.05 significance level. The explanatory power of the model is very strong, with the obtained coefficient of determination equal to 0.5285.

3.2. SPECIFICATION AND ESTIMATION OF THE FIRST SUPPLEMENTARY REGRESSION MODEL

Drawing on recent research in the field of microfinance, particularly in the context of crisis periods, it can be observed that a low degree of income diversification, i.e., the application of focused strategies in portfolio creation, significantly contributes to the profitability of microfinance institutions (MFIs). Duho, et al. (2021) examined the microfinance sector in Ghana using regression models, which showed a statistically significant negative relationship between income diversification and MFI profitability. To measure income diversification, the authors used indices developed by Leaven and Levin (2007) and the Herfindahl-Hirschman Index (Zamore, 2018). The results suggest that MFIs should focus on their traditional activities, particularly lending, rather than expanding their portfolio into various financial products, which reduces profitability.

In light of these findings and for the purpose of further examining the basic assumptions, this study analyzes the impact of income diversification on profitability of MFIs in Bosnia and Herzegovina, taking into account the specific challenges

caused by the COVID-19 pandemic. This links the existing empirical literature to the research context and formulates the hypothesis to be tested in the following section.

H1.1: A focused microcredit portfolio strategy has a positive impact on the profitability of the microcredit sector.

The specified regression model for testing this hypothesis is as follows:

$$Y_{it} = \alpha + \beta_1 X_{it1} + \beta_2 \text{dummy}_{it2} + \varepsilon_{it}$$

Where:

- Y_{it} (dependent variable) – indicators of profitability,
- X_{it1} – independent variable, diversification index,
- Dummy_{it2} – impact of the pandemic,
- β_{1-2} – regression coefficients for the variables to be estimated in the model,
- α – intercept term,
- εi_t – random error of the model.

In this model, ROA and ROE are used as dependent variables, while the independent variables include the diversification index developed by Leaven and Levin (2007) and a dummy variable capturing the impact of the COVID-19 pandemic. The diversification index is preferred over the HHI due to its simpler calculation and the fact that the results are almost identical for both indices, ensuring that the generated outcomes would remain nearly unchanged.

The independent variable, diversification index, is calculated using the following formula:

$$IDIV = 1 - \left[\frac{(net - non)}{total}\right]$$

Where IDIV is the income diversification index, net is net interest income, non is non-interest income (or other operating income), and total is total income. The calculated results are bounded between 0 and 1, making them easy to interpret using percentages. A higher index value indicates greater diversification, while a lower value indicates a more focused strategy. The results of the analysis are presented below.

Table 5: Descriptive statistics results of the first additional model

Variable	Obs	Mean	Std.Dev.	Min	Max
ROA	140	0.0285424	0.0217973	-0.0368	0.0598
ROE	140	0.0725435	0.0591858	-0.1447	0.169
IDIV	140	0.05174	0.0393349	0.003254	0.20655
Dummy_co19	140	0.5294118	0.5020964	0	1

Source: Authors' research

The descriptive statistics for the first additional model are presented in Table 6. The analysis was conducted on a balanced panel of 140 observations. The average return on assets (ROA) is 0.0285, with a standard deviation of 0.0218, ranging from a minimum of -0.0368 to a maximum of 0.0598. Return on equity (ROE) has a mean of 0.0725 and a standard deviation of 0.0592, with values spanning from -0.1447 to 0.169. The income diversification index (IDIV) shows an average value of 0.0517, a standard deviation of 0.0393, and ranges from 0.0033 to 0.2066, indicating that most microcredit institutions maintain a relatively focused portfolio strategy. The dummy variable representing the COVID-19 period (Dummy_co19) has a mean of 0.5294, reflecting that approximately 53% of the observations correspond to periods affected by the pandemic. Overall, the statistics indicate variability in profitability and diversification levels, providing a suitable basis for examining their relationships in the regression analysis.

The results of the correlation analysis suggest that conducting a regression analysis is justified, as the independent variables are negatively and statistically significantly correlated with the dependent variables, with the correlation being stronger in relation to the dependent variable ROA.

The following presents the results of the panel regression analysis for the first additional regression model.

Table 6: Random-Effects model results, dependent variable ROA

Number of obs = 140
Wald chi2 (2) = 89.06
Prob > chi2 = 0.0000
R-squared = 0.4730 (overall)

ROA	β-koef	Std. err.	t	P > t
IDIV	-.330264	.049194	-6.71	0.000
dummy_co19	-.011770	.003565	-3.31	0.001
Const.	.0518616	.003913	12.28	0.000

Source: Authors' research

According to the results of this model, both independent variables have a negative and statistically significant impact on the dependent variable ROA. Based on the obtained p-value of the model, it can be concluded that the model itself is statistically significant at the defined 0.05 significance level. The model has moderate explanatory power, with the obtained coefficient of determination equal to 0.4730.

The following presents the results of the multiple regression analysis with return on equity (ROE) as the dependent variable. The fixed-effects model was selected as appropriate.

Table 7: Fixed-Effects model results, dependent variable ROE

Number of obs = 85
F (2, 78) = 43.37
Prob > F = 0.0000
R-squared = 0.3946 (overall)

ROE	β-koef	Std. err.	t	P > t
IDIV	-1.07344	.143204	-7.50	0.000
dummy_co19	-.018282	.00998	-1.18	0.071
Const.	.137762	.00837	16.46	0.000

Source: Authors' research

According to the results of this model, the diversification index has a negative and statistically significant impact at the 0.05 level on the dependent variable ROE, while the effect of the dummy variable is statistically significant at the 0.1 level.

3.3. SPECIFICATION AND ESTIMATION OF THE SECOND SUPPLEMENTARY REGRESSION MODEL

Due to the COVID-19 pandemic, there were MFIs whose share of restructured loans in the total portfolio exceeded the maximum allowed threshold of 5%, and a "COVID portfolio" was introduced into the portfolio structure, which had to be monitored on a monthly basis. It was expected that this new category in the credit portfolio had a negative impact on profitability indicators, i.e., it reduced the positive effects of the focused MFI strategy. Based on this, the following additional hypothesis is defined:

H1.2: *The "COVID portfolio" significantly reduces the positive effects of a focused microcredit portfolio strategy.*

Data on the "COVID portfolio" for the selected MFIs in the sample were not available in the quarterly reports used for the previous analyses. Using survey questionnaires

for research and data collection, data on the level of the COVID portfolio for the sample institutions during the pandemic period were collected. Responsible MFI officials completed the survey questionnaire, indicating the shares of individual COVID categories in the total portfolio for semi-annual periods covering 2020 through June 30, 2022.

Based on the above, the basic research model can be specified as follows:

$$Y_{it} = \alpha + \beta_1 X_{it1} + \beta_2 X_{it2} + \beta_3 X_{it3} + \varepsilon_{it}$$

Where:

- Y_{it} (dependent variable) – profitability indicator,
- X_{it1-3} – independent variables, Covid portfolio indicators,
- β_{1-3} – regression coefficients for the variables to be estimated in the model,
- α – intercept term,
- ε_{it} – random error of the model.

Table 8: Variables of the second additional research model

Variable	Type of Variable	Code	Calculation
Return on Assets	Dependent variable	ROA	Net income / Average assets
Restructured Covid Portfolio	Independent variable	RSCoP	Amount of restructured Covid portfolio / Total loan portfolio
Refinanced Covid Portfolio	Independent variable	RFCoP	Amount of refinanced Covid portfolio / Total loan portfolio
Moratorium	Independent variable	MOR	Amount of approved moratorium / Total loan portfolio

Source: Authors' research

Before conducting the panel analysis, the results of the descriptive statistics and correlation analysis of the model variables will be presented.

Table 9: Descriptive statistics results of the basic model

Variable	Obs	Mean	Std.Dev.	Min	Max
ROA	25	0.0144756	0.0266571	-.0368275	.057
RFCoP	25	0.0165432	0.0075259	0.006542	.03654
RSCoP	25	0.1132553	0.047215	0.04125	.198564
MOR	25	0.0039508	0.0074778	0	.026543

Source: Authors' research

Based on the results of the descriptive statistics, it can be concluded that the data analysis was conducted on a balanced sample, as the number of observations is the same for all variables, 25 (5 microcredit institutions and 5 semi-annual periods). According to the calculated standard deviations and other descriptive statistics indicators, there is a noticeable difference between the minimum and maximum values for all variables, which is a consequence of the strong market disruption at the beginning of the pandemic that gradually stabilized over time.

Based on the correlation analysis results, it is evident that all independent variables are statistically significantly and negatively correlated with the dependent variable. The strongest correlation is observed for the share of restructured loans, while the lowest correlation is for refinanced loans. High correlation is also present among the independent variables of the model. These values confirm the justification for examining the impact of the independent variables on the dependent variable.

The results of the multiple-panel regression analysis are presented below.

Table 10: POLS model results, dependent variable ROA

Number of obs = 25
F (3, 21) = 16.83
Prob > F = 0.0000
R-squared = 0.7062
Adj R squared = 0.6642

ROA	β-koef	Std. err.	t	P > t
RFCoP	.368543	.946013	0.39	0.701
RSCoP	-.358397	.140695	-2.55	0.019
MOR	-1.37302	.595151	-2.31	0.031
const.	.0543935	.009491	5.73	0.000

Source: Authors' research

According to the results of this model, the share of restructured loans and moratoriums have a negative and statistically significant impact on the dependent variable ROA, while the share of refinanced loans has a positive effect. Based on the obtained p-value of the F-statistic, it can be concluded that the model itself is statistically significant at the 0.05 significance level. The explanatory power of the model is very strong, with a coefficient of determination of 0.7062, and an adjusted R^2 of 0.6642, indicating that 66.42% of the variation in the dependent variable is explained by changes in the selected independent variables.

The assumptions of multiple regression analysis were tested using standard diagnostic tests. The results of White's test indicate that, in most models, heteroskedasticity is not present, while Wooldridge tests show that first-order autocorrelation does not compromise the reliability of estimates, except in models where appropriate corrections were applied. Additionally, VIF test results confirm that harmful multicollinearity is not present, ensuring the stability and interpretability of the estimated coefficients.

3.4. DISCUSSION AND INTERPRETATION OF RESULTS

The previously obtained results of the specified regression models provide the basis for drawing conclusions regarding the defined research hypotheses. In the basic regression analysis, the effect of variables reflecting microcredit portfolio quality and extraordinary operating conditions on the profitability of microcredit institutions was examined, measured by return on assets (ROA) and return on equity (ROE),.

Considering the regression analysis with ROA as the dependent variable, the random-effects panel model was selected as appropriate. The results indicate that all independent variables have a negative impact on profitability measured by ROA. Specifically, the impact of the loan write-off rate and the dummy variable representing the COVID-19 pandemic period is statistically significant at the 0.05 level, while the impact of PAR>30 is significant at the 0.1 level. Based on the obtained p-value, the model as a whole is statistically significant at the 0.05 level. The explanatory power of the model is high, confirmed by a coefficient of determination of 0.5957.

In the regression analysis with ROE as the dependent variable, the fixed-effects model was selected as appropriate. The results show that all independent variables have a negative impact on return on equity, with PAR>30 statistically significant at the 0.05 level and the loan write-off rate significant at the 0.1 level. Based on the F-statistic p-value, this model is also statistically significant at the 0.05 level. The coefficient of determination is 0.5285, indicating strong explanatory power.

Based on the results of the basic regression analyses, it can be concluded that the empirical findings support the main research hypothesis: the deterioration of microcredit portfolio quality and extraordinary operating conditions during the COVID-19 pandemic had a statistically significant and negative impact on the profitability of the microcredit sector in Bosnia and Herzegovina.

In order to test the first additional hypothesis, a second regression model was specified to analyze the impact of income diversification strategies on the profitability of microcredit institutions. Considering the analysis with ROA as the dependent variable, the individual-effects panel model was selected. The assumptions of

regression analysis for ROE were not met, so those results are not considered. The results of the model with ROA as the dependent variable indicate that both independent variables—the income diversification index and the dummy variable—have a negative and statistically significant impact on profitability. The model is statistically significant at the 0.05 level, and the coefficient of determination of 0.4730 indicates moderate explanatory power. These results confirm that a focused microcredit portfolio strategy positively affects profitability measured by ROA, so the first additional hypothesis cannot be rejected.

To test the third additional hypothesis, a third regression model was specified to analyze the impact of the structure of the so-called "COVID portfolio" on microcredit institution profitability. The POLS model was selected as the appropriate panel model. The results show that the share of restructured loans and moratoriums has a negative and statistically significant impact on ROA, while the share of refinanced loans has a positive effect on profitability. The model as a whole is statistically significant at the 0.05 level, with high explanatory power: $R^2 = 0.7062$ and adjusted $R^2 = 0.6642$, meaning that 66.42% of the variation in the dependent variable is explained by the included independent variables.

These results indicate that the "COVID portfolio," through restructured loans and moratoriums, significantly reduces the previously identified positive effects of a focused microcredit portfolio strategy on profitability measured by ROA. This further confirms that short-term measures to mitigate the pandemic's effects had negative implications for the financial efficiency of microcredit institutions.

4. CONCLUSION

The analysis of the COVID-19 pandemic's impact on the profitability of the microcredit sector in Bosnia and Herzegovina shows that the pandemic had a significant negative effect on the financial performance of microfinance institutions. The results of the basic panel regression analysis indicate that all indicators of microcredit portfolio quality, including loan write-off rates, portfolio at risk over 30 days (PAR>30), and the loss reserve ratio, negatively affected profitability measured by ROA and ROE. In particular, the share of write-offs and the pandemic period significantly reduced return on assets, while PAR>30 had a significant negative impact on return on equity. These findings confirm a clear link between portfolio deterioration and reduced profitability, consistent with empirical evidence from other crisis-affected countries.

Additional analysis of income diversification indicates that a focused strategy, primarily based on core lending activities, can positively contribute to more stable profitability in crisis conditions. Panel regression models demonstrate that higher

income diversification negatively affects ROA and ROE, suggesting that expanding portfolios into multiple income sources during a pandemic can further burden risk management and reduce operational efficiency. The COVID portfolio analysis further confirms that measures such as loan restructuring and moratoriums, although necessary to preserve clients' short-term liquidity, can reduce profitability and increase credit risk in the long term.

The limitations of the study stem from the characteristics of the available data and methodological approach. First, the analysis was conducted on a sample of the five largest microcredit institutions covering approximately 80% of the market, which may limit the generalizability of the results to all microfinance institutions in the country. Second, the collection of COVID portfolio data was partially based on surveys, which may introduce subjectivity and potential deviations from actual conditions. Third, the study focused on financial profitability indicators (ROA and ROE) and key portfolio quality indicators, while other factors, such as client satisfaction, operational costs, and the socio-economic impact of loans, were outside the scope of the analysis.

Based on the results, specific recommendations can be made for management and regulators. Microcredit institution management should continuously monitor portfolio quality, especially in crisis conditions, and adjust lending strategies to preserve profitability and reduce risk. A focused portfolio strategy based on core lending activities proved more effective than broad income diversification during crises. Regulators should continue to provide support through crisis measures but in a limited and time-controlled manner to prevent long-term increases in credit risk. Finally, further research is recommended that includes a broader range of microfinance institutions and complementary socio-economic indicators to enable a more comprehensive assessment of the sector's resilience to external shocks.

LITERATURE

1. Afrah, N. & Abdullahi, M., 2021. *Economic impacts of COVID-19 on microfinance institutions and small businesses: Empirical survey from Somalia*. European Journal of Business and Management, 13(6).
2. Baydas, M., Douglas, G. & Valenzuela, L., 1997. *Commercial banks in microfinance: New actors in the world of microfinance*. USAID Microenterprise Best Practices Project Paper, No. 12.
3. Brickell, K., Picchioni, F., Natarajan, N., Guermond, V., Parsons, L., Zanello, G. & Bateman, M., 2020. *Compounding crises of social reproduction: Microfinance, over-indebtedness and the COVID-19 pandemic*. World Development, 136.

4. Campos, E., Foschi, L. & Dunkel, B., 2020. *The impact of the crisis on microfinance institutions: Analyses and perspectives*. Fondation Gramee, Credit Agricole.

5. Churchill, C. & Marr, A., 2017. *Microfinance: Principles and practice*. London: Routledge.

6. Cull, R., Demirgüç-Kunt, A. & Morduch, J., 2018. *Banking the poor: Measuring banking access around the world*. Washington: World Bank Publications.

7. Dąbrowska, K., Koryński, P. & Pytkowska, J., 2020. *Impact of COVID-19 pandemic on the microfinance sector in Europe: Field analysis and policy recommendations*. Microfinance Centre.

8. Duho, K.C.T., Agomor, P.E., Duho, D.M. & Onumah, J.M., 2021. *The profitability of microfinance and income diversification strategy in Ghana: Insights for a post-COVID-19 industry*. Dataking Working Paper Series.

9. Kashif, M. et al., 2020. *COVID-19 and the future of microfinance: Evidence and insights from Pakistan*. Oxford Review of Economic Policy, 36.

10. Leaven, I. & Levin, R., 2007. *Does financial structure matter? Evidence from microfinance institutions*. Journal of Financial Intermediation.

11. Nwadiubu, A. & Onwuka, I.O., 2021. *Does microcredit reach the poor and most vulnerable in era of pandemic? Evidence from Nigeria*. Savings and Development.

12. Shrestha, P.K., 2020. *Impact of COVID-19 on microfinance institutions of Nepal*. Nepal Rastra Bank Working Paper No. 51.

13. Zamore, S., 2018. *The Herfindahl-Hirschman index and its application in financial diversification*. New York: Finance Press.

14. Zheng, C. & Zhang, J., 2020. *The impact of COVID-19 on the efficiency of microfinance institutions*. International Review of Economics and Finance, 71.

Jasmina Džafić
Mirza Mulić

KVALITET KREDITNOG PORTFELJA I PROFITABILNOST MIKROKREDITNOG SEKTORA U USLOVIMA KRIZE: PANEL-DOKAZI IZ BOSNE I HERCEGOVINE

SAŽETAK

Cilj ovog istraživanja jeste empirijski ispitati utjecaj pandemije COVID-19 na profitabilnost mikrokreditnog sektora u Bosni i Hercegovini, s posebnim fokusom na promjene u kvalitetu mikrokreditnih portfelja. Analiza je provedena na uzorku najvećih mikrokreditnih institucija u Bosni i Hercegovini, koje obuhvataju cca. 80% tržišta, koristeći panel-podatke za period od 2018. do 2024. godine, kroz 28 kvartalnih izvještaja. Kvalitet portfelja operacionaliziran je putem stope rizičnog portfelja (PAR > 30), otpisa kredita te omjera rezervacija za gubitke, dok je profitabilnost mjerena pokazateljima povrata na imovinu (ROA) i povrata na kapital (ROE). U istraživanju su primijenjeni osnovni i prošireni panel-regresioni modeli, uključujući indikatore diverzifikacije prihoda i tzv. „COVID portfelj". Rezultati pokazuju da su sve ključne varijable kvaliteta portfelja imale negativan utjecaj na profitabilnost, pri čemu su statistički značajni efekti zabilježeni kod stope otpisa kredita, pokazatelja PAR > 30 te perioda pandemije. Dodatno, analiza strategije fokusiranog portfelja ukazuje na to da veća diverzifikacija prihoda umanjuje profitabilnost, dok „COVID portfelj" dodatno slabi pozitivne efekte fokusirane portfeljne strategije. Dobijeni rezultati potvrđuju da je pandemija imala snažan negativan utjecaj na finansijske performanse mikrokreditnog sektora, naglašavajući važnost upravljanja kreditnim rizikom, strateškog fokusa portfelja te implementacije regulatornih mjera u cilju očuvanja stabilnosti institucija u kriznim uslovima.

Ključne riječi: *mikrokreditne institucije, kvalitet portfelja, profitabilnost, pandemija COVID-19, kreditni* rizik.

JEL klasifikacija: G21, G32, C23