Journal of Islamic Monetary Economics and Finance, Vol. 8, No.1 (2022), pp. 149 - 160
p-ISSN: 2460-6146, e-ISSN: 2460-6618

DO ISLAMIC BANKS IN INDONESIA TAKE EXCESSIVE RISK IN THEIR FINANCING ACTIVITIES?

Muhamad Anindya Hiroshi Purbayanto[1], Taufik Faturohman[2], Yulianti[3] and Arson Aliludin[4]

[1] School of Business and Management Institut Teknologi Bandung, Bandung, Indonesia, hisroshi_purbay@sbm-itb.ac.id
[2] School of Business and Management Institut Teknologi Bandung, Bandung, Indonesia, taufik.f@sbm-itb.ac.id
[3] School of Business and Management Institut Teknologi Bandung, Bandung, Indonesia, yulianti@sbm-itb.ac.id
[4] School of Business and Management Institut Teknologi Bandung, Bandung, Indonesia, arson@sbm-itb.ac.id

ABSTRACT

This study analyzes the risk-taking behavior of Indonesian Islamic Banks by examining whether the relation between financing Growth rate and non-performing financing (NPF). We employ threshold regression models and bank-level data of 24 Islamic banks (full-fledged Islamic banks and Islamic banking windows) covering the period from 2009 to 2019. We find evidence for the excessive risk-taking of Islamic Banks. More specifically, while the relation between NPF and FGR is negative when the one-lagged NPF is below the threshold (estimated to be 5.42%), it turns positive once it is above the threshold. This means that banks with NPF above the 5.42 percent threshold tend to take risky loans.

Keywords: Risk taking behavior, Non-performing financing (NPF), Threshold regression, Islamic banks.
JEL classification: G18; G21; G28.

Article history:
Received : November 23, 2021
Revised : January 10, 2022
Accepted : February 27, 2022
Available online : February 28, 2022

https://doi.org/ 10.21098/jimf.v8i1.1431

I. INTRODUCTION

The emergence of Islamic banking into prominence has sparked scholarly and policy debate, in particular as to whether it is a viable alternative system. In many Muslim countries, Indonesia included, the governments have placed initiatives to accelerate the growth of Islamic finance and made Islamic finance a prime driver of economic progress. While is generally viewed that the Shari'ah bases of Islamic banking minimize its exposure to excessive risk (Hassan & Aliyu, 2017), the resulting fast-growth of Islamic financing has also raised a concern whether it reflects Islamic banks' excessive risk taking and is not merely a bionic growth to cater increasing demand for Islamic financial services.

Excessive bank lending/financing is widely viewed as a main cause of the 2008 Global Financial Crisis. The regulatory responses in the forms of Basel III capital and liquidity requirements well reflect the need to contain excessive expansion of bank credit and financing. Various studies have also forwarded arguments and evidence that excessive loan growth would jeopardize bank stability (Borio et al., 2001; Berger & Udell, 2004; Demyanyk & Van Hemert, 2011; Foos et al. 2010). Based on these, while the fast-growing Islamic financing even during difficult times is welcome by policy makers and practitioners, the concern that it can be an indication of excessive risk taking needs to be addressed.

Accordingly, in this paper, we empirically investigate the relation between Islamic financing growth and risk taking for a country that has in recent years witnessed rapid development of Islamic finance, i.e. Indonesia. While many studies have assessed the link between bank financing and bank risk, the higher growth rate of Indonesia's Islamic financing has received virtually no attention, especially in terms of its effect on bank risk. For Indonesia, Soedarmono, Saherudin & Prasetyo (2020) and Novellyni & Ulpah (2017) are perhaps only recent studies that investigate the impact of loan growth rate on bank riskiness. However, they focus on the banking sector in general without making distinction between Islamic financing and conventional financing. Given that the expansion of Islamic financing has been rapid in recent years, we believe that Islamic financing and its relation to risk taking deserves a special treatment. The question is: Is the risk taking from the expansion of Islamic financing is excessive?

To assess the of excessive risk-taking behavior in Indonesia's Islamic banking sector, we use non-performing financing ratio (NPF) as a measure of risk taking and apply threshold regressions to establish the link between Islamic financing and risk taking. In line with Zhang et al. (2016), we empirically examine whether or not banks with higher non-performing financing have a more aggressive tendency in adopting risky lending strategies.

The rest of the paper is structured as follows. Section II provides literature review. Section III presents the empirical methodology used in the analysis, followed by results and analysis in Section IV. Finally, section V provides conclusion and recommendation.

II. LITERATURE REVIEW

While excessive risk-taking is not readily visible, it can be deduced from bank activity, especially on granting a loan. Principally, excessive risk-taking in the

provisions of financing will lead to non-performing financing problem. According to Jensen & Meckling (1976), risk-taking arises as a result of the agency problem, leading to managerial rent seeking and conflict of interest between shareholders and creditors. The managerial rent seeking takes place when managers pursue their individual interest by investing in instruments of high benefit or through inadequate loan monitoring. The conflict of interest between shareholders and creditors would result in risky loans being undertaken and the risk being shifted to the depositors. Jensen & Meckling (1976) also claim that the risk-taking behavior relates to a higher rate of growth in loans accompanied by high NPLs.

In the literature, numerous studies have assessed the relations between bank credit growth and bank risk. According to Foos et al. (2010), loan growth is a significant determinant of a bank's riskiness. Assessing a panel sample banks from the United States, Canada, Japan, and Europe from 1997 to 2007, they find that loan growth leads to an increase in loan losses over the next three years, resulting in a drop in both interest income and capital ratio. Demirguc-Kunt (1989), Barr et al. (1994), Gorton & Rosen (1995), Berger & Udell (1994), and Shrieves & Dahl (2003) also examine the relationship between loan growth, non-performing loans, and bank risk-taking. Saunders, Strock & Travlos (1990) note that banks controlled by shareholders are more likely to take risks than banks controlled by managers.

In a more recent study, Zhang et al. (2016) documents the existence of a moral hazard and excessive risk-taking problem by Chinese banks. In their paper, they examine whether risky banks, defined as those banks with NPL higher than a threshold value, tend to take more risk. Using the threshold panel regression model and data from 60 city commercial banks, 16 state-owned banks, and 11 rural commercial banks spanning 2006 to 2012, they find evidence indicating the presence of moral hazard behavior. More specifically, bank lending of riskier banks is more strongly associated with NPL than that of less risky banks.

As for the case of Islamic banks, Sobarsyah et al. (2020) is perhaps the only study that examines the relations between loan growth, capitalization, and credit risk. Employing a panel sample of Islamic Banks from 29 countries including Indonesia, they find that higher loan growth exacerbates credit risk one year ahead, particularly for Islamic banks with higher capitalization. Further examination of the issue reveals that such evidence became more apparent following the global financial crisis of 2008. As a result, in the aftermath of the GFC, it is critical to increase prudential measures and oversight for Islamic banks with higher capitalization to mitigate moral hazards and ensure cautious lending behavior.

For Indonesia, two recent studies are notable. These are Soedarmono et al. (2020) and Novellyni & Ulpah (2017). According to Soedarmono et al. (2020), excessive loan growth (above average) is related to increased credit risk. However, if banks have more funding liquidity or are less reliant on non-core funding sources, this behavior is moderated. Further analysis reveals that the impact of the interplay between excess loan growth and financing available on credit risk is more significant for banks that are more exposed to depositor market discipline, i.e., small and non-government-owned banks. These data support the concept that depositor market discipline leads to prudent risk-taking by banks. Novellyni & Ulpah (2017) studies the existence of a moral hazard, excessive risk-taking in lending behavior by Indonesia's Banks. Following Zhang et al. (2016), she shows

most troubled banks behave differently. In dire condition, they are adopting riskier lending strategies instead of prudent lending strategies. The present studies add further to this line of research for the case of Indonesia by focusing exclusively on Islamic banks.

III. METHODS AND DATA

Following Zhang et al. (2016), we specify the following threshold model to examine whether Islamic banks take excessive risk in their financing activities:

$$NPF_{i,t} = c_i + \beta_{1.j} FGR_{i,t-j} I\left(NPF_{i,t-1} \leq \gamma\right) + \beta_{2.j} FGR_{i,t-j} I\left(NPF_{i,t-1} < \gamma\right) + \theta' X_{it} + \varepsilon_{it} \quad (1)$$

where NPF is non-performing financing, FGR is financing growth rate, X is a vector of controlled variables, and I is an indicator variable taking the value of 1 if the argument in the parenthesis is true. As in Zhang et al. (2016), the one-lagged NPF serves as the threshold variable. The model allows the relation between NPF and FGR to depend on the level of NPF in the last period. The main idea is, if Islamic banks take excessive risk when the lagged NPF is high, then we should observe a stronger relation between NPF and FGR when the lagged NFP is above the threshold value, i.e. .

We conduct the test to verify whether there exists the threshold effect (Hansen, 1999). The hypotheses are:

$$H_o: \ \beta_2 = \beta_1$$
$$H_1: \ \beta_2 \neq \beta_1$$

The null hypothesis states that there is no threshold effect, suggesting that the relation between NPF and FGR is the same regardless of the level of the threshold variable. The rejection of the null hypothesis, meanwhile, suggests that there exists the threshold effect. If Islamic banks take excessive risk in their lending activities, we should expect , where is positive.

For comparison, we first estimate the above model by restricting , i.e. the linear model. In this linear model, which we denote model 1, we incorporate both the contemporaneous and one-lagged FGR in the regression. Then, two variants of the threshold model are used. The first employs the one-lagged FGR in the model while the second the contemporaneous FGR, denoted respectively as model 2 and model 3. The financing growth rate is the key independent variable in the model. Sinkey & Greenawalt (1991) and Clair (1992) report evidence about the importance of loan growth on bank performance. Cottarelli, Dell'Ariccia, & Vladkova-Hollar (2005) and Kraft & Jankov (2005) analyze further the role of credit growth in bank risk-taking and the resulting volatility. Thus, we hypothesize a significant association between banks' financing/loan growth rate and NPF ratio for our case. Further, as we state above, the financing growth rate rise of a troubled bank is taken as an indication of the excessive risk-taking behavior when it results in incrementally higher NPF.

We include as the controlled variables those normally used in the literature. These are bank size (natural log of total assets), equity-to-asset ratio, and deposit growth rate. The relation between bank size and NPF is a priori ambiguous. Larger banks may be in a better position to manage risk as well as benefit from economies of scale. However, large banks are also subject the 'too big to fail' thesis (see, for example, Louzis, Vouldis, & Metaxas, 2012), we expect a positive relationship between bank size and NPF rates.

We use the equity-to-asset ratio to represent the bank's capital structure. Louzis et al. (2012) suggest that a higher percentage of liabilities can stimulate riskier behaviors and thus increase credit risk. Moreover, better capitalized banks would mean that the banks are healthier and hence would have lower risk (Berger & DeYoung, 1997). Thus, its effect is expected to be a negative. Finally, Lepetit et al. (2008) argue that the deposit-to-asset ratio may be seen as an indicator of the bank's objective function. Soedarmono et al. (2020) also confirm a positive relationship between the deposit-to-asset-ratio growth rate and the loan-loss provisions. Hence, we believe the rate of growth in deposits may also have a significant effect on NPFs.

We compile data from the annual reports of 24 Indonesian full-fledged Islamic banks and Islamic banking windows as provided by the Financial Services Authority and Bank Focus. The data are annual from 2009 to 2019. Table 1 provides descriptive statistics of the variables. As may be noted from the Table, there are quite marked variations in these variables across Islamic banks in Indonesia.

Table 1.
Descriptive Statistics

Variable	Obs	Mean	Std.Dev	Min	Max
Non-Performing Financing	280	4.310	15.487	01.02	06.34
Financing Growth Rate	280	58.54	140.29	-83.88	1263.8
Deposit Growth Rate	280	42.037	251.406	-100	2556
Equity Ratio	280	17.452	1.295950	5.80	80.11
Size	280	6.89	105.700	00.17	45.82

IV. RESULTS AND ANALYSIS

4.1. Basic Results

Before we estimate the threshold model as specify in (1), we first conduct the test to verify whether there exists a threshold in the relation between NPF and FGR. Note that our basic model takes the one-lagged NPF as the threshold variable. Table 2 reports the threshold test results.

Table 2.
Threshold Test Results

Model	Threshold (γ)	CI (95%)	SSEmin	Fstat	P-Value	Crit10	Crit5	Crit1
$FGR_{i,t-1}$	5.42%	[0.8745221 , 1.00324]	0.0644	1572.59	0.0000*	5.04	10.13	5.33
$FGR_{i,t}$	6.05%	[0.7412166 , 1.31342]	0.0820	14.62	0.1033	28.52	18.17	32.88

Note: p-value is constructed using 300 bootstraps. *shows significant at level 5%

As may be observed from Table 2, the threshold effect exists when the one-lagged FGR is used, i.e. in Model 2. The estimated threshold is 5.42 and it is significant at 1% significance level using the bootstrapped p-value. Meanwhile, for Model 3 where the contemporaneous FGR is used in the model, we observe no threshold effect in the relation between NFP and FGR. The F test statistic, i.e. 14.62, is not significant at even 10% significance level, where the p-value is slightly above 0.10.

Based on these results, we proceed to estimation of the model. As we have noted above, for comparative purposes, we also estimate the linear model. We opt for the fixed-effects panel model for the linear specification based on the Chow test for whether the individual-specific effects are common or different across banks and on the Hausman test for whether the individual-specific effects are fixed or random. The Chow test rejects the null hypothesis of a common intercept across banks. Meanwhile, the Hausman test rejects the null hypothesis that the error term is not correlated with the explanatory variables. Accordingly, the fixed-effects model is most appropriate. Take note also that we also estimate the threshold model for model 3, although our earlier result indicates the absence of the threshold. Since the p-value is at the borderline being only slightly higher than 0.10, the estimation could serve as a robustness to our results for Model 2. The estimation results are presented in Table 3.

The results from Model 1 (Linear Model) suggests a negative relation between financing growth and non-performing financing of Islamic banks. While the contemporaneous FGR is not statistically significant, the one-lagged FGR is significant at 5% significance level. This result is intuitive since the expansion of financing may take time to have effect on financing quality. The result from the linear model tends to indicate that Islamic banks tend to be prudent in their financing activities, where the expansion of financing leads to the reduction in NPF. However, the model is not able to inform whether a troubled Islamic bank tends to take more risk in their lending activities.

Table 3.
Basic Regression Results

	Model 1	Model 2	Model 3
FGR	-0.00429		
	(0.000)		
1.FGR	-0.081921**		
	(0.000)		
FGR (1.NPF< γ)			-0.0036315*
			(0.002)
FGR (1.NPF> γ)			0.0281876*
			(0.020)
l.FGR (1.NPF< γ)		-0.0012534*	
		(0.008)	
l.FGR (1.NPF> γ)		0.2230452***	
		(0.051)	
ER/TA	0.01245255	-0.0642816***	-0.0574994**
	(0.015)	(0.021)	(0.024)
DGR	-0.0015184	-0.011147**	-0.0015617
	(0.010)	(0.004)	(0.001)
Size	-0.0086	-0.036656	-0.0041423
	(0.048)	(0.036)	(0.034)
Constant	1.796592***	3.662486***	3.783861***
	(0.438)	(0.638)	(0.659)
N	280	280	280
R^2	0.1188	0.3748	0.1052

FGR = Financing Growth Rate, l.FGR = first lag of Financing Growth Rate, DGR = Deposit Growth Rate, ER/TA = Equity Ratio against total asset, Size = end-of-year total asset (in accumulation term). Standard errors below are in brackets below the coefficient.

*** statistically significance at 1% level.

** statistically significance at 5% level.

* statistically significance at 10% level.

The results from Model 2, where the one-lagged FGR is used in the model, tend to suggest that Islamic banks do take excessive risk when they are in trouble or have high non-performing financing. The estimated threshold of one-lagged NPF is 5.42. From the Table, we may have noted that the negative relation between NPF and one-lagged FGR observed in the linear model only hold when Islamic banks have NPF below the threshold. However, one the one-lagged NPF financing above the threshold, the relation between NPF and FGR turns positive. It is also significant at better than 1% significant level. This means that, once in trouble (i.e. having high NPF), Islamic banks tend to take more risk by expanding risky loans which later results in higher NPF. Note that, we document the same findings when we use contemporaneous instead of one-lagged FGR in the model (i.e. model 3), although the positive relation between NPF and FGR is weaker.

Our findings are in line with some other studies in the past. Koudstaal & Wijnbergen (2012) state that the more troubled the portfolio, the greater the banks' risk-taking tendency. Bruche & Llobet (2011) also report that when banks face

bankruptcy threats (financial authorities may impose penalties if banks do not meet healthy bank criteria), they continue to roll over bad loans to improve their chances of recovery. Bernanke & Gertler (1986) note these behavioral differences, stating that impaired banks' loans may induce different bank behavior according to banks' risk preferences. Our findings are also consistent with Zhang et al. (2016) and Novellyni & Ulpah (2017).

As for the controlled variables, we note that the deposit growth rate (DGR) is negatively related to NPF in all models is significant in Model 2. We also observe that the equity ratio (ER/TA) is negatively related to NPF in the two threshold models. This finding is similar to Zhang et al. (2016). Finally, we do not observe any significant relation between bank size and NPF in all models estimated.

4.2. Further Analysis: Different Threshold Variable

In this section, we perform further analysis of the link between financing growth rate and non-performing financing. More specifically, we use the FGR instead of the one-lagged NPF is the threshold variable. The reason behind this is that the link between NPF and FGR is likely stronger when the growth of financing is excessive, i.e. exceeding a certain threshold. If this is the case, the excessive lending can be construed as risk taking on the part of Islamic banks. Take note that, in this further analysis, we also address potential endogeneity issue by adopting the approach suggested by Caner & Hansen (2004). In addition, we employ model 2, where the one-lagged FGR is used as the key explanatory variable, based on the earlier results that it is more closely linked to NPF.

Table 4 presents the results of the threshold estimations, which show that the threshold does present. Based on the results, we may note that the FGR threshold is 48.93 percent. Based on this finding, we proceed to estimating the threshold model with the FGR as the threshold variable. Note that, for comparative purposes, we also estimate the linear model as well as model 3, as in Table 3. The results are presented in Table 5.

Table 4.
Threshold Estimation Using FGR as Explanatory

Model	Threshold (γ)	Std Error	SSEmin	Fstat	P-Value
$FGR_{i,t-1}$	48.93%	.0110247	0.0555	59.55	0.000***

Only uses model 2 include lagged loan growth rate.

Note: p-value is constructed using 300 bootstraps. *shows significancy at level 5%

Table 5.
Threshold Regression Results

	Model 1	Model 2	Model 3
FGR (FGR< γ)			-0.0015**
			(0.002)
FGR (FGR> γ)			0.03316*
			(0.020)
l.FGR(FGR< γ)		-0.004*	
		(0.010)	
l.FGR (FGR> γ)		0.53252***	
		(0.012)	
ER/TA	0.0324255***	-0.0642816***	-0.0341312**
	(0.000)	(0.021)	(0.039)
DGR	-0.0021403*	-0.021347***	-0.0017
	(0.010)	(0.000)	(0.001)
Size	-0.0031	-0.0056*	-0.00718*
	(0.052)	(0.004)	(0.004)
Constant	5.124152*	4.62409*	4.3832831*
	(0.214)	(0.284)	(0.659)
N	280	280	280
R^2	0.4921	0.40208	0.4912

FGR = Financing Growth Rate, l.FGR = first lag of Financing Growth Rate, DGR = Deposit Growth Rate, ER/TA = Equity Ratio against total asset, Size = end-of-year total asset (in accumulation term). Standard errors below are in brackets below the coefficient.

*** statistically significance at 1% level.

** statistically significance at 5% level.

* statistically significance at 10% level.

As can be seen from the table, below the threshold of FGR of 48.93%, the growth of financing is associated with lower NPF. However, once the FGR exceeds the threshold, it leads to higher non-performing. These results hold for model 2 and model 3, although we should emphasize that the effect of one-lagged FGR on NPF is stronger. Thus, from these results, we may conclude that excessive financing would lead to more risk, potentially reflecting that Islamic banks take more risk when they over-expand their financing. As for other controlled variables, we note similar results. However, in this further analysis, we also note that size turns to be significantly and negatively related to NPF.

V. CONCLUSION AND RECOMMENDATION

We examine whether Islamic banks in Indonesia take excessive risk in their financing activities by evaluating whether those banks that have high NPF undertake risky loans resulting in closer and stronger association between financing growth and NPF. As an additional analysis, we also evaluate whether the financing growth rate exceeding a certain threshold is more associated with higher credit risk or NPF. In the analysis, we employ bank-level data of Indonesian Islamic banks and apply the threshold regression models.

Our results suggest that excessive risk-taking behavior does exist in Islamic banks. More specifically, we document negative association between financing growth rate and NPF for banks with NPF below the threshold of 5.42. However, for banks with higher risk, i.e. NPF above 5.42, the expansion of their financing results in higher NPF. In other words, the troubled banks adopt a riskier financing strategy rather than prudent financing strategy. Our findings are consistent Novellyni & Ulpah (2017). Apart from this finding, we also document the risk implication from financing when the financing rate is above the threshold. Thus, despite being guided by the Shari'ah principles, banking regulators should be cognizant that Islamic banks do subject to excessive risk taking. Our results recommend that they should monitor closely the financing activities of banks that have high credit risk or that have high growth of financing.

We believe that the study can be extended in at least two directions such that we can further insight on the issue. First, the sample may include other countries that have Islamic banks. This would allow us to evaluate in more details, for examples, whether different banking regulations across countries would make a difference in the banks' excessive risk taking. And second, for concreteness, we may also extend the analysis by using other credit measures, such as capital buffers and leverage, such that recommendations related to macroprudential policy can be made on a more concrete ground.

REFERENCES

Barr, R. S., Seiford, L. M., & Siems, T. F. (1994). Forecasting bank failure: A non-parametric frontier estimation approach. *Recherches Economiques de Louvain/ Louvain Economic Review, 60*(4), 417–429.

Berger, A., & DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. *Journal of Banking and Finance, 21*(6), 849–870.

Berger, A. N., & Udell, G. F. (1994). Did risk-based capital allocate bank credit and cause a ''credit crunch" in the United States? *Journal of Money, Credit and Banking, 26*(3), 585–628.

Berger, A. N., & Udell, G. F. (2004). The institutional memory hypothesis and the procyclicality of bank lending behaviour. *Journal of Financial Intermediation, 13*(4), 458–495.

Bernanke, B., & Gertler, M. (1986). Banking and macroeconomic equilibrium. Princeton University, Woodrow Wilson School of Public and International Affairs.

Borio, C., Furfine, C., & Lowe, P. (2001). Procyclicality of the financial system and financial stability: Issues and policy options. In Monetary and Economic Department (Ed.), *Marrying the macro- and microprudential dimensions of financial stability*, BIS Papers, No 1, March 2001, pp 1-57. Basel, Switzerland: Bank for International Settlements.

Bruche, M., & Llobet, G. (2011). Walking wounded or living dead? Making banks foreclose bad loans. *FMG Discussion Papers dp675*, Financial Markets Group.

Caner, M., & Hansen, B. E. (2004). Instrumental variable estimation of a threshold model. *Econometric Theory*, *20*(5), 813-843.

Clair, R. T. (1992). Loan growth and loan quality: Some preliminary evidence from Texas banks. *Federal Reserve Bank of Dallas, Economic Review -Third Quarter,* (pp. 9-22).

Cottarelli, C., Dell'Ariccia, G., & Vladkova-Hollar, I. (2005). Early birds, late risers, and sleeping beauties: Bank credit growth to the private sector in Central and Eastern Europe and in the Balkans. *Journal of Banking & Finance, 29*(1), 83–104.

Demirguc-Kunt, A. (1989). Deposit-institution failures: A review of empirical literature. *Economic Review*, *25*(4), 2–18.

Demyanyk, Y., & Van Hemert, O. (2011). Understanding the subprime mortgage crisis. *The Review of Financial Studies*, *24*(6), 1848-1880.

Foos, D., Norden, L., & Weber, M. (2010). Loan growth and riskiness of banks. *Journal of Banking & Finance, 34*(12), 2929–2940.

Gorton, G., & Rosen, R. (1995). Corporate control, portfolio choice, and the decline of banking. *The Journal of Finance, 50*(5), 1377–1420.

Hansen, B. E. (1999). Threshold effects in non-dynamic panels: Estimation, testing, and inference. *Journal of Econometrics, 93*(2), 345-368.

Hassan, M. K., & Aliyu, S. (2017). A contemporary survey of Islamic banking literature. *Journal of Financial Stability, 34*(February 2018), 12–43.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305–360.

Koudstaal M., & Wijnbergen S. V. (2012). On risk, leverage and banks: Do highly leveraged banks take on excessive risk. *Tinbergen Institute Discussion Paper, No. 12-022/2/DSF31, Tinbergen Institute, Amsterdam and Rotterdam.*

Kraft, E., & Jankov, L. (2005). Does speed kill? Lending booms and their consequences in Croatia. *Journal of Banking & Finance, 29*(1), 105–121.

Lepetit, L., Nys, E., Rous, P., & Tarazi, A. (2008). Bank income structure and risk: An empirical analysis of European banks. *Journal of Banking & Finance, 32*(8), 1452– 1467.

Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking & Finance*, *36*(4), 1012-1027.

Novellyni, D., & Ulpah, M. (2017). Non-performing loans, moral hazard and lending behaviour of Indonesian banks. *International Journal of Economics and Management, 11*(S2), 365–378.

Saunders, A., Strock, E., & Travlos, N. G. (1990). Ownership structure, deregulation, and bank risk taking. *The Journal of Finance*, *45*(2), 643-654.

Shrieves, R. E., & Dahl, D. (2003). Discretionary accounting and the behavior of Japanese banks under financial duress. *Journal of Banking & Finance, 27*(7), 1219–1243.

Sinkey Jr., J. F., & Greenawalt, M. B. (1991). Loan-loss experience and risk-taking behavior at large commercial banks. *Journal of Financial Services Research, 5*(1), 43–59.

Sobarsyah, M., Soedarmono, W., Yudhi, W. S. A., Trinugroho, I., Warokka, A., & Pramono, S. E. (2020). Loan growth, capitalization, and credit risk in Islamic banking. *International Economics, 163*(October), 155–162.

Soedarmono, W., Saheruddin, H., & Prasetyo, D. (2020). Excess loan growth, funding liquidity and credit risk. *Indonesia Deposit Insurance Corporation Research Working Paper*.

Zhang, D., Cai, J., Dickinson, D. G., & Kutan, A. M. (2016). Non-performing loans, mora hazard and regulation of the Chinese commercial banking system. *Journal of Banking Finance, 63*(February), 48–60.