

## Bank Capital, Efficiency and Risk: Evidence from Islamic Banks

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### Abstract

This study aims to evaluate the relationship between bank capital, efficiency, and risk in Islamic banks. We use data from 129 Islamic banks in the world, retrieved from various data sources. We retrieved specific banking data from Moody's Analytics BankFocus and Thomson Reuters Eikon, while data at the country level was obtained from the World Bank website. This study uses various estimates both Pooled OLS (Ordinary Least Square) and Random Effect (RE). However, to overcome the issue of serial correlation which could cause bias in the results of the study, we used fixed-effect (FE) cluster estimates. The research results confirm the previous findings that bank capital positively affects bank stability (natural logarithm of Z-Score) and negatively affects credit risk (loan loss provision to total liabilities). The findings also show that efficiency has the same effect. The interaction test of bank capital and efficiency shows that efficiency encourages banks to reduce risk, including when bank capital is relatively lower. This finding is expected to have implications for the authorities to boost bank efficiency in addition to establishing several regulations related to capital. The efficiency implemented by the bank will encourage banks to act prudently so that the bank can maintain its performance through risk mitigation.

**Keywords:** Capital, Efficiency, Bank Risk, Islamic Bank

**JEL Classification Code:** G21, G32, B52

### 1. Introduction

The Islamic banking industry has an essential role in the development of the Islamic financial system in the world. Its existence still dominates compared to other Islamic financial instruments. Until 2017, Islamic banks controlled 71%

(1.7 trillion US \$) of the total Islamic financial assets (2.4 trillion US \$). Bitar et al. (2019) stated that the development in this sector is triggered by at least two factors: (i) oil revenues from Gulf countries, and (ii) the desire of the Muslim community to extend sharia law (sharia law) to all economic activities.

The level of distribution of Islamic banking is increasingly widespread, with 505 institutions in 69 countries (IFDI, 2018) making empirical research in this sector more intensive, giving rise to some findings of its impact on the banking system as a whole (Rizvi et al., 2020); financial stability/risk (Abedifar et al., 2013; Čihák & Hesse, 2010); competition (Kabir & Worthington, 2017; Meslier et al., 2017; Risfandy et al., 2020; Trinugroho et al., 2018); regulation (Ibrahim, 2019); and efficiency (Bitar et al., 2019; Muizzuddin & Isnurhadi, 2013; Mohd Noor et al., 2020). Many studies also compare the performance of Islamic and conventional banks (Qayyum & Noreen, 2019; Maswadeh, 2020)

The development of Islamic banking which has an impact on the financial system as a whole requires continuous study. Even though Islamic banks are relatively new to the market, the behavior of conventional banks has changed as a reaction to this situation (Risfandy et al., 2020). Various efforts by regulators aimed at promoting efficiency and creating a

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competitive environment in the banking sector also apply to Islamic banks. In other words, Islamic banks are also forced to operate with best practices or with efficient production functions.

On the flip side, competitive pressure is not always good for the banking industry. Increased competition can lead to high risk-taking due to reduced market power and the value of bank franchises (Hellmann et al., 1990). Especially with the presence of Islamic banks, on the one hand, there will be competition with conventional banks within the banking system, on the other hand, there will also be competition pressures among Islamic banks. Meslier et al. (2017) showed that conventional banks “fight” the competitive pressures of Islamic banks by setting higher deposit rates when their market forces are lower.

Such competitive environmental conditions require several regulations that are intended as control mechanisms (Repullo & Suarez, 2013), one of them is through capital requirements (Danisman & Demirel, 2019; Fiordelisi et al., 2011; Tan & Floros, 2013). Several studies have investigated the impact of capital on bank risk (Soedarmono et al., 2013), but a conclusive effect has not been achieved. The bank’s capital ratio is considered a financial buffer (buffer) that mitigates various types of risk (Anginer et al., 2018). However, there is a negative relationship between capital requirements and stability, because a higher capital ratio increases the cost of capital, which encourages banks to take higher risks to offset the higher cost of capital (Bitar et al., 2019).

Several studies have also shown a link between efficiency and risk in banking. Fiordelisi et al. (2011) show that low efficiency causes higher bank risk; the results of this study have important implications for bank supervision and the achievement of long-term efficiency to support financial stability. Surprisingly, there are only a few studies assessing the relationship between bank risk, capital requirements, and efficiency, particularly in the context of Islamic banking.

The recent crises have highlighted the need for further understanding of the determinants of bank risk by considering efficiency factors and bank capital requirements. This research highlights two critical issues (i) the relationship between efficiency and the level of risk in Islamic banks. A low level of efficiency encourages banks to increase profits by lowering their operating standards such as less intensive credit monitoring, however, changes in bank risk can also affect bank efficiency, for example, high monitoring costs due to a weak credit portfolio; (ii) assessing the impact of bank capital on the trade-offs between bank risk and efficiency.

Banks tend to have a low level of capital since high levels of efficiency give them the advantage of increasing the level of capital in the future. On the other hand, banks seem to be thinly capitalized because lower levels of efficiency induce

bank managers to balance their higher operating costs with lower volumes of funding via expensive capital. Eventually, capital and efficiency have influences on the risk-taking behavior of banks. Efficient banks with higher capital levels tend to allocate fewer funds to monitor loans which result in higher levels of credit risk, while inefficient banks with lower capital levels tend to increase the levels of credit risk to maximize their revenues

This research contributes in several ways. First, this research includes the latest world Islamic banking data from 2012 to 2019, thus providing a complete picture of the development of Islamic banking and according to our best knowledge, this is the first research to discuss this relationship in the context of Islamic banking. Second, empirically we apply several measurements (proxies) in this study so that the robustness can be fulfilled.

## 2. Literature Review

The financial crisis imposes high and persistent social costs (Thakor, 2014), thus making the topic of determinants of bank stability/risk a critical issue discussed by both academics and policy-making authorities. Furthermore, studies on risk determinants force banks to have a certain amount of capital to support bank stability (Fiordelisi et al., 2011). Previously, studies related to the research topic was limited to evaluating the impact of capital regulation on risk-taking incentives. In general, the results of research during that period were skeptical in discussing the impact of banking capital regulations on the soundness (efficiency) of banks (Marcus, 1984)

After the Basel I agreement in 1998, empirical research began to discuss the relationship between capital regulation and banks’ risk-taking behavior, especially in the banking sector in the United States. These findings indicate that bank financing (credit) decisions are influenced by the limits of bank minimum capital regulations. However, there is no consensus regarding the relationship between the level of bank capital and risk. The empirical findings show that on the one hand, bank capital is essential in mitigating risk (Anginer et al., 2018; Berger et al., 2009; DeYoung et al., 2018), on the other hand, high bank capital encourages banks to take higher risks (risk-taking) in offsetting the cost of capital that banks must pay (Bitar et al., 2019).

Hughes and Mester (1998) argued that it is necessary to consider bank efficiency when analyzing the relationship between the level of capital and risk. According to Fiordelisi et al. (2011), both the level of capital and risk tend to be determined by the level of bank efficiency. They assessed the inter-temporal relationship between bank efficiency, capital, and risk in a sample of European commercial banks employing several definitions of efficiency, risk, and capital and using the Granger-causality methodology

in a panel data framework. Our results suggest that lower bank efficiency concerning costs and revenues Granger-causes higher bank risk and that increases in bank capital precede cost efficiency improvements. They also found that more efficient banks eventually become better capitalized and that higher capital levels tend to have a positive effect on efficiency levels. These results are generally confirmed by a series of robustness tests. The results have potentially important implications for bank prudential supervision and underline the importance of attaining long-term efficiency gains to support financial stability objectives.

Overall, there is no empirical research that investigates the relationship between capital, efficiency, risk in the Islamic banking industry, so this study is relevant to be carried out by referring to the practical steps that have been carried out by Fiordelisi et al. (2011) and Tan and Floros (2013).

## **2.1. Bank Capital and Risk**

Thakor (2014) reviews the central issues surrounding the role bank capital plays in financial stability. Because the socially efficient capital level may exceed banks' privately optimal capital levels, regulatory capital requirements become germane. But such requirements may entail various bank-level and social costs. Thus, despite the agreement that higher capital would enhance banking stability, recognition of these costs has generated theoretical disagreement over whether capital requirements should be higher

Financial crises impose large and persistent social costs, making banking stability important. Empirical evidence reveals that, in the cross-section of banks, higher capital is associated with higher lending, higher liquidity creation, higher bank values, and higher probabilities of surviving crises. Moreover, increases in capital requirements are met with modest declines in lending. The overarching message from the research is that lower capital in banking leads to higher systemic risk and a higher probability of a government-funded bailout that may elevate government debt and trigger a sovereign debt crisis. Thus, capital regulation reform, as well as tax policy, should seek to increase bank capital.

The regulation of bank capital requirements restricts bank risk-taking to protect banks from bankruptcy risks. The regulator perspective shows that the evaluation of the relationship between capital regulation and risk is considered to be one of the most critical issues at this time. The goal of financial regulation is to enable banks to improve liquidity and solvency. Stricter regulation may be good for bank stability, but not for bank efficiency (Lee & Chih, 2013). Most of the studies were conducted on commercial banks in developed countries. Very few studies have been conducted in Asian countries, and no studies have discussed this relationship in the Islamic banking context with a cross-countries sample.

Rahman et al. (2018) analyzed the relationships between risk-taking, capital regulation, and performance in the banking sector. The empirical results show a significant negative relationship between risk-taking and capital regulation. Results also reveal that there is a significant positive relation between capital regulation and performance, and a significant negative relationship between risk and performance. This study provides various suggestions about risk management and capital adequacy for the regulators, stakeholders, and government. It is assumed that the higher capital requirements will have a positive impact on banking sector risk (Lee & Chih, 2013), but empirical results are mixed. Several studies have shown that there is a positive relationship between risk and capital.

On the flip side, several studies have found a negative relationship between risk and capital. Calem and Rob (1999) quantified the effect of capital-based regulation and find the U-shaped relationship between capital and risk-taking. The U-shaped means that undercapitalized banks take the maximum risk and a bank's capital rises as they take less risk. When capital increases again, they will take a higher risk again.

## **2.2. Bank Efficiency and Risk**

Islamic banks are established based on Islamic principles to become intermediaries between agents of economic surplus and deficit. Similar to the function of banks in general, Islamic banks are a source of funds to finance individual, private, public, and government investments, as well as allocating capital that supports a country's economic growth. Thus, the functioning of banks depends on their ability to manage tangible inputs (physical assets, labor, and capital and intangibles (managerial skills and competencies, reputation, intellectual property, and others) to achieve a required output. Studies rely on financial information such as costs, income, input and output, and profit to assess bank efficiency

Berger and Humphrey (1997) summarized and critically reviewed empirical estimates of financial institution efficiency and to attempt to arrive at a consensus view, as their primary goals. They found that the various efficiency methods do not necessarily yield consistent results and suggest some ways that these methods might be improved to bring about findings that are more consistent, accurate, and useful. The secondary goals were to address the implications of efficiency results for financial institutions in the areas of government policy, research, and managerial performance.

As the growth of Islamic banks is soaring rapidly, it is imperative to determine the efficiency of costs and profits. The viability of Islamic banks depends on their strength to manage costs efficiently and to maintain higher revenues, especially in a dual banking system. Efficient banks are

expected to be able to continuously increase profits by providing a range of quality services at affordable prices and maintaining a sufficient level of liquidity so that they can absorb possible risks that will arise (Berger, 1993). Banks can, of course, also be inefficient due to risk and low managerial competence which results in higher operating costs and lower profits (Hassan & Aliyu, 2018). In the context of its relation to risk, Berger and DeYoung (1997) argued that the concept of bank efficiency needs to be explicitly recognized in the empirical model in analyzing the determinants of bank risk.

Furthermore, using the Granger-causality method to assess the inter-temporal relationship between non-performing loans, cost efficiency, and sample bank capital in the United States from 1985 to 1994 it was found that a decrease in cost efficiency preceded an increase in non-performing loans (especially in small capitals), and non-performing loans resulted in reduced cost efficiency. Similarly, Williams (2004) evaluated the inter-temporal relationship between non-performing loans, cost efficiency, and financial capital in a sample of European savings banks during the period 1990-1998 and found that poorly managed banks tend to have low loan quality.

### 3. Data and Methodology

#### 3.1. Data and Samples

This study uses secondary data in the form of a dataset from Moody's Analytics BankFocus and Thomson Reuters Eikon, consisting of 29 countries with a total sample of 129 banks and 1,008 observations in the 2012-2019 period. The sample was selected based on the operation of Islamic banks in countries with profitable Islamic banking growth and complete disclosure of financial reports for at least five years of research (unbalanced panel data). For analysis at the country-level, we use inflation data, GDP growth was obtained through the World Bank website. We present the details in Table 1.

#### 3.2. Baseline Model

This study uses various estimates; we start with Pooled OLS and the Random Effect. However, because there are serial correlation and heteroscedastic issues in the research data, then referring to Hoechle (2007) we apply the estimation of fixed effect with heteroscedasticity and serial correlation cluster. The baseline model is described as follows:

$$Risk_{ijt} = \beta_0 + \beta_1 CAP_{ijt} + \beta_2 INEFF_{ijt} + \gamma[C]_{it} + \varepsilon_{it} \quad \dots(1)$$

**Table 1:** Samples of Research

Country	Number of samples
Algeria	2
Bahrain	12
Bangladesh	8
Brunei Darussalam	1
Cyprus	1
Egypt	2
Indonesia	11
Iraq	4
Islamic Republic of Iran	17
Jordan	4
Kenya	2
Kuwait	6
Malaysia	14
Maldives	1
Mauritania	1
Nigeria	1
Oman	3
Pakistan	7
Qatar	5
Saudi Arabia	5
Senegal	1
South Africa	1
Sri Lanka	1
Sudan	2
Thailand	1
Tunisia	1
Turki	3
United Arab Emirates	9
United Kingdom	3

Where subscript  $i$  denotes the cross-sectional dimension across banks, country  $j$  and  $t$  represent the time dimension. CAP is the capital ratio in the equation, INEFF is a measure of inefficiency, while Risk is the accounting variable for bank risk in the equation using either the Ln Z-Score or the credit risk ratio. We also control for bank-specific, industry-specific, and comprehensive macroeconomic variables; These variables are essential in explaining the relationship between the variables in the research model.

**Table 2:** Variables Used to Regression Analysis

Variables	Definition	Sources of data
<b>Dependent variables</b>		
Risk Credit (CR)	Loan loss provision/ total liabilities. The loan loss provision is a proxy to see the default bank customers.	Moody's Analytics BankFocus and Thomson Reuters Eikon
Ln of Z-Score (LnZ)	$LnZ_{i,t} = \frac{ROA_{i,t} + CAR_{i,t}}{SD ROA}$ Refers to an empirical step Lepetit, Nys, Rous, and Tarazi (2008), Setiyono and Tarazi (2014) dan Risfandy et al. (2018)	Moody's Analytics BankFocus and Thomson Reuters Eikon
<b>Explanatory variables</b>		
Capitalization (cap)	Equity/ total assets	Moody's Analytics BankFocus and Thomson Reuters Eikon
Inefficiency (ineff)	Cost/ Income The higher this ratio indicates the bank is inefficient	Moody's Analytics BankFocus and Thomson Reuters Eikon
Asset structure (asstruc)	Loans/ total assets	Moody's Analytics BankFocus and Thomson Reuters Eikon
Non-deposit funding	Wholesale funding/ total liabilities	Moody's Analytics BankFocus and Thomson Reuters Eikon
Profitability	Return on average assets (ROAA)	Moody's Analytics BankFocus and Thomson Reuters Eikon
SIZE	The natural logarithm of total assets is the level of bank size.	Moody's Analytics BankFocus and Thomson Reuters Eikon
INF	The annual inflation rate based on the consumer price index.	World Bank's Development indicator database
GDP	The annual real GDP growth rate	World Bank's Development indicator database

**Table 3:** Descriptive statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
LnZ	580	1.54	1.28	-4.39	4.06
Cr	767	.01	.03	-.1	.43
Cap	999	.16	.24	-1.96	.99
Ineff	998	109.91	1397.53	-2037.09	44064.68
Asstruc	996	.59	.19	0	.98
Ndf	874	.14	.17	0	.98
Liq	999	2050000	3430000	50.76	2.73e+07
Size	999	14.68	1.94	6.61	18.49
Gdp	998	3.72	3.14	-7.44	15.21
Inf	1008	6.36	8.92	-2.1	63.29

#### 4. Results and Discussion

Table 3 presents descriptive statistics on the characteristics of banks and countries used to analyze the impact of capital and efficiency on bank risk in the pooled OLS regression, random effects, and fixed effects. LnZ, as a proxy for bank stability, has an average value of 1.54. This index shows

that the greater the value, the more stable the bank is (away from the risk of solvency), on the other hand, the credit risk (cr), with an average value of 0.01, indicates that the greater the value, the higher the risk. We also present the mean, standard deviation, minimum and maximum values of each explanatory variable to provide an overview of the data pattern.

**Table 4:** Pairwise Correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) LnZ	1.00									
(2) cr	-0.09*	1.00								
(3) cap	-0.11***	-0.01	1.00							
(4) ineff	-0.46***	0.00	0.01	1.00						
(5) asstruc	0.29***	0.02	-0.15***	-0.04	1.00					
(6) ndf	-0.02	0.03	0.09***	0.01	-0.20***	1.00				
(7) liq	0.19***	-0.04	-0.13***	-0.01	0.06*	-0.07**	1.00			
(8) size	0.30***	-0.17***	-0.35***	0.01	0.06*	-0.14***	0.66***	1.00		
(9) gdp	-0.05	0.07*	-0.11***	0.00	0.14***	-0.05	-0.17***	-0.09***	1.00	
(10) inf	-0.30***	-0.05	-0.14***	0.04	-0.13***	-0.08**	0.08**	0.05	-0.28***	1.00

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Furthermore, we also tested the correlation. The results of the pairwise correlation show that the independent variables are not correlated so that they do not have multicollinearity issues. We also test for variance inflation factor (VIF  $< 10$ ) and show the respective values for bank risk proxies, namely 1.55 (LnZ) and 1.33 (cr). Furthermore, the heteroscedasticity test after running with the fixed effect (FE), indicate that there is an issue of heteroscedasticity (variance is not constant). Finally, we also tested the serial correlation with Lagrange-Multiplier (LM). The results indicate that it rejects the null hypothesis ( $p$ -value  $< 0.05$ ) so that the data does not have the first-order autocorrelation. If FE has heteroskedasticity and serial correlation issues, the estimation will be robust if using cluster regression. We present the details in Table 4.

We conducted regression analysis between the independent variables and the dependent variable and showed the results that capital has a positive effect on risk reduction using both the LnZ proxy and credit risk (column 1 and column 2). The same thing also confirms that a high level of efficiency has a positive impact on bank stability and credit risk reduction.

As previously mentioned, based on the diagnostic check, several problems require appropriate estimation so that the empirical findings are not biased. We tested the existing regressions with cluster-based estimates. The findings are confirmed in Table 5. In Table 5, it is shown in columns (7) and (8) that both capital and bank efficiency have a positive effect on bank stability and a negative effect on credit risk. This finding is in line with some previous estimates, showing that this finding is robust.

Furthermore, we also conduct interaction tests to see whether efficiency encourages banks with lower capital to behave prudently. The results show that the interaction test carried out (capeff) has an effect on bank stabilization and

risk-taking mitigation on bank lending (Table 6, column 7, and column 8). Several previous empirical studies have shown that when banks have relatively high capital, they get incentives to behave prudently.

This finding is in line with the prediction of the theory, which shows that the amount of capital affects bank stability. Most of the literature agrees that capital requirements are one of the essential tools of banking regulation to promote prudent behavior. Keeley (1990) stated that a fixed-rate deposit insurance system provides a moral hazard for excessive risk-taking and is not viable absent regulation. He tested the hypothesis that increases in competition caused bank charter values to decline, which in turn caused banks to increase default risk through increases in asset risk and reductions in the capital. Another reason is that borrower selection, and bank risk management systems are enhanced by higher capitalization. The empirical literature regarding capitalization on risk shows a negative relationship between capital requirements and bank risk

Barth et al. (2004) examined regulatory restrictions on bank activities, regulations on capital adequacy, deposit insurance system design features, supervisory power, independence, and resources, loan classification stringency, provisioning standards, and diversification guidelines, regulations fostering information disclosure and private-sector monitoring of banks and government ownership. The results, raise a cautionary flag regarding government policies that rely excessively on direct government supervision and regulation of bank activities. The findings suggested that policies that rely on guidelines that force accurate information disclosure, empower private-sector corporate control of banks, and foster incentives for private agents to exert corporate control work best to promote bank development, performance, and stability.

**Table 5:** Regression Analysis

	(1)	(2)	(3)	(4)
Var	Pooled OLS=LnZ	Pooled OLS=Credit Risk	RE=LnZ	RE=Credit Risk
cap	2.05*** (0.68)	2.05*** (0.68)	3.00*** (0.98)	-0.00 (0.01)
ineff	-0.02*** (0.00)	-0.02*** (0.00)	-0.01*** (0.00)	0.00 (0.00)
asstruc	1.74*** (0.36)	1.74*** (0.36)	1.00* (0.52)	0.00 (0.01)
Ndf	-0.93** (0.38)	-0.93** (0.38)	-0.87** (0.44)	-0.00 (0.01)
Liq	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00 (0.00)
size	0.22*** (0.05)	0.22*** (0.05)	0.28*** (0.08)	-0.00*** (0.00)
gdp	-0.03* (0.02)	-0.03* (0.02)	-0.04** (0.02)	0.00 (0.00)
inf	-0.03*** (0.01)	-0.03*** (0.01)	-0.03*** (0.01)	-0.00* (0.00)
Constant	-1.59* (0.86)	-1.59* (0.86)	-2.42* (1.29)	0.04*** (0.01)
Observations	481	481	481	644

**Table 6:** Regression Analysis Using FE Cluster and the Interaction Term

	(5)	(6)	(7)	(8)
Var	FE Cluster=LnZ	FE Cluster=Credit Risk	cap*ineff=LnZ	cap*ineff=Credit Risk
cap	3.45 (2.29)	-0.07** (0.03)	2.89 (2.80)	-0.07** (0.03)
ineff	-0.01** (0.00)	0.00** (0.00)	-0.01 (0.01)	0.00** (0.00)
capieff			0.01 (0.03)	-0.00* (0.00)
asstruc	-1.93** (0.87)	-0.01 (0.02)	-1.93** (0.86)	-0.01 (0.02)
ndf	-0.95 (0.93)	-0.02 (0.02)	-0.94 (0.93)	-0.02 (0.02)
liq	-0.00* (0.00)	0.00 (0.00)	-0.00* (0.00)	0.00 (0.00)
size	0.99** (0.38)	-0.00 (0.00)	0.99** (0.38)	-0.00 (0.00)
gdp	-0.03 (0.02)	-0.00 (0.00)	-0.03 (0.02)	-0.00 (0.00)
inf	-0.01 (0.01)	-0.00* (0.00)	-0.01 (0.01)	-0.00* (0.00)
Constant	-11.62** (5.65)	0.10 (0.07)	-11.55** (5.69)	0.10 (0.08)
Obse	481	644	481	644
No of id	105	114	105	114

Beck et al. (2013) documented large cross-country variations in the relationship between bank competition and bank stability and explored the market, regulatory, and institutional features that can explain this variation. They showed that an increase in competition significantly impacts banks' fragility in countries with stricter activity restrictions, more generous deposit insurance better-developed stock exchanges, lower systemic fragility, and more effective systems of credit information sharing. The effects are economically large and thus have important repercussions for the current regulatory reform debate.

The implication of the findings also confirms a more efficient bank will eventually become a bank with a higher level of capital and a higher level of capital tends to have a positive effect on the level of efficiency. The critical implication shows the importance of prioritizing the principle of prudence in the bank and long-term efficiency to support financial stability goals (Fiordelisi et al., 2011; Tan, 2016).

## 5. Conclusion and Policy Implication

The development of Islamic banking that has an impact on the financial system as a whole requires continuous study. Although Islamic banks are relatively new to the market, the behavior of conventional banks has changed as a reaction to this situation (Risfandy et al., 2018). Meslier et al. (2017) showed that conventional banks "fight" the competitive pressure of Islamic banks by setting higher deposit rates when their market power is lower. The behavior of conventional banks, in this case, can endanger their financial stability. In this environment, several studies have focused on the impact of capital and operating efficiency on bank risk.

However, it is surprising to know that there are minimal studies that assess the relationship between bank risk, capital, and efficiency. According to our best knowledge, only Fiordelisi et al. (2011) and Tan and Floros (2013) evaluated this. There are still a few studies on Islamic banking such that this research will fill the empirical gap from several previous studies in the context of Islamic banks in the world. The results of this study confirm the previous findings that bank capital has a positive effect on bank stability (LnZ) and a negative effect on credit risk (cr), the same way it affects efficiency. The interaction test of bank capital and efficiency shows that efficiency encourages banks to reduce risk, including when bank capital is relatively lower. This finding is expected to have implications for the authorities to improve banking efficiency in addition to establishing several regulations related to capital. The need for banks to improve efficiency will encourage them to act prudently and they can become the focus of regulators.

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