



Credit Risk and Macroeconomics of Islamic Banking in Indonesia

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Jel Classification

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Abstract

The purpose of this study is to analyze the effect of macroeconomic variables, namely GDP, Inflation and Unemployment to credit risk in Islamic banking of Indonesia. The data for this study were collected from secondary sources via Statistics Center Indonesia (BPS) and financial statements of the 7 Islamic bank of Indonesia. The data used are the annual ones from 2009 to 2016. This research uses an explanatory analysis. The test is a panel data regression testing using Eviews 9. The result of panel data regression with random effect model consisted gross domestic product (GDP) and unemployment rate (UNEMP) have a significant negative effect on credit risk of Islamic banking in Indonesia. While the inflation variable has a negative but statistically insignificant effect on credit risk in Islamic banking system of Indonesia.

1. Introduction

Credit risk is one of the main risks in Islamic banking. Credit risk is a source of financial instability in the banking sector. The Bank for International Settlements (2000) stated that in order to have an appropriate credit risk management system, banks must identify, measure, monitor and control the credit risk properly. Appropriate measurement of credit risk provides the basis for developing prudential monitoring and control mechanisms to manage credit risk. Therefore, measuring credit risk in the Islamic banking system is an important concern for all bank stakeholders.

In principle, the basis of the Islamic banking system relies on two alternative principles, namely profit loss sharing (PLS) and mark-up financing. As a result, risk-averse borrowers can choose Islamic banking considering the opportunity to share losses with banks (Hasan and Dridi, 2010). In addition, Islamic banking may face the risk of withdrawal if they share their losses with depositors (Ahmed and Khan, 2007; Siddiqui, 2008). This provides many opinions that Islamic banking has a higher credit risk level than conventional banking as well as based on the fact that, Islamic banks do not have an appropriate risk management tool yet to handle those risks. Under this scenario, Islamic banking must have a higher credit risk management than a conventional bank. Some researchers argued that Islamic bank lending products are much more risky than conventional bank lending products (Chong & Liu, 2009; Rahman, et.al, 2014).

A literature survey revealed that there are two different types of credit risk factors, i.e, systematic and unsystematic (idiosyncratic) risk factors (Aver, 2008, Castro, 2013). Systematic risk refers to macroeconomic factors, changes in economic policy, political change and the leading goals of political parties. Meanwhile, the main unsystematic factors lie in individual customers, such as customer personality, financial solvency and customer capital, credit insurance and general terms and conditions. In this study, the analyzed factor is only systematic factor that is macroeconomic.

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2. Literature Review

Islamic banking came back to the surface in the 1960s. Its emergence was characterized by the establishment of interest-free cooperation founded by Ahmed El Najjar 1963 in the city of Mit Ghamr, which is a small city in Egypt (Ahangar et.al 2013). Then began to develop in Islamic countries and other non Islamic in 1975 (Misman et al 2015), namely the UK, Australia, Singapore, Hong Kong and some countries in Europe. In Indonesia, Islamic banking was emerging in 1992, which coincided with the establishment of Bank Muamalat by MUI. The emergence of Islamic banking provides alternative funding in addition to conventional banking. In addition, Islamic banking are increasingly showing their existence as a stable financial institution with a proof that they are the only bank that did not have liquidity of capital when the crisis is striking. However, even Islamic banking is stable amid the shocks of crisis, Islamic banking is not immune from the risks as well as the risk experienced by conventional banking. One risk that must be faced by Islamic banking is credit risk.

There are two types of the credit risk factors, namely the systematic (macroeconomics) and unsystematic (bank specific) risk (Haryono et.al 2016). In this study, the analyzed factor is only systematic factor that is macroeconomic. Research on macroeconomics affects credit risk first discovered by Modigliani and Brumberg in the early 1950s (Deaton, 2005). According to them, factors included in the macroeconomics are GDP, unemployment rate, and inflation rate. According to Louzis et al (2011) credit risk is influenced by macroeconomic factors. Empirical studies by Bikker and Hu (2002), Salas and Saurina (2002), Jimenez and Saurina (2006), Das and Ghosh (2007), Boudriga et al (2009), Thiagarajan et al (2011) and Castro (2012) have confirmed a negative relationship between GDP and non-performing loans (credit risk). In addition, empirical studies by Bikker and Hu (2001), Rinaldi and arellano (2006) and Castro (2012) have revealed that unemployment and inflation rates have a negative relationship with problem loans.

Several previous studies that have examined macroeconomic factors as potential factors for credit risk in Islamic banks are the ones belonged to Khan and Ahmed (2001) and Akkizidis and Khandelwal (2008). They said that macroeconomic variables have a substantial effect on credit risk changes. The Islamic banking industry has several financial management styles followed by Islamic law that are vulnerable to various types of risks. The mentioned researches above show that the

success of financial institutions depends on their strengths to combat systematic risks and the capacity to survive in difficult economic situations so that it will remain profitable for shareholders. The Islamic Financial Services Board (IFSB) has also recognized the importance of effective risk management due to legal challenges and international pressure on Islamic banking.

3. Research Method

3.1 Data collection

The data for this study were collected from secondary sources via Statistics Center Indonesia (BPS) and financial statements of the 7 islamic bank of Indonesia. The data used are annual ones from 2009 to 2016. Financial statement data obtained from the stock exchange Indonesia, while macroeconomic data obtained from the bank Indonesia and via Statistics Center Indonesia (BPS). The reason why only we take data on 7 Islamic banks in Indonesia because there are 12 Islamic banks that have been established in Indonesia, only the 7 banks have data for 8 years from 2009 to 2016. This can represent the state of Islamic banking in Indonesia because the 7 islamic banks account for more than half of the existing population of 12 islamic banks.

3.2 Measure and Scale of variables

The credit risk variable is calculated using the formula *Total non Performance Financing/ Total Financing*. The GDP variable is calculated using the formula $C + I + G + (X - M)$, where *C* is consumption, *I* is the investment, *G* is the state expenditure, *X* is the export and *M* is the Import. Inflation variable is calculated using the formula $(CPI_n - CPI_0) / CPI_0$ where CPI is the consumer price index. The Unemployment variable is calculated using the formula of the number of *unemployed / number of labor force*.

3.3 Model Specification

The model specified in equation 1 is used to express the relationship between variables:

$$CR = \beta_0 + \beta_1GDP + \beta_2INFL + \beta_3UNEMP + \varepsilon$$

Where,

CR : Credit Risk

GDP : Gross Domestic Product

INFL : Inflation

UNEMP : Unemployment

3.4 Method of Data Analysis

This research uses an explanatory analysis. The test is a panel data regression testing using Eviews 9. In the panel data regression testing requires 3 steps, namely: Correlation test, Model Test and Regression. In the correlation test, the value between variables should be <0.8 to be free from multicollinearity. Next is the model test, this is done to determine the best regression model. There are four regression model of panel data namely: Common effect, fixed effect, fixed effect with cross section weight and random effect. There are three test models named chow test, hausman test and lagrange multiplier test. Chow test to choose the common effect or fixed effect model, Hausman test to choose the random effect or fixed effect model and lagrange multiplier test to choose common effect or random effect. The last test used when the result of chow test and hausman test is not aligned. Below is a hypothesis for model test:

- *The first model is a chow test that is h_0 : Common effect and h_a : Fixed effect.*
- *The second model is the test of that h_0 : Random effect and h_a : Fixed effect.*
- *The third model is lagrange multiplier test that is h_0 : Common effect and h_a : Random effect.*
- *If $p\text{-value} > 0,05$ then accept h_0 and if $p\text{-value} < 0,05$ then reject h_0 .*

The next step is to read the results of the panel data regression which is the best model, whether it is common effect, fixed effect, fixed effect with cross section weight and random effect.

4. Results and Discussion

4.1 Correlation analysis

Table 1 summarizes the correlation values for all the variables used. This test is performed to identify some variables that have high correlation with correlation value above 0.8. If there is a correlation value above 0.8, then inter variables occur multicollinearity.

Table 1. Correlation Matrix of Study Variables

	CR	GDP	INFL	UNEMP
CR	1.0000			
GDP	-0.0601	1.0000		
INFL	0.0378	0.0836	1.0000	
UNEMP	-0.2048	-0.4309	-0.9992	1.0000

Test results in Table 1 show that all variables have a correlation value below 0.8. This means that all variables are independent of multicollinearity. If all variables are freed from multicollinearity, then the research can be proceed.

4.2 Model Testing

1. Chow test

Testing the first model is a test using Chow test. Table 2 below is the result of chow testing.

Model Testing

Table 2. Chow Test

Redundant Fixed Effects Tests			
Equation: Untitled			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	44.095976	-6.46	0.0000

Table 2 shows the probability result is 0.0000. This explains that H_0 is rejected so that the result obtained is a fixed effect model better than the common effect model. Therefore, according to the results of Chow testing, the model used is a fixed effect model.

2. Hausman test

The next model test uses the hausman test. Table 3 below is the result of the hausman test.

Table 3. Hausman Test

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.00000	3	1.0000

The results in table 3 indicate incompatibility with the previous test, i.e, ho accepted then the resulting result is a random effect model is better than the fixed effect model. If in the chow and hausman test are not align, then the next required test is lagrange multiplier test.

3. The third test is the test performed if the first and second model test results are not aligned.

Table 4. Lagrange Multiplier Test

Lagrange Multiplier Tests for Random Effects			
Null hypotheses: No Effects			
Alternative hyphoteses: Two-sided (Breusch-Pagan) and one-sided (all others) alternatives			
	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	95.20042 (0.0000)	3.695255 (0.0546)	98.89567 (0.0000)
Honda	9.75707 (0.0000)	-1.922305 (0.9727)	5.540016 (0.0000)

In testing lagrange multiplier obtained result that ho is rejected, then best model is random effect. In conclusion, in the selection of the best models in chow, hausman and lagrange multiplier testing, the random effect model is the best model.

4.3 Regression Analysis

The estimation result in table 5 is the estimated macroeconomic effect on credit risk. Table 5 below is a summary of common effects model, fixed effect, fixed effect cross section weight and random effect.

Table 5. Estimation Results

Independent Variable	Dependent Variable : CREDIT RISK ISLAMIC BANKING							
	COMMON EFFECT		FIXED EFFECT		FIXED EFFECT		RANDOM EFFECT	
	Coeff	Prob	Coeff	Prob	Coeff	Prob	Coeff	Prob
GDP	-0.2474	0.2220	-0.2474	0.0288	-0.2061	0.0169	-0.2474	0.0282
INFL	0.0348	0.8532	0.0348	0.7357	0.0094	0.9044	-0.0349	0.7356
UNEMPL	-0.5492	0.0639	-0.5492	0.0012	-0.4527	0.0005	-0.5493	0.0011
C	0.0684	0.0160	0.0684	0.0000	0.0614	0.0000	0.0684	0.0001
R-squared	0.0696		0.7533		0.8588		0.1996	
Durbin-Watson stat	0.3507		1.3224		1.4312		1.1698	
Dummy Variables	No		Yes		yes		No	
GLS-Weights	no weights		no weights		cross-section weights		no weights	

Table 5 above is the result of testing of panel data regression with the whole model. After passing the testing phase of the model in the previous 3.2, the random effect model was chosen as the best model in this panel data regression test. Goodness of fit in this model is 0.1996 or 19.96%. This means that the three independent variables such as GDP, Inflation and Unemployment affects credit risk in Islamic banking in Indonesia by 19.96% while the other 80.04% is influenced by other factors. R-square is very important in every research, but only limited to the informer how much influence the independent variable to the dependent variable. R-square in this study is low because macroeconomic factors are only a fraction of other factors that may affect credit risk in Islamic banking in Indonesia. This is possible because macroeconomic variables are only a small part of the factors that affect credit risk from systematic risk.

The result of panel data regression with random effect model consisted of the variable of gross domestic product (GDP) and unemployment rate (UNEMP) have a significant negative effect on credit risk of Islamic banking in Indonesia. While the inflation rate variable has a negative but it does not have any significant effect on credit risk of Islamic banking in Indonesia. Among the three variables, the variable which affects the highest credit risk is the unemployment rate, which is equal to 0,5493 or 54.93%. The unemployment rate provides information on the impact of economic conditions, which indicates future uncertainty of income, thus it is affecting paying ability. Therefore, an increasement in the unemployment rate should have a positive effect on non-performing loans due to a decrease in paying ability.

The results of this study is inversely proportional to the theory of significant negative effect, in other words, the high unemployment rate the credit risk will be lower. This is expected because in Indonesia the unemployment rate remains high despite the high GDP. Thus, a high GDP increasement which is a picture of the high absorption of labor is not reflected in the decline of the unemployment rate. In addition, a strict credit risk management system in Islamic banks in Indonesia also has an impact on low credit risk despite high unemployment rates. However, the results of this study are not in line with previous research that is Haryono et.al (2016) which obtained the result that the unemployment rate has no effect on credit risk of Islamic banks.

The results of GDP analysis are in line with previous researches of Al-Wesabi and Ahmad (2013), Kabir et.al (2015) Haryono, et.al (2016) who found out that Gross domestic product has a negative effect on credit risk. GDP growth provides information on the country's economic development, which represents the amount of compensation to employees, gross profit for established and non-incorporated companies, and taxes minus subsidies. Thus, an increase in GDP levels should adversely affect credit risk given that an increase in GDP of a country will increase people's paying capacity and will have an impact on reduced credit risk. The results of this study are not in line with Waemustafa and Sukri (2015) who found GDP results did not affect credit risk in Islamic banks. This is possible because the research conducted by Waemustafa and Sukri (2015) with Malaysian country subjects that have different character from Indonesia. Malaysia is an Islamic country that

firstly implements Islamic banking than Indonesia, so that factors from external banks do not affect credit risk.

Inflation analysis results are not in line with previous researches of Al-Wesabi and Ahmad (2013), Kabir et.al (2015), Nursechafi and Abduh (2014) which found the result that inflation has a negative effect on credit risk while this research shows that it has a negative effect but not significant. The difference in results is due to the data used on different inflation indicators. If previous research use customer price index (CPI) data, while inflation data in this research use inflation data presented on website of central bank Indonesia (BI). This will certainly affect the results of research.

5. Conclusion

This research is done because it has a purpose to analyze the effect of macroeconomic variables, namely GDP, Inflation and Unemployment to credit risk in Islamic banking of Indonesia. R-square in this study is low 19.96% because macroeconomic factors are only a fraction of other factors that may affect credit risk in Islamic banking of Indonesia. This is possible because macroeconomic variables are only a small part of the factors that affect credit risk from systematic risk.

This result is compatible with the fact that the GDP indicator has a significant negative effect on credit risk on Islamic banks. This is evidenced by the declining GDP levels in Indonesia caused high levels of problem loans of Islamic banking in Indonesia, especially Bank Muamalat. Until now, the need for large fund injection due to the bubble of credit risk which is one of the causes is the low GDP in Indonesia. While other results are on the unemployment rate has a negative and significant impact on Islamic banking in Indonesia. This means that if unemployment is high, then the level of credit risk in Islamic banking decreases. This result is very likely obtained because with rising unemployment, the financing of credit will decrease. Because the provision of credit has a strict requirement one of which is the capital that must be adequate. Because with the weakness of capital on the borrower, the credit can not be given. If a given credit declines, it may result in a credit risk that also decreases. The inflation rate in this study had a negative but insignificant effect on credit risk in Islamic banks of Indonesia. This is very possible because if the high

inflation that usually happens is the interest rate of the bank to be high it will cause interest customers to save funds and avoid loans to conventional banking. While Islamic banking does not use interest rate systems such as conventional banking. So, despite high inflation and high interest rates, this does not affect the performance or credit risk in Islamic banking of Indonesia.

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References

- Ahmed, H. and Khan, T. 2007. Risk management in Islamic banking, in Hassan, M.K. and Lewis, M.K. (Eds), Handbook of Islamic Banking, Edward Elgar, Cheltenham.
- Akkizidis, I. and Khandelwal, S. K. 2008. Financial Risk Management for Islamic Banking and Finance, Palgrave Macmillan, First Ed.
- Al Wesabi, H. A. H., & Ahmad, N. H. 2013. Credit Risk of Islamic Banks in GCC Countries. The International Journal of Banking and Finance, 10(2), 95–112. Retrieved from <http://repo.uum.edu.my/9558/1/Cre.pdf>
- Aver, B. 2008. An Empirical Analysis of Credit Risk Factors of the Slovenian Banking System. Managing Global Transitions 6, 6(3), 317–334
- Bikker, J.A., and Hu, H. 2002. Cyclical Patterns in Profits, Provisioning and Lending of Banks and Procyclicality of the New Basel Capital Requirements. Banca Nazionale del Lavoro Quarterly Review, 55(221):143-175.
- Boudriga, A., Taktak, N. B., And Jellouli, S. 2009. Banking Supervision And Nonperforming Loans: A Cross-Country Analysis. Journal Of Financial Economic Policy, 1 (4), 286-318.
- Castro, V. 2013. Macroeconomic determinants of the credit risk in the banking system: The case of the GIPSI. Economic Modelling, 31(1), 672–683. <https://doi.org/10.1016/j.econmod.2013.01.027>
- Chong, B. S., & Liu, M.-H. 2009. Islamic banking: Interest-free or interest-based? Pacific-

- Basin Finance Journal, 17, 125–144. <https://doi.org/10.1016/j.pacfin.2007.12.003>
- Das, A., And Ghosh, S. 2007. Determinants Of Credit Risk In Indian State-Owned Banks: An Empirical Investigation. *Economic Issues*, 12(2), 27-46.
- Deaton, A. 2005. Franco Modigliani And The Life Cycle Theory Of Consumption. Paper Presented At The Convegno Internazionale Franco Modigliani,' Academia Nazionale Dei Lincei, Rome.
- Haryono, Y., Mohd, N., & Hamat, M. 2016. Factors Affecting Credit Risk in Indonesian Islamic Banks. *Journal of Islamic Finance*, 5(1), 12–25.
- Hasan, M., & Dridi, J. 2010. The Effects of the Global Crisis on Islamic and Conventional Banks: A Comparative Study. *IMF Working Paper*, 2(2), 163–200. <https://doi.org/10.1142/S1793993311000270>
- Jiménez, G., And Saurina, J. 2004. Collateral, Type Of Lender And Relationship Banking As Determinants Of Credit Risk. *Journal Of Banking And Finance*, 28(9), 2191 -2212.
- Jimenez, G., And Saurina, J. 2006. Credit Cycles, Credit Risk And Prudential Regulation. *International Journal Of Central Banking*, 2(2), 65- 98.
- Kabir, M. N., Worthington, A., & Gupta, R. 2015. Comparative credit risk in Islamic and conventional bank. *Pacific Basin Finance Journal*, 34, 327–353. <https://doi.org/10.1016/j.pacfin.2015.06.001>
- Khan, T. and Ahmed, H. 2001. Risk management: an analysis of issues in Islamic financial industry, Occasional Paper No. 5, IRTI, Jeddah
- Louzis, Dimitrios P, Vouldis, Angelos T, & Metaxas, Vasilios 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.
- Nursechafi, & Abduh, M. 2014. The Susceptibility of Islamic Banks' Credit Risk Towards Macroeconomic Variables. *Journal of Islamic Finance*, 3(1), 23–37.
- Rahman, R. A., Alsmady, A., Ibrahim, Z., & Muhammad, A. D. 2014. Risk management practices in Islamic banking institutions: A comparative study between Malaysia and Jordan. *The Journal of Applied Business Research*, 30(5), 1295–1304.
- Salas, V., and Saurina, J. 2002, Credit Risk in Two Institutional Regimes: Spanish Commercial and Savings Banks. *Journal of Financial Services Research*, 22(3), 203-

225.

Siddiqi, M. Nejatullah . 1983 . Issues In Islamic Banking, London, Islamic Foundation

Thiagarajan, S., Ayyappan, S., And Ramachandran, A. 2011. Credit Risk Determinants Of Public And Private Sector Banks In India. *European Journal Of Economics, Finance And Administrative Sciences*, (34), 147-154.

Waemustafa, W., & Sukri, S. 2015. Bank Specific and Macroeconomics Dynamic Determinants of Credit Risk in Islamic Banks and Conventional Banks. *International Journal of Economics and Financial Issues*, 5(2), 476-481.
<https://doi.org/10.6084/m9.figshare.4042992>