

SCIENTIFIC EVALUATION OF ECONOMIC AND FINANCIAL ISSUES: Theory and Practice

Editor
Dr. Şahin KARABULUT

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Editör

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κίταβevi

"En İyi
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Editör

Dr. Şahin KARABULUT

ORCID: 0000-0001-7955-6404

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FOREWORD

Economy and finance is effective in many areas such as, social welfare, public peace, global development. For this reason, it is necessary to consider social factors other than monetary facts while making decisions regarding economy and finance. On the other hand, all countries have not same level of development and the macroeconomic priorities of the countries also different. While developed countries aim to achieve a stable growth rate, undeveloped countries aim to achieve development. From this point of view, the successful results of the implemented policies depend on the correct prediction of the results in advance. However, sometimes the expected results in theory may be different in practice. It is also seen that sometimes the opposite effects are observed. On the other hand, the policies implemented for the realization of one aim may create a deviation from another aim. In this book, developments in the economic and financial fields are examined from different scientific perspectives.

The book *Scientific Evaluation of Economic and Financial Issues: Theory and Practice* has been prepared with the contributions of 49 different authors from 32 different universities, including Ağrı İbrahim Çeçen University, Aksaray University, Alanya Alaaddin Keykubat University, Avrasya University, Aydın Adnan Menderes University, Balıkesir University, Bandırma Onyedil Eylül University, Beykent University, Bilecik Şeyh Edebali University, Bingöl University, Doğuş University, Dokuz Eylül University, İstanbul Esenyurt University, Fırat University, Gaziantep University, Gebze Technical University, Giresun University, Hitit University, İstanbul Sabahattin Zaim University, İstanbul University, İzmir Katip Çelebi University, Karabük University, Kocaeli University, Maltepe University, Marmara University, Muğla Sıtkı Koçman University, Ordu University, Osmaniye Korkut Ata University, Sakarya University, Siirt University, University of Reading and Yıldız Technical University.

Şahin KARABULUT

CHAPTER AUTHORS

Prof.Dr.	Fazıl KAYIKÇI	Yıldız Technical University
Prof.Dr.	İbrahim Güran YUMUŞAK	İstanbul Sabahattin Zaim University
Prof.Dr.	Muhittin KAPLAN	İstanbul University
Assoc.Prof.Dr.	Burçak POLAT	Siirt University
Assoc.Prof.Dr.	Engin KÜÇÜKSİLLE	İzmir Katip Çelebi University
Assoc.Prof.Dr.	Hakan HOTUNLUOĞLU	Aydın Adnan Menderes University
Assoc.Prof.Dr.	Muhammed BENLİ	Bilecik Şeyh Edebali University
Assoc.Prof.Dr.	Onur POLAT	Bilecik Şeyh Edebali University
Assoc.Prof.Dr.	Özlem AYVAZ KIZILGÖL	Bandırma Onyedli Eylül University
Assoc.Prof.Dr.	Rıdvan KARACAN	Kocaeli University
Assoc.Prof.Dr.	Yasin ACAR	Bilecik Şeyh Edebali University
Asst.Prof.Dr.	Bilal ÖZEL	Bingöl University
Asst.Prof.Dr.	Bilge ERİŞ DERELİ	Marmara University
Asst.Prof.Dr.	Burcu DÜZGÜN ÖNCEL	Marmara University
Asst.Prof.Dr.	Çağrı HAMURCU	Aksaray University
Asst.Prof.Dr.	Demet ÖZOKAKLI	Gaziantep University
Asst.Prof.Dr.	Elmas DEMİRCİOĞLU KARABIYIK	İstanbul Esenyurt University
Asst.Prof.Dr.	Ezgi DEMİR	Gebze Technical University
Asst.Prof.Dr.	Fatih GÜÇLÜ	Karabük University
Asst.Prof.Dr.	Fırat GÜNDEM	Dokuz Eylül University
Asst.Prof.Dr.	Gülbahar ATASEVER	Muğla Sıtkı Koçman University
Asst.Prof.Dr.	Hilal H. ERDOĞAN	Avrasya University
Asst.Prof.Dr.	Işıl DEMİRTAŞ	Giresun University
Asst.Prof.Dr.	Işın Ulaş ERTUĞRUL YILMAZER	Maltepe University
Asst.Prof.Dr.	İsmail Erkan ÇELİK	Doğuş University
Asst.Prof.Dr.	M.Emin YARDIMCI	Kocaeli University
Asst.Prof.Dr.	Mustafa NURAN	Dokuz Eylül University
Asst.Prof.Dr.	Oğuz TÜMTÜRK	Ordu University
Asst.Prof.Dr.	Özgür UYSAL	Alanya Alaaddin Keykubat University
Asst.Prof.Dr.	Özlem DÜNDAR	Hitit University

Asst.Prof.Dr.	Özlem KUVAT	Balıkesir University
Asst.Prof.Dr.	Pınar KAYA SOYLU	Marmara University
Asst.Prof.Dr.	Şekip YAZGAN	Ağrı İbrahim Çeçen University
Asst.Prof.Dr.	Yeşim KUBAR	Fırat University
Lect.Dr.	Muhammed Hadin ÖNER	Aksaray University
Res.Ass.Dr.	Abdullah AÇIK	Dokuz Eylül University
Res.Ass.Dr.	Halil ŞİMDİ	Sakarya University
Res.Ass.Dr.	Melike TORUN	İstanbul University
Res.Ass.Dr.	Mustafa NAİMOĞLU	Bingöl University
Res.Ass.Dr.	Serdar GÖCEN	Osmaniye Korkut Ata University
Res.Ass.Dr.	Sercan YAVAN	Aydın Adnan Menderes University
Dr.	Mustafa KESGİN	Yıldız Technical University
Dr.	Seyhan AYGÜL	University of Reading
Dr.	Sinem KOÇAK	
Res.Ass.	İsmail ÖZTANIR	Aydın Adnan Menderes University
Res.Ass.	Mehmetcan SUYADAL	Beykent University
Res.Ass.	Nergis ÖZİSPA	Dokuz Eylül University
	Ahmet ÇAĞLAR	Bilecik Şeyh Edebali University
	Alsajed Asaad Kamal AL-DOORA	Karabük University

The authors are listed alphabetically according to their titles.

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WHAT DRIVES THE NON-PERFORMING LOAN RATES OF ISLAMIC AND CONVENTIONAL BANKS? A COMPARATIVE ANALYSIS BASED ON PANEL REGRESSION¹

Muhammed Hadin ÖNER²
İbrahim Güran YUMUŞAK³

1. INTRODUCTION

Unlike deposit banking, participation banking is a type of banking that operates following Islamic principles and rules. In this context, participation banks avoid manipulative transactions involving interest, speculation, and extreme uncertainty. Participation banks operate under the principles of commerce because, while usury is forbidden in the religion of Islam, trade has been made halal. Therefore, instead of lending money and providing a guaranteed return through interest, participation banks are a banking system that prefers to invest the funds on hand in commercial businesses that may involve profit or loss.

As a result of the financial crises experienced in Turkey and the world, the problem of non-repayment of loans banks gives has been able to occur. Non-repayment of loans has given birth to the concept of non-performing loans (NPLs). Increases in NPLs can adversely affect bank capital; some banks whose balance sheets deteriorate may go bankrupt while others may be forced to turn over to the public. For this reason, making reasonable determinations of the reasons for NPLs and taking measures is considered necessary. Loans that become problematic negatively affect financial markets first, then country economy and financial stability.

¹ This study is extracted from the PhD thesis of Islamic Economics and International Finance in Istanbul Sabahattin Zaim University supervised by Prof. Dr. İbrahim Güran Yumuşak.

² Lect. Dr., Aksaray University, Ortakoy Vocational School, hadinoner@aksaray.edu.tr, ORCID: 0000-0001-7746-8865.

³ Prof. Dr., İstanbul Sabahattin Zaim University, Department of International Trade and Finance, ibrahim.yumusak@izu.edu.tr, ORCID: 0000-0003-1655-9872.

The issue of NPLs is one of many new issues for Turkey. This issue has not been previously discussed because the ratio of loans to national income was meager in previous years. The balance of bank loans to national income fluctuated between 15%-20% during the 2001 Bank Reform era. In the aftermath of the reform, the banking sector directed its collected deposits to the public and government bonds and began transferring funds to the private sector. Consequently, loans have progressed at a rate close to 70% of the national income over time. The non-payment risk for banks with credit volume growth has also begun increasing. The inability of companies that use credit to pay their loan installments has also started to increase non-performing loans. This problem has also opened the path to negative impacts on economic growth. Identifying issues for minimizing these impacts forms an essential aspect of the study.

In this manner, the study examines the factors affecting NPL rates for participation banks operating in Islamic finance in Turkey and compares them with deposit banks. It additionally looks at how NPL rates have been affected by the 2008 global financial crisis. As a result of the literature review and research, the number of studies examining NPL rates for participation banks was low. In this sense, theoretical studies made in participation banking and deposit banks have been scanned to be a resource for the research. Together with these academic studies, the economic analyses that have been performed provide empirical evidence on the extent to which NPL rates affect participation banks and deposit banks.

2. LITERATURE REVIEW

Although many studies are found in the literature on the reasons for the emergence of determinants of NPLs, very few studies are found on participation banks. Research has mainly been conducted on deposit banks. In academic studies addressing the micro and macro variables affecting deposit banks' NPLs, the macro variables are generally GDP, exchange rates, inflation rates, interest rates, and unemployment. In contrast, the micro variables are the asset sizes of banks, capital adequacy ratio, active returns, loan-to-deposit ratio, interest revenues, interest expenses, capital returns, and return on assets. When examining studies made on the causes of NPLs for banks operating in Turkey, current theoretical studies and research made over compliant and weighted deposit banks draw attention. In all academic studies, the salient issues are seen to focus on the effects of certain specific factors in determining

the factors affecting NPLs. The use of panel and time data analytical methods is striking in the studies in the literature.

Louzis, Vouldis, and Metaxas (2010) examined factors affecting NPLs in Greece's banking sector. It has been observed that NPLs are affected by macroeconomic variables such as unemployment rate, GDP, and interest rate. Nkusu (2011) discussed the macro determinants of NPLs from a sample of 26 advanced countries. While low GDP, high unemployment, and falling asset prices increase in NPLs, low-interest rates, exchange rates, and low loan rates decrease NPLs.

Mileris (2012) researched the macroeconomic variables affecting NPLs from 22 banks operating in Europe using 2008-2011. According to the analysis results, inflation, GDP, unemployment, foreign trade, and consumption affect NPLs. Farhan et al. (2012) interviewed staff at banks operating in Pakistan. According to the analysis, the exchange rate, unemployment, interest rate, inflation, and energy crisis increased NPLs; GDP reduced NPLs.

Klein (2013) used data from the banking sector in 16 EU countries. According to the analysis results, while the exchange rate and unemployment increased NPLs, GDP and return on equity decreased NPLs. Skarica (2014) investigated the determinants of NPLs in selected European emerging markets. According to the analysis results, GDP fell in NPLs; inflation and unemployment increased NPLs.

Nursechafia (2014) examined the factors affecting NPLs of Islamic banks in Indonesia between October 2005 and May 2012. The exchange rate, inflation, and growth indicated a negative influence on NPLs. In addition to Yağcılar and Gulbahar (2015) used quarterly data from 26 commercial banks in Turkey between 2002/4 and 2013/1. According to the analysis results, stock market listed, return on assets, liquidity, and credit/deposit ratio have a negative effect on NPLs; interest rates, capital adequacy ratio, GDP, and foreign banks positively affect NPLs.

Chaibi and Ftiti (2015) concluded that the NPLs of banks operating in Germany and France were influenced by interest rates, exchange rates, unemployment, and GDP. Abdioglu and Aytekin (2016) used data 2002-2014 to determine NPLs in their studies. Both of them stated that capital adequacy ratio and interest rate negatively influence NPLs; on the other hand, interest rates, activity effectiveness, and loan/deposit rates positively influence NPLs.

Zheng, Bhowmik, and Sarker (2019) analyzed the NPLs in the banking system in Bangladesh from 1979 to 2018. As a result of the research, they

found that bank loan growth, deposit rates, net operating profit, and GDP negatively impacted NPLs; Meanwhile, bank liquidity, lending rates, domestic credit, and exchange rates positively related to NPLs. Önder, Ş, Önder, H, and Akbas (2019) used quarterly data between 2005 and 2018 to investigate macroeconomic determinants of NPLs of participation banks. According to the analysis results, the unemployment rate and consumer confidence index from macroeconomic indicators negatively affect the NPLs; Meanwhile, GDP, inflation, and the sector's size reduce the NPLs.

Cetinkaya (2019) used quarterly data for the period 2014-2017 to investigate the factors affecting the NPLs of the three largest banks operating in Turkey. The analysis concluded that whereas the return on assets, total assets, interest rate increase in NPLs, liquidity risk, return on equity, capital adequacy ratio reduces the NPLs.

Sunday, Mukisa, and Mwebaze (2020) used data for 2002Q1-2017Q2 to examine the determinants of NPLs in Uganda's commercial banking sector. The study's findings indicated that NPLs increase with interest rates, exchange rate, and unemployment rate while total assets and GDP decreased NPLs. Rahmah and Armina (2020) pointed out the determinants of NPLs in the Indonesian Islamic banking sector. The results showed that the return on assets and loan/deposit ratio significantly impacted NPLs. In contrast, the capital adequacy ratio has a significant positive effect on NPLs.

According to the literature researches, there are many studies on the determinants of NPLs for deposit banks. But the studies on Islamic banks are not sufficient. In addition, there has been no comparative analysis between banks in the current studies. The study aims to solve these problems in the literature and contribute to the literature by determining the micro and macro determinants of Islamic banks and deposit banks and revealing their differences.

3. DATASET, METHOD AND ECONOMETRIC MODEL

3.1. Method and Dataset

The most crucial stage of the process to be used in research and econometric analyses is collecting data. The more robust and reliable the data obtained from sources are, the more reliable the predictive analyses will be. The data used in econometric analyses consist of three categories: time series sequences, cross-section series, and panel data. Time series involve

observations about the numerical and time values for the variables concerning the periods. While cross-section data provides information about several sample units in a specified slice of time, panel data is formed by combining the cross-section data belonging to different branches in a specified period (Brooks, 2014: p. 526; Tatoğlu, 2020: pp. 1–2).

Panel data is based on measurements repeated at different points over time for people, firms, states, and countries. Analyses performed using these parameters deal with the change between units over time. Most reasonable estimation methods could be achieved by panel data analyses (Cameron & Triverdi, 2009: p. 229). In order to determine the relationships of NPLs of the banks with other variables, calculations are based on panel data analyses due to cross-sections and time-series data.

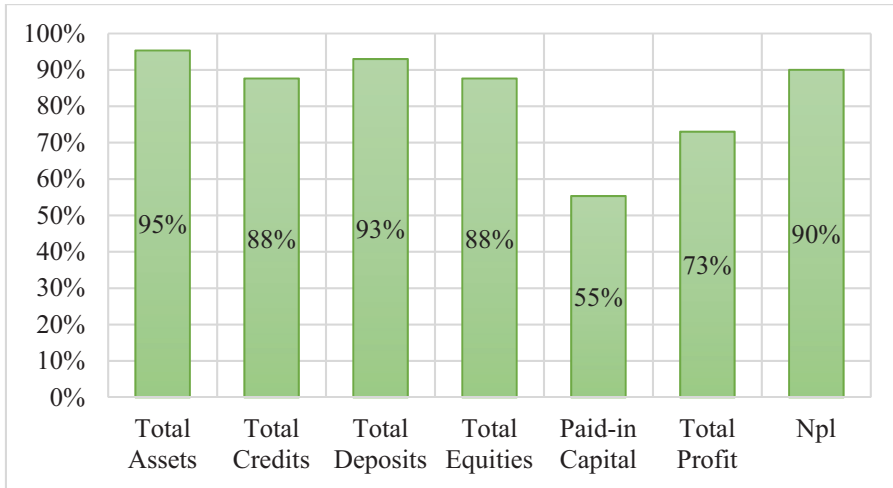
The data used in the study consist of 235 observations covering the years 2005-2019. Due to participation banks being integrated into banking law in 2005, our study considers the start year to be 2005. Bank-level data cover 12 deposit banks and six participation banks. Data related to NPLs and banks have been obtained from annual activity reports from banks and internet sites belonging to the Participation Banks Association of Turkey and the Banks Association of Turkey. Macro variables have been obtained from the Electronic Data Delivery System of the Central Bank of the Republic of Turkey. Table 1 shows the explanations, definitions, and summary of the data.

Table 1. Description of variables

Term	Definitions	Obs	Period	Data
Tdo	Non-performing loans	15	2005–2019	TKBB, TBB and Bank Repors
Kb	Participation bank dummy variable	15	2005-2019	Created by the Authors
Sk	Capital profitability	15	2005-2019	TKBB, TBB and Bank Repors
Ak	Return on assets	15	2005-2019	TKBB, TBB and Bank Repors
Kao	Loan-to-asset ratio	15	2005-2019	TKBB, TBB and Bank Repors
Kmo	Loan-to-deposit ratio	15	2005-2019	TKBB, TBB and Bank Repors
G	Gross domestic product growth rate	15	2005-2019	TCMB
U	Unemployment rate	15	2005-2019	TCMB
I	Inflation rate	15	2005-2019	TCMB
X	Exchange rate	15	2005-2019	TCMB
Kriz	Dummy variable for 2008	15	2005-2019	Created by the Authors

The position of the banks mentioned in the study is shown in Figure 1. It is concluded that the 18 banks considered as samples can represent the sector in many items. In other words, within the econometric analysis, it is understood that the explanatory power of the model is very high.

Figure 1. Sample Banks and Banking Sectors



The factors affecting NPL ratios consist of bank-specific indicators on the microscale and economic indicators on the macro scale that has been considered predominantly in the literature. Some of the selected variables consist of parameters explicitly used for this study. Fifteen parameters have been used in the analyses; the variables that are not statistically or theoretically significant have been removed from the model. With this aim, the exchange rate on non-performing loans (TDO), participation bank dummy variable (KB), capital profitability (SK), return on assets (AK), loan-to-asset ratio (KAO), loan-to-deposit ratio (KMO), gross domestic product growth rate (G), unemployment rate (U), inflation rate (I), and exchange rate (X) have been used for determining the factors affecting participation banks' NPL rates. Thus, Kriz is used as the dummy variable for 2009, controlling the effects of the global financial crisis.

3.2. Econometric Model and Evaluation of the Findings

The study will benefit from the panel data analysis method to observe the difference between participation and deposit banks by determining the factors affecting these banks' non-performing loans. The panel data analysis method having both cross-section and time dimensions ensures that the obtained

regression results are more reliable by increasing the number of observations. The regressions made using the panel data analysis are performed from the perspective of slightly restrictive assumptions. For example, the multi-linear connection problem is minimal in panel data analyses, and the comments provide successful results (Baltagi, 2005: pp. 3–5). For this reason, the study prefers panel data analysis for the complex relationships of the model remaining to be tested. The preferred analysis method in related studies adheres to the determinants impacting established and non-performing loans by referencing the analysis methods of national and international studies.

Whether or not any difference exists between the ratio of NPLs provided by participation banks and the ratio of NPLs provided by deposit banks will be analyzed using the panel data method with random effects. The assumption in the random-effects model is that the independent variables and explanatory variables are random and unrelated. In other words, the model's error terms are irrelevant to different parameters that do not change with time. The main difference between the random effects model and the fixed effects model is related to the unobserved individual effects due to explanatory variables related to one another or whether these effects are random. The most significant advantage of random-effects model analyses is that the model includes variables that do not change with time. The random effects can be mentioned in assumptions where the correlation between unit effects and explanatory variables is zero. In contrast, fixed effects can be cited in cases where the unit effects and explanatory variables are connected. Random effects models are accepted as the most convenient analysis method for concluding outside of the used sample is performed analyses (Tatoğlu, 2020: pp. 79–125).

Whether any difference exists between the NPL rates given by participation banks and the NPL rates shown by deposit banks will be analysed using the panel data method random-effects model. The analyses use the data of eighteen banks (twelve deposit, six participation) between the years 2005-2019. Following Naudé and Saayman (2005), the econometric model was established, and its different variations have been estimated as follows (Yüksel et al., 2018: p. 10):

$$Y_{it} = \alpha + \sum_{k=1}^K \beta_k X_{kit} + \varepsilon_{it} \quad (1)$$

Here, Y represents the dependent variable, and X represents the independent variables from X_1 to X_k . In the equation, α is the fixed term, β expresses the coefficients of the independent variables, and ε is the error term. Additionally, i denotes the cross-section units (bank), and t is time (year). In

place of the dependent variable Y_{it} and the statement $\sum_{k=1}^K \beta_k X_{kit}$ in Equation 1, when adding the variables to be used in the model, our created model is stated as follows:

$$TDO_{it} = \alpha + \beta_1 KB_{it} + \beta_2 SK_{it} + \beta_3 AK_{it} + \beta_4 KAO_{it} + \beta_6 KMO_{it} + \beta_7 G_{it} + \beta_8 U_{it} + \beta_9 I_{it} + \beta_{10} X_{it} + \beta_{11} Kriz_{it} + \varepsilon_{it} \quad (2)$$

For each year t and bank i in the equation, TDO represents the NPL ratio, KB is the participation bank dummy variable, SK is capital returns, AK returns on assets, KAO is the loan-to-asset ratio, KMO is the loan-to-deposit ratio, G is the gross national product growth rate, U is the unemployment rate, I is the inflation rate, X is the exchange rate, and Kriz represents the 2009 dummy variable controlling the effects of the global financial crisis.

Table 2 contains summary statistics of the variables used in the analyses. Because participation banks and the 2008 global crisis are included in the model as dummy variables, they have not been included in the table.

Table 2. Descriptive Statistics

Variables	N	Median	St dev	Min	Max
Tdo	235	.0395847	.0262295	0	.2173
Sk	235	.6158566	.5425018	-.5907	3.2406
Ak	235	.0151315	.0070855	-.0224	.0367
Kao	235	.6210068	.2131865	.2064	3.4263
Kmo	235	.9735736	.2188957	.2593	1.6369
G	270	5.053807	3.887415	-4.7045	11.1135
U	270	11.04	1.532459	9	13.7
I	270	9.488667	3.380596	6.16	20.3
X	270	2.516467	1.43629	1.1909	5.7957

The table contains descriptive statistical information on the dependent and independent variables used in the analyses. The average for the NPLs of capital banks and participation banks is 0.039. In other words, this result means that 0.039% of every 100 loans are not paid back, as it shows the share NPLs have within all the loans of participation and deposit banks. Capital returns are 0.61%, and returns on assets are 0.015%. The average loan-to-asset ratio for all banks is 0.62%, and their average loan-to-deposit ratio is 0.97%. The average GDP of the macro determinants is 5.053%. This result shows the average annual growth rate between 2005-2019 in Turkey in the examined period. The averages for the other parameters are seen as the unemployment rate is 11.04%, the inflation rate is 9.48%, and the exchange rate is 2.516.

4. SUMMARY AND EVALUATION OF THE EMPIRICAL FINDINGS

Before the econometric estimates, the pairwise correlations among variables were analysed. Table 1 shows the binary correlations between the dependent variable (NPL ratio, or TDO) and the independent variables (participation bank dummy variable, capital returns, returns on assets, loan-to-asset ratio, loan-to-deposit ratio, GDP growth rate, unemployment rate, inflation, exchange rate, and 2008 crisis dummy variable (correlations among all the variables are given in Table A-1 in Annex-A).

According to Table 3, negative and significant correlations exist among the variables participation bank dummy (KB), capital returns (SK), returns on assets (AK), loan-to-asset ratio (KAO), loan-to-deposit ratio (KMO), and GDP growth (G) with NPL rates (TDO). Alongside these, positive and significant relationships exist for the variables of unemployment (U) and the 2009 global crisis (Kriz) variables with NPL rates (TDO). No significant correlation exists for inflation (I) and exchange rate (X) with the NPL ratio (TDO). When evaluated in general, no high correlations were determined to be present among the variables.

Table 3. Correlation Matrix

	TDO	SK	AK	KAO	KMO	KB	U	I	X	G	Kriz
TDO	1										
SK	-0.1906*	1									
AK	-0.1766*	0.3288*	1								
KAO	-0.2069*	-0.1650*	-0.1433*	1							
KMO	-0.2429*	-0.104	-0.4300*	0.3821*	1						
KB	-0.1671*	-0.3987*	-0.0966	0.3231*	0.005	1					
U	0.2193*	0.0148	-0.2240*	0.1081	0.0702	0	1				
I	0.0663	0.0955	-0.2468*	0.0561	0.1596*	0	0.4742*	1			
X	0.1274	0.1108	-0.4736*	0.1702*	0.3046*	0	0.6378*	0.7517*	1		
G	-0.1691*	0.0284	0.008	-0.0396	0.0364	0	-0.7603*	-0.0931	-0.2404*	1	
Kriz	0.1380*	-0.0233	0.2138*	-0.0709	-0.1602*	0	0.2726*	-0.2343*	-0.1917*	-0.6721*	1

* represent coefficients statistically significant at the 5% levels, respectively (* $p < 0.1$).

The signs and significance of the estimates' variables are expected to resemble the correlation coefficients substantially. However, because the effects from the other variables are also being kept in check in the regression method, the sign (+/-), significance, or both the sign and significance may differ.

Before performing the panel data analysis, unit and time effect tests were first performed for preliminary evaluations. As a result of the analyses

performed using the F test, Breusch-Pagan LM test, maximum likelihood estimation, and score test for the time effect tests, the result was reached that time did not affect. As a result of using the same tests for the unit effects, the results show unit effects. Therefore, the POLS estimator was observed to be invalid; the panel was analysed using the F and LM test results and observed unit and time effects.

The appropriate estimator was selected by making the necessary corrections for the regression estimates used in the analyses. Robust standard errors have been used to resolve problems in the models such as autocorrelation, heteroscedasticity, and inter-unit correlations. The appraisals in Tables 1 and 2 were conducted using the panel data analysis with random effects to analyse whether or not participation and deposit banks' NPL rates differ or not through the final analysis results. The data used in the estimates are formed from 15 year (2005-2019), 18 banks (Akbank, Albaraka, Denizbank, Emlakbank, Garanti Bankası, Halkbank, ING Bank, İş Bankası, Kuveyttürk, QNB Finansbank, Şekerbank, TEB, TFK, Vakıfbank, Vakıf Katılım, Yapı Kredi, Ziraat Bankası, and Ziraat Katılım), and 235 observations.

Table 4. Estimation Results with Micro Variables

Dependent Variable: Non-Performing Loans						
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Tdo	-0.0143** (0.00716)	-0.0228** (0.00890)	-0.0158** (0.00743)	-0.0176** (0.00789)	-0.0205*** (0.00728)	-0.0174** (0.00760)
Sk	-	-0.0158*** (0.00598)	-	-0.0148*** (0.00554)	-0.0122** (0.00485)	-
Ak	-	-	-0.524* (0.287)	-	-	-1.226*** (0.321)
Kao	-	-	-	-0.0220 (0.0138)	-	-
Kmo	-	-	-	-	-0.0335* (0.0177)	-0.0577** (0.0242)
Cons	0.0420*** (0.00497)	0.0536*** (0.00842)	0.0501*** (0.00755)	0.0657*** (0.0136)	0.0835*** (0.0223)	0.117*** (0.0308)
Number of Obs	235	235	235	235	235	235
Number of Groups	18	18	18	18	18	18
P	0.0454	0.0177	0.0278	0.0308	0.0177	0.0001
χ^2	4.003	8.068	7.162	8.888	10.10	20.66
R2 (within)	0	0.0669	0.0226	0.100	0.142	0.225
R2 (between)	0.179	0.249	0.215	0.303	0.327	0.218
R2 (overall)	0.0279	0.105	0.0585	0.134	0.172	0.185

Corrected (robust) standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

When looking at Table 4, the participation bank dummy variable (KB) is seen to be negative and significant for the six estimated models. This case shows participation banks' NPL rates significantly statistically lower than

deposit banks' NPL rates. The findings are consistent with the studies by Ferhi and Chkoundali (2015).

Among the other variables in the model, capital returns (SK) are negative and significant. This situation shows that increases in banks' capital return lower their NPL rates. This result supports the idea that banks tend to use more robust and risk-free loans as their capital returns increase. The findings are consistent with the studies by Podpiera and Weill (2008), Louzis et al. (2012), Espinoza and Prasad (2010), Vatansever and Hepşen (2013), Messai and Jouini (2013), Gezu (2014), Makri et al. (2014), Chaibi and Ftiti (2015), Çetinkaya (2019), Torun and Altay (2019).

Return on assets (AK) is one of the variables found to be negative and statistically significant in the estimations in Table 4. In this respect, NPL rates decrease as banks' return on assets increases. Just as with capital returns, when banks' return on assets increase, they tend to have sturdy risk-free loans, and when the return on assets decline, banks tend to have problematic and risky loans. At the same time, successful management is seen between bank profitability and credit risk management. In one sense, as banks increase their profits, they avoid dissolving their profits by issuing low-quality loans. The findings are consistent with the studies by Podpiera and Weill (2008), Boudriga et al. (2010), Curak et al. (2013), Messai and Jouini (2013), Makri et al. (2014), Yağcılar and Demir (2015), Çetinkaya (2019), Torun and ve Altay (2019), Rahmah and Armina (2020).

As a result of the analysis, the variable loan-to-asset ratio is found to be negative but not statistically significant. Berger and DeYoung (1997), Macit and Keçeli (2012), Ghosh (2015), Abdioğlu and Aytekin (2016), and Zheng et al. (2019) have reached the same conclusion that the loan-to-asset ratio decreases the non-performing loans.

When looking at the analysis results, another micro variable, the loan-to-deposit ratio, is negative and statistically significant. In other words, as banks' loan-to-deposit ratio increases, their NPL ratios decrease. This result coincides with the situation, in theory, where "high loan-to-deposit ratios push banks to be more cautious when lending due to liquidity dependence, and NPL rates are expected to decrease as a consequence." Additionally, increases in NPL rates cause the risk to appear that banks will be unable to fulfill their responsibilities to depositors. Thus, banks avoid risky loans by keeping the loan-to-deposit ratio under control, thus lowering the NPL ratio. Similarly, these findings are consistent with the studies by Ranjan and Chandra (2003),

Messai and Jouini (2013), Yağcılar and Demir (2015), Demirel (2016), Zheng et al. (2019), Torun and Altay (2019), Rahmah and Armina (2020).

When looking at the general significance of the model, all χ^2 probability values are seen to be less than .05 ($p < .05$). Model 6 is seen as the model with the highest model significance level (p) and R2. R2 = .225 for Model 6; this means the estimated model explains 22.5% of the variations in NPL ratios. R2 is small in the predicted models because when loans become NPLs, the main determining factors are related to the firms and people using those loans or the country's macroeconomic stability. Each new variable added to the model will increase R2; therefore, R2 will be higher in models containing the macro variables.

Table 5. Estimation Results with Macro Variables

Dependent Variable: Non-Performing Loans						
Variables	(7)	(8)	(9)	(10)	(11)	(12)
Tdo	-0.0176** (0.00793)	-0.0294*** (0.00995)	-0.0175** (0.00787)	-0.0242*** (0.00929)	-0.0295*** (0.00968)	-0.0203** (0.00906)
Sk	-	-0.0201*** (0.00535)	-	-0.0192*** (0.00483)	-0.0169*** (0.00398)	-
Ak	-	-	-0.344 (0.359)	-	-	-0.803*** (0.270)
Kao	-	-	-	-0.0248 (0.0167)	-	-
Kmo	-	-	-	-	-0.0493** (0.0206)	-0.0608** (0.0243)
G	0.00161* (0.000834)	0.00182** (0.000844)	0.00157** (0.000801)	0.00175** (0.000811)	0.00151** (0.000746)	0.00118* (0.000679)
U	0.00599*** (0.00190)	0.00544*** (0.00165)	0.00604*** (0.00186)	0.00545*** (0.00168)	0.00359*** (0.00111)	0.00373*** (0.00114)
I	-0.000626** (0.000304)	-0.000585** (0.000267)	-0.000426 (0.000390)	-0.000846*** (0.000308)	-0.00111*** (0.000429)	-0.000798* (0.000450)
X	0.00208 (0.00228)	0.00391** (0.00178)	0.000888 (0.00284)	0.00455** (0.00187)	0.00787*** (0.00246)	0.00462* (0.00245)
Kriz	0.0210*** (0.00488)	0.0248*** (0.00518)	0.0219*** (0.00531)	0.0227*** (0.00457)	0.0206*** (0.00431)	0.0187*** (0.00458)
Cons	-0.0330* (0.0181)	-0.0184 (0.0162)	-0.0270 (0.0168)	-0.00335 (0.0172)	0.0443** (0.0190)	0.0611** (0.0264)
Number of Obs	235	235	235	235	235	235
Number of Groups	18	18	18	18	18	18
P	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
χ^2	164.6	340.3	163.0	359.2	539.9	327.0
R2 (within)	0.141	0.248	0.145	0.288	0.387	0.359
R2 (between)	0.0991	0.137	0.132	0.183	0.141	0.0984
R2 (overall)	0.0957	0.186	0.114	0.225	0.286	0.221

Corrected (robust) standard errors are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

When looking at Table 5, the participation bank dummy variable for the six estimated models is seen to be negative and significant, just as in Table 4. This situation shows the NPL rates of participation banks to be statistically

lower than the NPL rates of deposit banks. It was obtained similar results as in Table 4 for the micro variables.

When observing the macro variables in the model, GDP growth (G) is positive and statistically significant for all models. Accordingly, banks' NPL rates increase as GDP growth rates increase. Under the assumption that economic growth increases economic confidence, these results mean banks provide riskier loans, or dangerous credit groups use loans more in times of increased economic confidence. The findings that GDP has a negative effect on non-performing loans are consistent with the studies by Tekşen and Çelik (2018) and Çetinkaya (2019). But Berger and DeYoung (1997), Das and Ghosh (2007), Boudriga et al. (2010), Espinoza and Prasad (2010), Şahbaz and İnkaya (2014), Nkusu (2011), Farhan et al. (2012), Saba et al. (2012), Macit and Keçeli (2012), Mileris (2012), Castro (2013), Messai and Jouini (2013), Klein (2013), Gezu (2014), Makri et al. (2014), Skarica (2014), Firmansyah (2014), Nursechafia (2014), Yağcılar and Demir (2015), Ghosh (2015), Chaibi and Ftiti (2015), Bhattarai (2016), Demirel (2016), Yüksel (2016), Önder vd. (2019), Zheng et al. (2019), Zhen et al. (2019), Torun ve Altay (2019) ve Sunday et al. (2020). The unemployment rate (U) variable is found to be positive and statistically significant for all models. This situation shows that NPL rates increase as unemployment rates increase. These results are meaningful under the assumption that businesses that lay off employees and people who remain unemployed will have difficulty repaying their loans. In the literature, Boudriga et al. (2010), Vogiazas and Nikolaidou (2011), Nkusu (2011), Mileris (2012), Farhan et al. (2012), Macit and Keçeli (2012), Castro (2013), Klein (2013), Messai and Jouini (2013), Vatanserver and Hepşen (2013), Gezu (2014), Skarica (2014), Makri et al. (2014), Chaibi and Ftiti (2015), Ghosh (2015), Anastasiou et al. (2016), Bhattarai (2016), Konstantakis et al. (2016), Önder et al. (2019), Zheng et al. (2019), Zhen et al. (2019), Torun and Altay (2019) and Sunday et al. (2020) have found that unemployment has a positive effect on NPLs.

The variable of the inflation rate is observed to be negative and significant for all models. Accordingly, because periods of high inflation are also times when nominal interest rates are high, low-risk groups can also be assumed to use loans more frequently during these periods. Therefore, NPL rates decrease significantly statistically as inflation rates increase. In the literature, Vogiazas and Nikolaidou (2011), Farhan et al. (2012), Mileris (2012), Castro (2013), Curak et al. (2013), Klein (2013), Makri et al. (2014), Skarica (2014), Firmansyah (2014), Nursechafia (2014), Chaibi and Ftiti (2015), Yağcılar and Demir (2015), Bhattarai (2016) have reached similar conclusions. On the other

hand, Ghosh (2015), Tekşen ve Çelik (2018), Çetinkaya (2019), Önder vd. (2019) and Zhen et al. (2019), Torun and Altay (2019) have assumed that inflation increased the non-performing loans ratio.

Apart from Models 7 and 9, the exchange rate variable is found to be positive and significant. Therefore, NPL rates increase as exchange rates increase. This situation can be explained by firms in Turkey generally having a foreign exchange deficit structurally and firms being insolvent in positive exchange shocks. Espinoza and Prasad (2010), Yücememiş and Sözer (2011), Nkusu (2011), Mileris (2012), Farhan et al. (2012), Klein (2013), Skarica (2014), Nursechafia (2014), Yüksel (2016), Chaibi and Ftiti (2015), Bhattarai (2016), Genç and Şaşmaz (2016), Zheng et al. (2019), Zhen et al. (2019), Torun and Altay (2019), Sunday et al. (2020) have come to the conclude the same results in literature.

The 2008 global crisis and its effects have been controlled using the 2009 crisis dummy variable. As expected, the 2009 crisis dummy variable is positive and significant for all estimations. In other words, NPL rates can be said to have been higher in 2009 compared to other years. The findings are consistent with the studies by Espinoza and Prasad (2010), Castro (2013), Ferhi and Chkoundali (2015), Anastasiou et al. (2016).

5. CONCLUSION

Participation banks operating in Islamic finance have become one of the fastest-growing sectors in Turkey and the world in recent years. The main reasons for this can be attributed to many factors such as participation banks having a sturdy structure in the recent financial crisis, the trust felt toward Islamic finance, and the increase in the Muslim population. Additionally, broad macroeconomic and structural reforms started in financial systems, global integration of financial markets, privatization, and new Islamic products have enabled the expanding Islamic finance. Risks also have diversified and increased alongside this expansion. Credit risks come first among these identified risks. Non-performing loans are the main indicator of credit risks. Banks' balance sheets have been negatively affected due to banks' provisioning due to the increase in non-performing loan rates; this has reduced banks' profitability and efficiency.

The basic financial understanding of the interest-rate banking system is based on credit and debt. The credit and debt mechanism transforming into different financial instruments through derivatives by becoming more complicated have significantly increased the indebtedness levels of countries,

businesses, and individuals. Contrary to the credit-debt relations of deposit banks, participation banks do not perform transactions in risky areas by providing financing of transactions based on real trade per Islamic principles by collecting funds concerning participation banks' profit/loss partnerships. Thus while the quality of participation banks' assets is higher on their balance sheets, they have less risky liabilities. They are also less vulnerable to fluctuations in economic and financial markets. This situation was clearly observed in the global financial crisis in particular. Since the recent global crisis, participation banks have been more resilient than deposit banks in performance, efficiency, and risk management. Among the leading indicators, participation banks can act on a risk-sharing basis and avoid leveraged, speculative, and derivative products. Participation banks have been claimed to be sturdier than deposit banks not just in the last global crisis but for many years; however, little theoretical or empirical evidence is found to support these claims. This study has analyzed resistance to NPLs loans in this way using data from participation and deposit banks. According to the analysis results, micro and macro determinants affecting NPLs have given results similar to the studies in the literature; what is most striking in the analyses was that participation banks are more resistant to NPLs than deposit banks.

The performed analyses and empirical results prove the claim that participation banks are sturdier than deposit banks. The theoretical arguments claimed thus far have been put forth empirically. Analysis findings show that participation banks can increase the banking system's stability by revealing the differences in the interest-free banking system. Thus, public authorities can investigate in detail the reasons for NPLs determinants and assist financial markets in taking more conscientious steps in terms of risk management from the perspective of participation banks.

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