



Determinants of Credit and Financing Risk: Evidence of Dual Banking System in Indonesia

Raditya Sukmana

Department of Islamic Economics, Faculty of Economics and Business, Airlangga University, Surabaya, Indonesia

Received 20 Aug. 2017, Accepted 25 Nov. 2017, Published 01 Dec. 2017

Abstract. Given the fact that banking is the backbone of the Indonesian economy with a dual banking system, this paper seeks the determinants of Non-Performing Financing (NPF) and Non-Performing Loan (NPL) in Indonesia. Various techniques of econometric tools such as unit root, cointegration test and Impulse Response function are utilized with 129 number of observations (January 2004 to September 2014). Variables of capital, rates, loans, output, price, and exchange rate are adopted. The result shows that bank capital is important in influencing the credit and financing risk. Among the recommendations are for the government to maintain economic performance to keep NPF and NPLs as low as possible; and Financing Deposit Ratio-based Reserve Requirement policy (which is adopted only in Indonesia) imposed by the central bank seems to be effective in developing the real sector and should be adopted in conventional banks. This is because this policy “punish” bank which has low Financing Deposit Ratio. This paper covers comprehensive analysis on dual banking system in Indonesia, a country in which banks are the important engine of the economy and a country which has the largest muslim population.

Keywords: Non Performing Loan, Non Performing Financing, Financing Risk, Credit Risk, Islamic bank, Conventional bank

JEL Classifications: E3 and E5

1. Introduction

Following subprime mortgage crisis in 2008 which brought a slight decrease of 4.6% in Indonesian economic growth, it bounced back to more than 6% in the subsequent years. Based on the data from the central bank, in 2011, the economic growth reached to 6.49% which was the highest since the subprime crisis (SPI October BI, 2014).

Positive economic performance of Indonesia could not have been achieved if it was not supported by the banking industry as asserted by Goeltom (2007). This industry was vital in assisting Indonesian economic activities. For such a long time, banking industry comprised only conventional banks until the introduction of first Islamic bank namely Bank Muamalat Indonesia in 1992. The founding of this bank paved the way for other Islamic banks such as Bank Syariah Mandiri, established in 1998. In term of its asset, in 2000, amounts reached Rp1,790,168 million, accounting for only 0.17% of total banking assets. 2004 marked the year in which the proportion of Islamic banking assets surpassed 1% (Islamic Banking Statistics, August 2004). In 2013, the assets, financing, and deposits reached Rp242,276,169 million, 184,122,000 million, and 183,534,056 million, respectively.

Given the significant role of the banking industry in the Indonesian economy, it is highly important to ensure the successful performance of Islamic banks. Such success is reflected in various banking indicators of which NPL is one of the important variables. NPL accounts for how much the default of the banks. In the other word, NPL indicates whether the borrowers have the ability to pay back the loans. The current study will focus largely on the issue of NPLs.



In essence, since NPL are a significant indicator of banking performance, it is vital to determine the factors influencing NPLs. While the term “NPL” is used in conventional banks to refer to defaulted loans, NPF is used in Islamic Banks to refer to defaulted financing. The term “loan” would refer to the use of interest, which is prohibited in Islam, whereas “financing” adopts the term “margin” or “rental fees,” depending on the involved contract. As the Islamic banking industry is gaining prominence in the country, this study looks at both indicators (NPF and NPL¹).

Table 1. NPF and NPL in Indonesia

		2007	2008	2009	2010	2011	2012
(%) NPF	SME	4,08	3,64	4,50	3,47	2,98	2,27
	Non SME	3,97	4,71	2,44	1,52	1,45	2,13
(%) NPL	SME	3,50	3,27	3,08	2,60	2,27	2,79
	Non SME	4,64	3,14	3,54	2,52	2,06	1,20

Source: Statistik Perbankan Indonesia, Bank Indonesia (rearranged)

From the table 1, we can infer that NPF in the case of SME is generally higher than that of the Non-SME. For example, in 2007 NPF for SME and non SME are 4,08 and 3,97. The other years such as 2008 to 2012 NPFs for SME are almost consistently higher than that of non SME except in 2008 whereby NPF for non SME, 4,71 is higher than that of SME which is 3,64. Quite similarly is the performance of NPL both for SME and non SME. NPLs for SME are generally higher than that of non-SME such as in the year 2008, 2010, 2011 and 2012. Only two years, which are, 2007 and 2009 where NPLs for SME are lower than that of non-SME.

The possible reason of why NPF and NPL both for SME are generally higher than that of non-SME is due to the fact that SME may not have a proper and accurate financial record administration. This may create asymmetric information which eventually lead to the default payment by the SME. Meanwhile non-SME tend to have a comprehensive financial reporting system and even more it is audited by the external party. Therefore, less possibility of the default payment as compared to that for SME.

The other important fact obtained from table 1 is that from 2007 to 2012, the trend of both NPF and NPL is decreasing, from 3-4% in 2007 to 1-2% in 2012. This certainly creates motivation on what are the factors that influence the performance of NPL and NPF as the indicator of credit risk and financial risk.

As asserted by Goeltom (2007) that banking is the backbone of the Indonesian economy, hence ensuring the low level of NPF or NPL is very important. In order to do so, it is of substantial to look into the determinant of NPF and NPL. The identification of the determinants is very important for the monetary authority to issue necessary policies.

Many studies pertaining to these issues have been done, including work by Boudriga et al. (2009), Keeton (1999), Berger and de Young (1997), and Godlewski (2005). Loan, bank size and capital adequacy are the factors used to determine NPF. Other macro variables such as GDP and inflation are also adopted. The relationship between those variables and NPF/NPL will be addressed in the literature section. The sequence of the paper is as follows: after the introduction, it is followed by a review of the literature review and then a description of the data, model and method used for the study. After that, results and analysis are given followed by the conclusion.



2. Literature Review

This chapter discusses the findings for the various determinants of NPL and NPF. To have a comprehensive result, the discussion will be based on the determinants and the NPL/NPF

2.1 Loans /Credit

Extensive studies have been done in this issue. Study by Boudriga et al (2009b) on MENA region resulted a negative relationship between credit growth and NPL. However, Keeton (1999) found that credit growth has a positive relationship with NPLs. He argued that high growth in loans comes from lower standards in the loan procedure. For example, business proposals that may be rejected under high standard loan procedure can be approved for financing under the lesser standards.

The relationship between loan growth and NPLs was also examined by Kwan and Eisenbeis (1997). They found that growth in loans was negatively associated with bad loans but that the square of the one-year total loan growth rate was positively correlated with bad loans. The authors concluded that the relationship between loan growth and bad loans is U-shaped. This means that when loan growth is low, it has a negative effect on NPLs. When the loan growth increases, it diminishes NPLs and when there exists high loan growth, the amount of bad loans increases.

In other words, They argue that sustainable loan growth as it is characterized by a low to moderate loan growth rate is a reflection of good quality of management which eventually results a smaller number of bad loans. However, if the loan growth is excessive in which can be achieved by adopting lesser quality of lending standard, it leads to the higher number of bad loans. If the loan growth returns back to low to medium then bad loans will be reduced. This is what they means of U-Shaped

The amount of credit being disbursed shall consider the liquidity within the bank. The bank has to able to predict amount of liquidity stayed within bank for withdrawal purposes and treat the remaining as credit. Too much liquidity will create less return for the depositors and too little liquidity creates difficulty for the depositors to withdraw their funds. Study by Masood and Younas (2016) is important to seek the attitude of central bank and Islamic bank on the liquidity risk in order to decide how much credit being disbursed.

2.2 Size

Big banks certainly have more complex rules and regulations. The ability of big banks to provide large loan to a single company necessitates a larger amount of scrutiny and documentation, which aims to mitigate the loan risk. In essence, their standard operating procedure (SOP) for lending is more stringent than that of the small banks. Conversely, for a small bank, the money provided in a loan is relatively less than that of big banks. The required documentation and standard operating procedure will also be simpler. This exposes smaller banks to more credit risk due to asymmetric information. Thus, the larger the size of the bank, the lower the amount of NPLs. Further study on this issue can be found in the work of Shrieves (1992, p.454) and Godlewski (2005, p.136).

2.3 Capital Adequacy

For a bank which is about to become insolvent, recapitalization is important in order to avoid further deterioration. The standard of CAR used as its indicators is 8%. Thus, when a bank has CAR of less than 8%, it can then be considered that the bank is unable to face the risk for given productive assets. Conversely, a bank with a CAR which is much higher than 8%, then Bank has more ability to face the risk. For a bank having less than the specified CAR, the central bank will request the bank to add more capital relative to the given risk of the asset on the bank's balance sheet. Another alternative is for the bank to reduce the risk weighted asset to maintain the CAR. In their study, Boudriga et al.(2009a) suggest that regulatory capital can serve as an indicator of the financial risk exposure of the whole system.



The relationship between CAR and NPL varies. The negative relationship means that increase in CAR will decrease NPL and this can be seen in the study by Boudriga, A., Taktak, N. B., &Jellouli, S. (2009a), Berger, A.N., and DeYoung, R. (1997), and Godleswki, C. J. (2005). Increase in CAR means that there is a higher source of loan and eventually higher loan will absorbed current NPL. This is the argument of the negative relationship between CAR and NPL. However, there is also study which shows otherwise which means CAR and NPL has a positive relationship which means when CAR increase, NPL is also increase. This can be seen in the study by Boudriga, A., Taktak, N. B. &Jellouli, A. (2009b). They argue that increase in CAR leads the management to take higher credit risk which eventually create higher NPL. Based on the obtained previous study, Despite many of them has a negative relationship between CAR and NPL, there is also study in which the relationship is positive. Hence, for the conclusion, there is no concensus on the relationship between the two as it is argued by Boudriga, A., Taktak, N. B.,& Jellouli, A. (2009b)

2.4 GDP

Many studies have been conducted with regard to the relationship between GDP and NPL. To name a few, Shu, C.(2002), Festic & Beko (2008), Zeman and Jurca (2008), Farhan, M., A. Sattar, A. H. Chaudhry, and F. Khalil (2012) are some of studies focusing on those variables.

The secondary data of NPL used from the first three studies above are not the individual NPL of a bank, rather each of those studies utilizes the aggregate NPL within the respective countries. Data frequency adopted varies between quarterly and annually except for the Farhan, M., A. Sattar, A. H. Chaudhry, and F. Khalil (2012) which they attempt to obtain the primary data. In order to do so, they distribute the questionnaire to get the perspective from the selected banking practitioners (decision makers) on their experiences of the relationship between the economic activity and NPL.

The general result from those studies reveals that it has a negative relationship between GDP and NPL whereby increase in GDP leads to decrease NPL. Study conducted by Shu,C (2002,p 6) in the case of Hongkong reveals that bad loans as a fraction of total lending rise with the fall of economic growth. It means that the downturn economy leads the inability of the firms (borrowers) to repay back the loan and hence NPL increases. Similar study is done by Festic and Beko (2008, p 132) in the country of Hungary and Poland. It argues that periods of economic growth and strong demand for a country's exports have a positive effect on the domestic corporate sectors. At the time of the economic boom, corporates are performing and it is creating the ability to repay back the loan and therefore NPL decreases. The other study with regard to this relationship can be found from the work conducted by Zeman and Jurca (2008, p.13) in the case of Slovakia. It found out that the growth of GDP leads to decrease NPL in the long run.

While those three studies are utilizing the secondary data to conform the relationship, there is another study conducted by Farhan, M., A. Sattar, A. H. Chaudhry, and F. Khalil (2012, p 95)to gather more information from the selected bankers in Pakistan. This study is important as it is the confirmation from the bankers' practitioners on the GDP and NPL interactions. The result suggest that Pakistani bankers perceive that growth in GDP has a significant negative relationship with the NPL.

From the studies above, the general overview of the relationship is that increase in GDP will decrease the NPL. It suggests that when the economy is improving, the revenue obtained from the corporates and income received by individuals creates positives effects on the loan capacity hence NPL will go down.

2.5 Interest Rate, Price and Exchange Rate

The relationship between interest rate and NPLs is obvious. Higher interest rates put borrowers into a difficult situation. Business might not be able to afford the higher payments resulting from an interest rate increase, and as a result, NPLs increase. Hence, the relationship between these two variables is



positive. Studies regarding this issue have been done by Festic and Beko (2008), Farhan et al. (2012), Jakubik (2007), Bofondi and Ropele (2011), Zeman and Jurca (2008) and Shu (2002). With regard to the relationship between price and NPLs, a study by Farhan et al. (2012) showed that a positive relationship exists between the two. A price increase would put the borrower in a better position since the real value of the loan decreases. Meanwhile, a study by Festic and Beko (2008) looked at the relationship between the exchange rate and NPLs in several central European countries such as Hungary, Poland, the Czech Republic and Slovakia. All of the results showed a significant relationship although the relationship was not consistent between countries. All previous studies gathered in this study focus on the conventional banks in various countries such as MENA region, countries in Europe and etc. So far there is no study looking at the case of Islamic banks. This study utilizes the Islamic banking as the case study and moreover, the conventional banks also taken into account. Therefore, the current study gains its importance not only for central bank in a country which adopt dual banking system (conventional and Islamic bank) such as in Indonesia.

This study extends the previous study by taking the Islamic banking as the case. This type of banking differs particularly on the contract adopted in various banking instruments both funding and financing which open a new landscape on the risk management, policies issues, etc. Furthermore, the result of this study stimulates the future study for example whether Islamic banks can transmit the monetary policy into the real sector or other research for example risk mitigation on the each type of financing contract in Islamic banks such as murabaha, mudharabah etc. This ensures the extension of the new knowledge.

3. Methods

The data utilized covers the period of January 2004 to September 2014 (number of observations = 129). Data covered in this study started from the earliest data published by Bank Indonesia (central bank of Indonesia) until the last data when the study starts. The total number observation which is 129 is sufficient for the adopted method. The study utilizes Cointegration and impulse response function (IRF) due to the following reasons. The long run relationship is one of the aim in this study. Technically, it seeks the determinants of the NPL and NPF in the long run. This is important, particularly for the central bank as the regulator to create policies to develop real sector by looking at the NPL and NPF performance.

IRF is adopted to look into the short run relationship. It enables to see the respond of NPL and NPF on the shock of the each determinants used in this study. Therefore, the adopted methods ensure the comprehensiveness of the analysis. As explained above, two models are being examined, namely non-performing financing and non-performing loan. For the NPF model, the variables of capital adequacy ratio Syariah (CARS), financing rate (FR), Islamic financing (LIFIN), industrial production index (LIPI)², consumer price index (LCPI), Islamic banking assets (LIBASSET), and exchange rate (LXRATE) are used as determinants for non-performing financing (NPF). To provide a comparison, we continue with a discussion of non-performing loans (NPL), for which the variables of capital adequacy ratio (CAR), interest rate (INT), conventional loans (LCLOAN), industrial production index (LIPI), consumer price index (LCPI), Islamic banking asset (LIBASSET), and exchange rate (LXRATE) are adopted.

The models of NPF and NPL as follows:

$$\text{NPF} = f(\text{CARS}, \text{FR}, \text{LIFIN}, \text{LIPI}, \text{LCPI}, \text{LIBASSET}, \text{LXRATE})$$

$$\text{NPL} = f(\text{CAR}, \text{INT}, \text{LCLOAN}, \text{LIPI}, \text{LCPI}, \text{LCBASSET}, \text{LXRATE})$$



3.1 Unit root tests

This first test of order of integration is very important in the time series analysis. Failure to do this test could lead to spurious regression in which the result shows a relationship between the variables of X and Y as significant, whereas a priori there should be none. So to test the order of integration of the variables, two types of unit root tests were performed for this study. These are the Augmented Dickey Fuller (ADF) Test and the Phillips-Peron (PP) Test.

The unit root test of ADF is an extension of the Dickey Fuller (DF) test. The difference lies in adding the component of lagged values of the dependent variable Δy_t , which does not exist in the DF test. This additional component is meant to control for the serial correlation of the error term, which in the original test is presumed to be uncorrelated.

The unit root test of PP was developed as a generalization of the DF procedure. PP allows for a fairly mild assumption concerning the distribution of error. Whereas DF assumes independence and homogeneity, the PP test allows the disturbances to be weakly dependent and heterogeneously distributed. The critical values for the PP test statistics are the same as those in the DF test.

In both ADF and PP, the hypotheses are as follows:

Null Hypothesis : $H_0: d = 0$

Alternative Hypothesis : $H_a: d < 0$

The null hypothesis of $d = 0$ implies that there is a unit root or a non-stationary time series. The alternative hypothesis that $d < 0$ means the time series is stationary. If for example, the result is non-stationary, then transforming the non-stationary time series into stationary data is necessary. Otherwise, a spurious regression result will be obtained, as was described above.

3.2 Johansen Cointegration Test and Impulse Response Function

Economically speaking, co-integration exists when two (or more) series are linked to form an equilibrium relationship spanning the long run, although the series may contain stochastic trends (non-stationary). They will nevertheless move closely together over time and difference between them will be stable (stationary) (Harris, 1995). This definition implies that even though examining non-stationary variables may result in spurious regression, if the residual of the model is found to be stationary then the variables are said to have co-movement in the long run or a long-term equilibrium relationship. Therefore, in such a case the regression is meaningful. In this study, the JJ method was adopted.

The Johansen and Juselius procedure can prevent the use of the two-step estimator³ and can estimate and test for the presence of multiple cointegrating vectors. The JJ procedure is an extension of a multivariate generalization of the DF test ($\Delta y_t = \delta y_{t-1} + \epsilon_t$). Consider the following formula (Enders, 1995, p. 390):

$$\Delta x_t = \sum_{i=1}^{p-1} \pi_i \Delta x_{t-i} + \alpha x_{t-p} + \epsilon_t \dots\dots\dots 1$$

$$\pi = - \left(I - \sum_{i=1}^p A_i \right) \dots\dots\dots 2$$

$$\alpha = - \left(I - \sum_{i=1}^p A_i \right) \dots\dots\dots 3$$

The key in Equation 3 is the rank of matrix π . The rank of π is equal to the number of independent cointegrating vectors. If the rank of $\pi=0$, then the matrix is null; hence, the standard VAR model in first difference is employed. If the rank of π is of rank n , then the vector is stationary. If the rank of $\pi=1$, there is a single cointegrating vector and the component of πx_{t-p} is the error correction factor. In other cases, in which $1 < \text{rank} < n$, there are multiple cointegrating vectors.



It is now necessary to outline the VAR order selection, or the selection of relevant lag length in the modeling of VAR. Some of the criteria used in selecting the VAR lag length for each variable are, among others, the Akaike’s Information Criterion (AIC) and the Schwarz Information Criterion (SIC). The lag length used should be long enough to confine the dynamics of the system. However, it should not be so long as to exhaust the degrees of freedom. The criteria for AIC and SIC are as follows (Kennedy, 1998):

$$AIC = \ln(\text{Sum of Square Error} / T) + 2 K / T \dots\dots\dots 4$$

$$SC = \ln(\text{Sum of Square Error} / T) + (K \ln T) / T \dots\dots\dots 5$$

Where T is the sample size and K is the number of regressors.

Lastly, IRF accounts for the effect of shocks at a particular time on the future values of a variable in a dynamic system (Pesaran and Shin, 1998). This method is well-suited for this study as it focuses on the relative strength of shocks to be measured compared to the variation in a particular variable of interest. Moreover, it enables us to determine the direction of the transmission. The current study looks at the responses of the main variables, namely NPF and NPLs, to a shock in the various variables of CARS/CAR, FR/INT, LIFIN/LCLOAN, LCPI, LIBASSET/LCBASSET, and LXRATE.

4. Result and Discussions

This section discusses the results of the adopted model and continues with an analysis. As explained above, two models are being examined, namely non-performing financing and non-performing loans.

4.1 Results

This study utilized the Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) tests. The lag in the test equation, is chosen based on AIC and SC. In all the cases, the test was conducted with intercept and trend & intercept. Table 2 reports the result of those tests. It can be seen that based on ADF unit root test, all variables CAR, CARS, LCBASSET, LCLOAN, LCPI, FR, LIBASSET, LIFIN, INT, LIPI, NPF, NPL, LXRATE contain unit root. Namely, the null hypothesis of the presence of unit root cannot be rejected at 5% significance level especially for ADF level and intercept. However, the variables are stationary when first differenced (PP). We therefore conclude that they are I (1) variables. Therefore, for our analysis, this serves as a prerequisite for our cointegration test.

Table 2: Unit Root Test Results

	ADF				PP			
	Level		1st diff		Level		1st diff	
	intercept	T & Int	intercept	T & Int	Intercept	T & Int	intercept	T & Int
CAR	-1.87	-2.44	-1.98	-1.99	-2.88*	-3.29*	-12.02***	-12.06
CARS	-2.64*	-2.87	-8.96***	-8.93	-3.71***	-3.96**	-19.72***	-19.84***
LCBASSET	-0.43	0.65	-3.1**	-3.07	1.15	-3.32**	-12.44***	-12.5***
LCLOAN	-1.00	***-6.73	-2.24	-2.39	-1.61	-2.25	-11.56***	-11.66***
LCPI	-2.4	-2.3	-11.53***	***-11.56	-2.45	-2.38	-11.53***	-11.57***
FR	-2.34	-2.38	-9.8***	***-9.79	-2.91**	-3.09	-15.21***	-15.18***
LIBASSET	-2.28	-1.78	-12.48***	***-12.85	-2.31	-2.41	-12.41***	-12.77***
LIFIN	-1.05	-3.73**	-3.17**	-3.14	-2.34	-3.34**	-8.43***	9.10***



INT	-1.57	-3.33*	-3.53***	** -3.5	-1.5	-2.29	-7.57***	-7.59***
LIPI	1.32	-1.5	-3.13**	** -3.75	-0.002	-4.17***	23.52***	-24.05***
NPF	2.23	-2.43	-10.02***	*** -4.64	-2.93**	-2.98	-15.69***	-15.64***
NPL	-1.15	-4.2***	-2.93**	-2.95	-1.22	-2.12	-10.38***	-10.35***
LXRATE	-1.16	-2.00	-5.67***	*** -5.68	-1.54	-1.95	-9.67***	-0.93***
	***, **, * are 1%, 5%, 10%							
	T & Int = Trend and Intercept							

As can be seen in Table 3, trace statistics and max eigenvalue for NPF show two and one cointegrating equations, respectively. This means that in the long run, NPF and its determinants, namely capital adequacy ratio for Islamic banks (CARS), financing rate (FR), Islamic financing (LIFIN), industrial production index (LIPI), consumer price index (CPI), Islamic banking assets (LIBASSET), and exchange rate (LXRATE) are found to be cointegrated. In short, the presence of cointegration between NPF and other variables provides evidence that these variables share a long-run relationship. Therefore, we can conclude that there is a long-run equilibrium governing the relationship among the variables.

A similar result was found for conventional banks. The results show that cointegration exists between non-performing loan (NPL) and capital adequacy ratio (CAR), interest rate (FR), conventional loan (LCLOAN), industrial production index (LIPI), consumer price index (CPI), conventional banking assets (LCBASSET), and exchange rate (LXRATE). Table 4 reveals that the trace statistics and the max eigenvalue statistics provide five and two cointegrating equations, respectively. Theoretically number of cointegration vector has to be less than total variable minus one. Since we have eight number of variables and five cointegrations, then our model is reliable. Hence, the results suggest that the variables in NPL equation share a long-run relationship.

Table 3: Cointegration of NPF

$$\text{NPF} = f(\text{CARS}, \text{FR}, \text{LIFIN}, \text{LIPI}, \text{LCPI}, \text{LIBASSET}, \text{LXRATE})$$

Model	Null Hypothesis	Trace Statistic	Crtcl 0.05 Value	Max-Eigen Statistic	Crtcl 0.05 Value	Result
$r \leq 0$	0.440851	205.3045	159.5297	72.08598	52.36261	2 and 1 coint equation in TT and ME
$r \leq 1$	0.273274	133.2185	125.6154	39.58147	46.23142	
$r \leq 2$	0.221891	93.63707	95.75366	31.11015	40.07757	
$r \leq 3$	0.202059	62.52692	69.81889	27.98943	33.87687	
$r \leq 4$	0.140929	34.5375	47.85613	18.83599	27.58434	
$r \leq 5$	0.074598	15.70151	29.79707	9.613326	21.13162	
$r \leq 6$	0.039879	6.088183	15.49471	5.046261	14.2646	
$r \leq 7$	0.008367	1.041921	3.841466	1.041921	3.841466	

Normalized Cointegration Equation for NPF Model



NPF	CARS	FR	LIFIN	LIPI	LCPI	LIBASSET	LXRATE
1	0.586343	0.782149	-98.8115	-69.8786	42.88138	106.3613	85.91561
St-error	(0.35675)	(0.87938)	(22.3395)	(15.7722)	(6.58457)	(21.6836)	(11.4535)
t-stat	1.64357	0.88943	-4.423178	-4.430495	6.5124	4.90515	7.50125

Table 4: Cointegration of NPL

$$NPL = f(CAR, INT, LCLOAN, LIPI, LCPI, LCBASSET, LXRATE)$$

Model	Null Hypothesis	Trace Statistic	Crtcl 0.05 Value	Max-Eigen Statistic	Crtcl 0.05 Value	Result
$r \leq 0$	0.40309	230.21	159.5297	63.98262	52.36261	5 and 2 cointegration in TT and ME
$r \leq 1$	0.340265	166.2274	125.6154	51.57376	46.23142	
$r \leq 2$	0.273401	114.6537	95.75366	39.60319	40.07757	
$r \leq 3$	0.177551	75.05047	69.81889	24.23815	33.87687	
$r \leq 4$	0.167873	50.81232	47.85613	22.78754	27.58434	
$r \leq 5$	0.125041	28.02478	29.79707	16.56371	21.13162	
$r \leq 6$	0.055658	11.46108	15.49471	7.101057	14.2646	
$r \leq 7$	0.03455	4.36002	3.841466	4.36002	3.841466	

Normalized Cointegration Equation for NPL Model

NPL	CAR	INT	LCLOAN	LIPI	LCPI	LCBASSET	LXRATE
1	0.990607	0.798827	-0.71187	-6.8452	-1.32765	4.360558	-6.40997
St-error	(0.1483)	(0.25501)	(2.85671)	(3.1057)	(1.06703)	(4.24624)	(1.54087)
t-stat	6.67975	3.13253	-0.249194	-2.20407	-1.244245	1.02692	-4.159969

Based on the above long-run cointegrating vectors, several notable points need to be highlighted. In the long run, capital adequacy seems to be significant. The positive and significant role of the capital adequacy ratio for Islamic banks (CARS) (t -stat= -1.64) indicates that an increase in CARS will likely be followed by an increase in NPF. Similarly, for the conventional model, the CAR shows a positive correlation with NPL (t -stat= 6.68).

Interest Rate (INT) seems to relate positively and significantly with NPL. This implies that when the rate increases, NPL tends to follow in the same direction. This is expected and can be justified theoretically.



The documented relationship between Islamic financing and NPF shows a negative and significant relationship, while conventional loan suggests a not significant relationship to NPL. The t -stat of Islamic financing shows the variable (LIFIN) to be significantly related to NPF (t -stat=4.42), and the variable of conventional loans is shown to insignificantly related to NPL (t -stat= 0.24).

With regard to the role of the industrial production index (LIPI) for both types of banks, it is noted that LIPI has the same effect on NPL and NPF. The relationship of LIPI to both NPF and NPL is negative and significant, with t -stats of 4.43 and 2.2, respectively. This means that an increase in LIPI will be followed by a decrease in NPL and NPF.

Price is shown to have a long run-effect on NPF but not NPL, with t -stats of 6.5 and 1.24, respectively. This means that when the price increases, NPF tends to increase but NPL does not. In terms of size, the variable of Islamic banking assets seems to have a significant positive effect on NPF (t -stat= -4.905), while this is not the case with conventional banking assets (t -stat= 1.02). Lastly, exchange rate seems to have a different impact on the different types of banks in the long run. For the NPF model, an increase in the exchange rate (depreciation) will be followed by an increase in NPF (t -stat= -7.5). Conversely, an increase in exchange rate will cause a decrease in NPL.

An impulse response function (IRF) maps out the response of a variable in the VAR system to shocks in other variables (Gujarati, 2003). In other words, it is used to see how a shock in one variable is transmitted to other variables through a dynamic VAR structure, besides directly affecting the concerned variable itself. A generalized impulse response is applied in all cases, since it does not depend on the VAR ordering (Eviews 5 User Guide, 2005)

The IRF results show that shocks in Islamic financing and conventional loans lead to a fast and negative response in NPF/NPL (figure 1 and 2). A shock in size also leads to a negative response in NPF and NPL. This means that an increase in size would reduce the NPL and NPF.

Shocks in FR/INT and LCPI do not cause a good response from NPF and NPL in the short run. Similarly, NPF or NPL show no response by the shock of IPI. This suggests that a lag is required for the shock of IPI to have an impact on NPF and NPL. For capital, the IRF has a different impact on NPF than NPL. The same is true for the exchange rate.

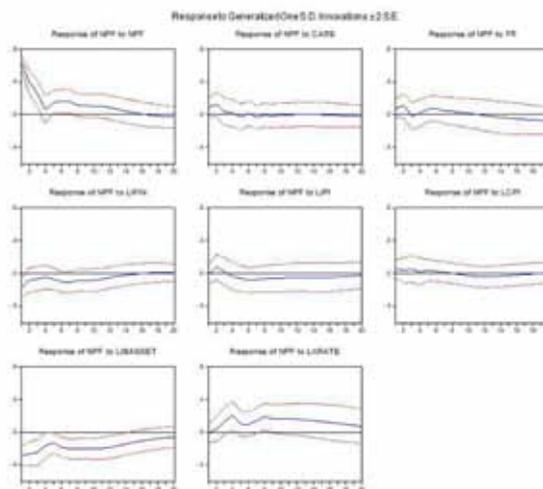


Figure 1. Impulse Response Function of NPF

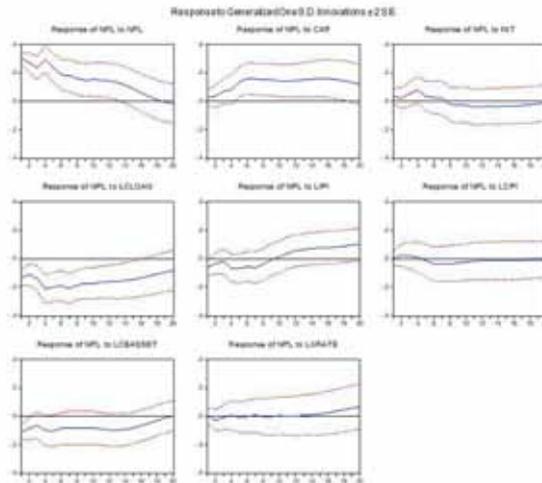


Figure 2. Impulse Response Function of NPL

4.2 Analysis

In this study, economic performance (GDP) is represented by the industrial production index (IPI) following Sukmana and Kassim (2010). When the economy grows, IPI increases. In this study, IPI is shown to have negative relationship with NPF, which means that when the economy booms, businesses are earning more revenues, which later increases their ability to repay financing. Hence, non-performing financing decreases. For the last three years, Indonesian economic growth has stood at around 5.7% to 6.5% (Bank Indonesia, 2007). As such, it can be regarded as a country with high economic growth, especially given the low economic growth of the European countries. With high economic growth, prospective businesses are expanding their activities by requesting loans from banks (both conventional and Islamic). Repayment of loans or financing to those banks should not face much difficulty, as overall economic performance in Indonesia is rising. This result is consistent with the studies done by Shu (2002), Jakubik (2002), Festic and Beko (2008), Zeman and Jurca (2008), and Farhan et al. (2012). However, in the short run, IR shows not significant of the financing rate and interest rate to the NPF and NPL respectively.

In terms of the relationships of FR and INT to NPF and NPL, respectively, this study shows that the relationships are different. Interest rate is positively correlated with NPL, but such is not the case with FR and NPF. This is understandable, since the increase in interest rate would increase defaults on loan payments. In this case, the increase in interest rate would lead to a higher amount of money being paid by businesses to banks, creating a burden on the borrower. As a result, some of them would be unable to pay, hence it increases the amount of payments in default. Further more, banks can increase their interest rate at will, following the monetary rate before or during the loan period. The result supports much of the literature, including studies by Berger and De Young (1997), Jakubik (2007), and Bofondi (2011).

The fact that FR is not significantly related to the NPF shall also be explained once the types of financing contracts adopted in Islamic banks are described. Similar to Islamic banking elsewhere, financing contract types in Indonesia are dominated by the *murabahah* (buy and sell agreement), whereby banks will buy the asset and sell it to the customer with margin and definite term. During



the term, the margin cannot be changed whatsoever or else the contract will be invalid. The margin is fixed from the beginning of the signed contract to the end of the *murabahah* term, even if the interest rate in the conventional bank increases. Given the fixed rate, NPF can be expected to be low. In contrast, an increase in interest rate during the term of a conventional loan may directly increase NPL. In Indonesia, *murabahah* represents more than 58% out the total financing given by Islamic banks (Statistik Perbankan Syariah, Oct 2014). Hence, this domination perhaps leads to the insignificance of the relationship between FR and NPF.

Price is positively related to NPF, with an increase in price leading to an increase in NPF. The previous literature showing the negative relationship between price and NPL, including work by Shu (2002) and Zeman and Jurca (2008), suggests that an increase in price would create the loan repayment value to decrease in real terms. Hence, in this case, the borrower or fund recipients are at an advantage. This leads to lower NPL, since the borrower will have a greater ability to pay back the loan. However, such is not the case with Islamic banking, where the increase in price increases the NPF. LPPS (2005, p.23; 2006, p. 25) reports that an increase in general price due to fuel subsidy reduction increased the inability to repay financing. In the short run of IRF, the shock of price seems to increase both NPF and NPL.

Perhaps the type of businesses financed by Islamic banks can explain this result. Based on data from Bank Indonesia (Statistik Perbankan Syariah, Oct 2014) for the period of 2005 to 2013, the financing provided to small and medium enterprises (SMEs) ranged from 55% to 77%. The rest was given to large enterprises. SMEs are companies in which the executor is also the owner, and the assets of the company are the assets of the owner. Thus, SMEs may not have proper separation of the asset. These sectors are dominated by the lower and middle-income segments, which are more sensitive to increases in price. When the price of basic needs increases, SMEs use the money/asset from the companies as opposed to their own money. As a result, they may not be able to pay back the loan. This could perhaps explain the positive relationship between price and NPF.

In this study, Islamic financing is shown to have a negative relationship with NPF, meaning that an increase in financing will cause NPF to decrease. However, the same is not the case for conventional loans. The fact that increase in Islamic financing decreases NPF perhaps due to the regulation by the central bank of Indonesia (Bank Indonesia) is applied to the Islamic banking industry. The regulation in this case is on the reserve requirement, which is not based on the number of deposits collected but rather on the financing-to-deposit ratio (FDR). The aim of this policy is to return banks to the in primary role as financial intermediaries. The banks functioning in this main role are rewarded by lowering the reserve required by central banks. Conversely, banks that failure punished by paying more for the reserve requirement. Paying more on this reserve is unexpected and therefore banks need to maintain the FDR by providing more financing. Further study can be read in Sukmana and Kholid (2013)

Loans from conventional banks are shown to have a negative relationship (in the short run of IRF) with NPL, meaning that when loans increase, NPL will go down. This means that conventional banks have been able to select the prospective businesses which request funds from banks. The more loans given by conventional banks will create lower NPLs. This result is consistent with studies by Kwan and Eisenbeis (1997) and Boudriga et al. (2009b). However, in the long run, there is no significant relationship seen between the two.

Size is shown to have a negative impact on both NPF and NPL in the short run, as shown by IRF, supporting the study done by Shrieves and Dahl (1992). This suggests that when there is an increase in the assets of Islamic banks and conventional banks, there is a decrease in NPF and NPL, respectively. Conversely, a decrease in assets will lead to high NPF. Big banks have a greater ability to equip themselves with sophisticated information technology to facilitate customer transactions.



Such advanced technology provides customers with any kind of banking transaction required, and even includes software for credit scoring, which allows account officers to assess a business's risk more accurately. Furthermore, given the large size of banks, such technology upgrades the skills of risk assessors, as a way to address the risk involved. Both Islamic and conventional banks are utilizing technology to do this.

Capital adequacy in both types of bank seems to have the same impact on NPF/NPL. Both coefficients are positive with a significant *t*-stat result. This result conflicts with many other studies, including those of Boudriga (2009) and Berger and De Young (1997). Exchange rate is shown to have a negative relationship with the NPL. When the rupiah depreciates (increase in value/USD), NPL decreases. This can be explained by the role of the exporters. In the case of depreciation, the exporter tends to export more since they will receive more rupiah for the same amount of USD. However, this is not the case for Islamic banks, where it is found that the relationship between the two is positive.

5. Conclusion

The Islamic banking industry, which has been in existence in Indonesia for more than two decades, also contributes to Indonesian economic development. Despite the fact that the current market share is still around 5%, the growth of the sector by more than 30% shows the acceptance of this new industry by people and businesses at large. As the largest Muslim country, there is a necessity for interest-free financial institutions earmarked for Muslim and people in general. Not only Muslim but also non-Muslims need this bank, since Islamic banks have unique features that suit with different risk appetites than conventional banks. For example, certainty regarding the margin is assured in the *murabahah* concept. Therefore, ensuring the soundness of Islamic banking performance is also important in providing continued support to the Indonesian economy.

The banking sector plays major role in the economic development in Indonesia. Given the country's underdeveloped capital market, the banking sector is still the main channel for the individual consumer and business investment. Therefore, a sound banking sector is crucial for the overall development of Indonesia's economy. Of many other indicators, non-performing financing (NPF) in the case of Islamic banks and NPL in the case of conventional banks, are important.

For this reason, both non-performing financing and non-performing loans are chosen as important variables for looking at the performance of the banking industry. Based on the existing literature on this topic, this study identifies factors which may influence NPF and NPL, namely the capital adequacy ratio (for Islamic and conventional banks), financing rate/interest rate, Islamic financing/conventional lending, industrial production index, consumer production index, Islamic/conventional banking assets, and exchange rate.

Monthly data was utilized from between January 2004 and September 2014. Using ranges of time series econometric techniques, some of the results show that economic performance (GDP as proxied by IPI) is important in determining the non-performing financing/loans. An economic boom will likely bring about expansion in businesses and increase individuals' wealth. Therefore, their repayment ability increases during this time. Conversely, an economic bust would decrease the ability to repay loans, resulting in increased NPF/NPL.

The government must maintain stable economic performance (GDP) so as to keep the NPF and NPL low. The relationship of Islamic financing to NPF is negative, which means that as Islamic financing increases, the NPF decreases. This suggests that when providing more financing, Islamic banks have been selecting the businesses appropriately so as to ensure their ability to pay back the financing. This is demonstrated by a high financing-to-deposit ratio while keeping the NPF low. One of the reasons for Islamic banks to provide more financing to businesses is to avoid the higher required



reserve payment to the central banks. In the case of Indonesia, the Islamic banking industry is required to provide more reserve, unless their FDR is above 80%.

This policy is aimed at ensuring the role of banks as financial intermediaries, to eventually support the real sectors. In this case, FDR is used as a proxy for financial intermediation. High FDR refers to a high level of financial intermediation and vice versa. While giving more financing, Islamic Banks also need to maintain the quality of financing so as to provide a competitive margin for depositors despite for the bank's operational expenses. The fact that Islamic banks can maintain an average FDR above 80% while maintaining NPF at less than 5% shows that Islamic banks have performed well in their role as financial intermediaries and in terms of quality of financing. Regulation by Bank Indonesia on this matter seems to be effective and is also imposed on conventional banks (Sukmana and Kholid, 2013).

The negative relationship between the overall economic performance (GDP) and NPF suggests a recommendation for practitioners. Islamic Banks should be equipped with an early warning system showing international and domestic economic performance. In the case that a tendency toward economic decline emerges, financing disbursement should be reduced to avoid an increase in NPF. Further research should focus on the NPF in different sectors in relation to the macro and micro economic variables, to determine the sensitivity of those economic sectors.

References

- Bofondi, M. and Ropele, T 2011, 'Macroeconomic determinants of bad loans: evidence from Italian banks', *Occasional Papers*, 89.
- Boudriga, A., Taktak, N. B., & Jellouli, S 2009a, 'Does bank Supervision impact nonperforming loans: cross country determinants using aggregate data? *MPRA Paper no.18068*, posted 22 October 2009. Online at <http://mpra.ub.uni-muenchen.de/18068/>
- Boudriga, A., Taktak, N.B., & Jellouli, A 2009b, 'Bank Specific, Business and Institutional Environment Determinants of Non performing Loans: Evidence from MENA Countries', *Economic Research Forum, ERF 16th Annual Conference. November 7-9, 2009. Marriot Cairo Hotel, Cairo, Egypt*
- Enders, W 1995, '*Applied Econometric Time Series*', New York: John Wiley & Sons, Inc.
- Farhan, M., Sattar, A., Chaudhry, A.H., Khalil, F 2012, 'Economic Determinants of Non-Performing Loans: Perception of Pakistani Bankers. *European Journal of Business and Management*. ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online) Vol 4, No.19, 2012
- Festic, M., and Beko, J 2008, 'The Banking Sector and Macroeconomic Performance in Central European Economies', *Czech Journal of Economics and Finance*, 58, no 3-4
- Godleswki, C. J 2005, 'Bank Capital and Credit risk taking in emerging market economies', *Journal of Banking Regulation* Vol 6 no 2, pp 128-145
- Berger, A.N., and DeYoung, R 1997, 'Problem loans and Cost efficiency in Commercial Bank', *Journal of Banking and Finance* Vol.21
- Jakubik, P 2007, 'Macroeconomic Environment and Credit Risk', *Czech Journal of Economic and Finance* 57
- Keeton, W 1999, 'Does Faster Loan Growth Lead to Higher Loan Losses?', *Federal Reserve Bank of Kansas City, Economic Review*, Second Quarter 1999
- Kwan, S. & Eisenbies, R. A 1997, 'Bank Risk, Capitalization, and Operating efficiency. *Journal of Financial Service Research* 12:2/3 117-131. Kluwer Academic Publishers



- Pesaran, M.H., & Shin, Y 1998, 'Generalized impulse response analysis in linear multivariate models', *Economic Letters*, Vol. 58, pp. 17-29.
- Shrieves, R., & Dahl, D 1992, 'The relationship between risk and capital in commercial banks', *Journal of Banking and Finance*, vol. 16, issue 2, 439-457
- Shu, C 2002, 'The Impact of macroeconomic environment on the asset quality of Hong Kong's banking sector', *Hong Kong Monetary Authority Research Memorandums*.
- Harahap S., S., & Basri, Y., Z 2003, 'History and Development of Islamic Bank in Indonesia', *Paper presented at International Islamic Banking Conference*, Kuala Lumpur.
- Sukmana, R. & Kassim, S.H 2010, 'Roles of the Islamic banks in the monetary transmission process in Malaysia', *International Journal of Islamic and Middle Eastern Finance and Management* 3(1): 7-19
- Sukmana, R., & Kholid, M, 2013, 'An Assessment of Liquidity policies with respect to Islamic and conventional banks: A case study of Indonesia', *Qualitative Research in Financial Market* Vol.5 No. 2
- Masood, O., and Younas J. 2016, 'The impact of Liquidity Risk Management n Selected Islamic Banks in Pakistan. *Journal of Islamic Financial Studies* Vol 2 No.1 (June-2016). ISSN (2469-259X)

Official Websites:

- Bank Indonesia 2007, '*Laporan Perkembangan Perbankan Syariah Tahun 2007* [Shariah Banking Development Report 2007]. Jakarta: Author.
- Bank Indonesia 2013, '*Bank Sentral, Status, Kedudukan, Tujuan dan Tugas Pokok Bank Indonesia*', Batam, 27 February 2013
- Bank Indonesia. *Statistik Perbankan Syariah Bank Indonesia* [Shariah Banking Statistic]. Jakarta: Author. Various Issues

Books:

- EViews 5.1 *User's Guide* 2005, 'Quantitative Micro Software', LLC
- Gujarati, D. N 2003, '*Basic Econometric* (4th ed.)', New York: McGraw-Hill/Irwin
- Goeltom, M 2007, '*Essays in Macroeconomic Policy: The Indonesian Experience*', Jakarta: Gramedia Pustaka Utama Publisher.
- Harris, R 1995, '*Using Cointegration Analysis in Econometric Modelling*', Essex Prentice Hall.
- Islamic Banking Statistics. Various Issues Aug 2004
- Kennedy, P 1998, '*A guide to Econometrics*', The MIT Press Cambridge, Massachusetts

Endnotes:

- 1 Due to unavailability of monthly data, IPI is adopted as a proxy for GDP
- 2 In the Engle Granger step