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The Determinant of Indonesia's Islamic Rural Banking Risk Taking

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Abstract: Despite as the fastest growing financial institution in Indonesia, Islamic banking is still at infancy stage and the infrastructure to support them is relative left behind. This study focus on Islamic Rural Banking (IRB). IRB is a specific financial institution mainly operating in the rural or suburb area and 100% of its revenue comes from financing activities. It means credit risk taking is a key for its survival. We apply ARIMAX model to investigate the determinant of risk taking. The results indicate that risk taking are determined positively by NPF, BI-Rate and negatively by ROA. Leverage, Asset Management, CAR. For Arima, AR (1) and MA (1) are both significant. The future of Islamic rural banks will depend to a large extent on how well they manage its risk taking behaviour.

Key words: Risk taking, IRB, Arimax, Bi-Rate, behaviour

INTRODUCTION

Islamic banking is currently the fastest growing industry in the financial sector. Accoding to Weill and Godlewski (2014), fast growing of islamic banking is an impact of pent up demand among moslem society as it is previously not availbale to serve strict moslem. However, it is not only in the Islamic countries, Islamic Banking and finance also flourish in the non Moslem countries.

Central bank and industries work together to promote Islamic banking in Indonesia. They introduce a program known as IB-Campaign (Islamic Banking Campaign) to educate and improve access for Islamic banking service. Within two decades since the first introduced in 1993, the Islamic finance industry grew very fast in term of asset and profitability. Up to March 2015, there are 22 Islamic commercial banks, 22 Islamic Windows and 163 Islamic Rural Banks with total asset IDR 264.81 trillion.

Considering the total Moslems in Indonesia which around 200 million, the achievement is regarded as sub-optimal. More Efforts are needed to make Islamic banking as the key player in the biggest Moslem country. The total IRB operating grows from time to time. However, if we look at the branch office, the number is unstable due to failure. Most of IRB failures are due to mismanagement and low governance.

According to the predictions of the consulting firm Ernst and Young, Sharia finance can reach USD 2 trillion globally. However, some weakness is inherent. As a part of Islamic banking industry, Islamic Rural Banking in also grows fast and steadily.

In Indonesia, Sharia banking performance was strong. In 2014, base on Indonesia FSA, there are 163 Shariah rural banks with total office 439. Total asset is 6.343 trillion. On average, it grows around 25% but last year, it has only grown 8%. Further, the industry experience a substantial weakness in term of risk management. Sharia banks are forced to be more conservative in investment as its risk management capacity is below its conventional counterpart (Fig. 1).

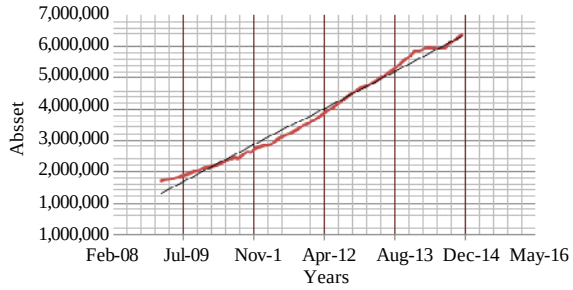

Fig. 1: Total Asset of Islamic Rural Banks (in Million IDR)

Purposes and problem of the Study: In general, Sharia bank has two important functions, namely as business agencies and charities. In terms of a business entity that Sharia banks will be looking for the function as an investment fund manager and as a provider of banking services. As the investment manager function Sharia bank is looking for investors and invest the available funds to finance customer's productive business. In terms of fund raising it is clearly different from commercial banks that use fixed principles. In practice for savings there are three groups: deposit, loan virtue and profit sharing.

The purposes of this study are to investigate the determinant of risk taking in the rural banking in Indonesia. It is important to gain understanding the risks involved in Islamic banks, especially on how risk taking is determined. Currently, Shariah Rural Bank (SRB) faced increased competition because an increasing number of commercial banks engaged in microfinance segment. That requires SRB be more efficient so that it has a sufficient competitiveness amid the increasingly fierce competition. Study on SRB in Indonesia is already availabe such as on efficiency (Mongid and Tahir, 2010) relatively and on liquidity risk (Mongid *et al*., 2012). However, no study on risk taking has been done.

The problem in this research is what is the banking characteristics and external variables that determining risk taking practice in the Sharia rural banking.

Literature review: Islamic bank is banking firm that similar in nature to conventional baking. The main difference is it follows the Islamic law that prohibits the riba or interest rate. In Islamic banking, type of financing can be Musharakah, Mudarabah, Istisna', Salam, Ijarah and murabahaha. Banking firms are intermediary institutions that provide services to both depositors and borrowers. While doing so they take on part of their risk. Risk is a condition in which there exists a possibility of deviation from a desired outcome that is expected or hoped for (Gallati, 2003). It is implied that banks have to manage the risks through appropriate structuring of their activities and to maximize their profitability.

There is a strong perception that Islamic banks have a higher degree of credit risks (EX POST) than their counterparts in conventional finance. It IS BECAUSE Islamic banks do not have appropriate risk management tools to deal with. How, Karim and Verhoven (2005) study the credit risk among Islamic banks and conventional banks in Malaysia. They applied credit risk using ex post and defined it as the proportion of the allowance for loan loss to total assets as a proxy for credit risk. Credit risk is the most dominant source of risks in Islamic Banking. Profit and Loss Sharing (PLS) based contract faces higher Credit risk because Islamic banking, financing is based on partnership, leasing or sale. The bank does not have sufficient Shari'ah compliant tools for dealing with debt-based contracts (Elgari, 2003) Ideally, risk management is combined with good corporate governance practice. The combination will give improvement to risk governance and risk culture. In a banking organisation, top executive function is mainly about risk management. Before, making decisions top executive should ask questions before making the best decisions. Altunbas *et al*. (2007) suggest capital position and size are important for risk taking.

Akerlof (1970) explained how asymmetric information between buyers and sellers about the quality of a product can cause a market to malfunction. This situation can easily exist in the credit market. That means banks can not rely on an application, but must screen the quality of debtors.

Colquitt (2007) provides a distinction between credit risk assessment and credit risk measurement. The credit assessment is a process to evaluate, to identify and to control risks by determining the borrower's probability of repaying the debt. The credit assessment is made from the borrower's income, balance sheet and cash flow statements, along with character, capacity and capital adequacy.

Credit assessment is to identify a borrower's primary source of debt repayment that will be available to repay an extended credit obligation. This process also identifies the source of repayment in the event that the primary source becomes unavailable. The credit assessment relies on the borrower's provided information. The credit risk measurement is a process by the bank to analyse and measure the risk exposure of the bank.

Credit risk measurement has three goals: to limit the credit risk exposure that the lenders accept after considering the probability of a loss and the loss exposure amount over a period of time; to ensure that adequate compensation is earned for the risk undertaken; and to mitigate the credit risk exposure by structuring transactions to protect against loss as well as into asset classes.

Altman and Saunders (1998) documented the development of credit risk assessment. At the beginning the credit risk assessment is exclusively relying on subjective analysis or so-called banker "expert" systems to assess the credit risk of corporate loans. Essentially, bankers used information on various borrower characteristics such as borrower's character (reputation), capital (leverage), capacity (volatility of earnings) and collateral. This approach is known as the '4Cs' of credit and it is a mostly subjective judgment in small lendings.

According to Watanabe (2007) there is a strong link between risk taking and bank profitability. In the Japanese banking, most of banking firms are part of group company that has better access to financing its own group. These parts of the value chain financial company tended to shift lending to higher credit risk companies rather than low risk ones because they have better access to the group. This access improves bank's ability asses the risk.

Foos *et al*. (2010) using data from 16 countries study the risk taking behaviour among conventional banks. They find that abnormal loan growth has a positive and

highly significant influence on subsequent loan losses. Abnormal loan growth leads to a decline in the relative interest income of banks. The abnormal loan growth is significantly negatively related to bank solvency. A higher abnormal loan growth leads to lower capital ratios. It then can be inferred that any abnormal loan growth is an indicator of a future decrease of bank solvency.

Previously, using samples from European banking market study bank risk taking and found that banks with more capital and less efficient tend to have higher risk. Risk-taking has negative impact on risk position, size is negative to risk-taking, liquidity is positive to risk position and solvency is negative.

Ahmad and Ahmad (2004, 2011) show that management efficiency, risk weighted assets and size of total assets have significant influence on the credit risk of Islamic banking while conventional is influenced by long exposure to risky sectors, regulatory capital, loan loss provision and risk-weighted assets. At the same time, Srairi (2013) using MENA banking data suggest that risk taking is ownership linked characteristics. Risk taking is a negative association with ownership concentration and family-owned bank and positive for state-owned banks.

Boumediene demonstrated empirically, IBs have lower credit risk than Conventional Banks. They also found that Islamic banks do not lack of risk management tools, but tendency to manage credit risk using like Conventional Banks. It is inconsistent because contracts in both Banks are not of the same nature. Ahmed *et al.* (2011) using Pakistan Islamic banking conclude that the risk management practices is determined by credit and liquidity risk but for capital adequacy has a negative and significant relationship with credit and operational risk.

MATERIALS AND METHODS

Data and variable: This study uses secondary data. Secondary data used in this study are the data associated with the development and Performance of Rural Banks (BPR) in Indonesia which is gathered from Bank Indonesia. Secondary data are then tabulated to the subject of data analysis. Specification of the data used in the study follows Table 1. This study utilizes the financial data of Sharia rural banks from the period of 2009-2014.

There are two groups of varied uses in this study. The dependent variable is Credit risk taking (Yc). Independent variables in this study reflect financial characteristics of the SRB. These variables are Cost to Income Ratio (CIR) to reflect efficiency, ROA to reflect profitability pressure, leverage to reflect capital risk, loan loss reserve to indicate credit risk, NPF as a measure of ex post credit risk that will direct credit risk taking decision. Capital position measured by the Capital Adequacy Rtio (CAR) is very important to risk taking. Higher capital ratio should give positive impact to risk taking position. For external variable, we apply the inflation rate to indicate price risk and BI-Rate to measure the policy action of the central bank (Table 1).

Table 1: Variables and definitions

Dependent variables	Proxies	Symbol
Risk Taking	Ratio of Total Loan to Total Assets	Y_C
Explanatory variables		
Bank's Size	Logarithm of Total Assets	X_1
NPFs Ratio	Non-Performing Financing/Total Financing	X_2
Capital Adequacy	Tier 1 Capital+Tier 2 Capital/Risk Weighted Assets	X_3
Leverage	Total company debt/equity	X_4
Asset Management	Asset Utilization Ratio = Operating Income/ Total Assets	X_5
Inflation	Month to Month inflation rate	X_6
BI-Rate	Central Bank reference rate	X_7
Risk taking (-)	AR (1), MA (10) D (1)	Arima

Econometric Models: Based on previous studies related to risk taking, we find that asset growth, problem loan, capital adequacy, leverage and asset management are important for credit risk taking. After considering the risk taking is related to previous action (memories) we apply Time Series modelling in this study. In this case, Arimax model is the main tool.

ARIMAX Model is time series modelling that consist of three related issues. The first, AR (autoregressive) which postulate the value of an observation is derived from its previous value (lag). Second, MA (moving Average) is a function of past shock that can be deviation or error of previous observation. The third, X (exogenous) which the value of an observation is determined by other factors (predictors).

Hence the Arimax model is econometric model that joint the time series analysis with conventional regression analysis. We apply Arimax to improve forecast on bank risk taking. We believe the combination of structural model with time series produce better results.

To capture variables in the model, we set up a model of Risk Taking (RT) as follows:

$$RT = \alpha+X1\beta1+X2\beta2+X3\beta3+X4\beta4+X5\beta5+ X6\beta6+X7\beta7+X8\beta8+RT_9\,(MA, AR)+\varepsilon$$

In order to ensure that all regression requirement assumptions are met, we test each variable using stationary and normality test. This test will increase the reliability of the model.

RESULTS AND DISCUSSION

We apply Arimax model to investigate the determinant of Islamic rural banking. After considering coreolegram both corelogram (AC) and partial corelogram (PAC), we decided to use AR (1), MA (1) and D (1). The model is then AR (1), D (1) and MA (1). We apply D (1) because there are three variables which after tested for unit root test using ADF-test result non stationary. As this study using time series data, failure to comply the unit root test must be avoided (Table 2).

In this study, we use LTA as risk taking variable. This dependent variable is regressed using nine variables. The LTA has mean value 77.34 meaning the total loan is 77.34% of total Islamic rural banking. Standard Deviation (SD) is 1.67. The coefficient variation is 2%. The Cost to Income Ratio (CIR) representing inefficiency measure. Higher the CIR means more inefficiency. The mean value is 59.25 meaning every 100 income generated, banks must spend 59.25. The coefficient variation is 4%. Non Performing Finance (NPF) is 2 meaning average problem finance is 2% of the loan. The coefficient variation is 9%.

For the ROA, the mean is 0.003 or in annual term, it is 3.6%. Standard deviation is 0.184 and the Coefficient Variation (CV) is 47%. The variation is very high, indicating the instability of Islamic rural bank profitability. Leverage is 517.171 meaning the total asset is 5.17 times of its capital. The standard deviation is 62 and the coefficient variation is 12%. Loan Loss Reserve (LLR) is 2.014 and the CV 9%. Asset management has a mean value 9.62 with SD 4.8. The CV is 50% indicating bad asset management in the Islamic rural banking. The CAR is 17.16 indicating the average capital adequacy ratio around 17%. It is much higher than regulatory requirement that set minimum 6%. The CV for CAR is 12%.

Inflation rate is an indicator of the ability of the central bank to maintain the price stability. Higher inflation rate is regarded as a bad business environment. The inflation rate is 6.15 meaning average inflation rate is 6.15%. The CV is 42%, meaning the variability of inflation rate can be 42% of the average inflation rate. Central bank of Indonesia introduces BI-Rate as a benchmark for all interest rates in Indonesia. It is a tool to control inflation using demand side approach. The mean for BI-Rate is 6.85%. The highest BI-Rate is 9.5% with the CV around 15%.

Before we start, we checked the data normality. Ideally, the time series data are normally distributed and stationer. From Table 3, we find that LTA has probability 0.92 meaning it is normally distributed. The CIR has Z-score 0.24 with probability 41%. It means the data is normally distributed. The rests have probability value below 5% meaning the data is not normally distributed. We also perform Second test to see if the data is stationairy or not. Time series analysis require the data must be stationer for further analysis as it is a necessary condition for time series analysis. Failure to do will end to spurious regression that will create wrong conclusion. We apply Augmented Dicky Fuller (ADF) test and find that BI-Rate, Inflation and Leverage are not stationairy. As these variables indicating non-stationairity, we decided to use the first difference value for estimation. This implies that interpretation for the result is not using level but the difference.

From the empirical model as presented in Table 4, we find the CIR is positive, but not significant. The positive

Table 2: Desciptives variables

Variable	obs	Mean	Std. Dev.	Min	Max	Stationary
LTA	71	77.340	1.668	73.823	81.653	Level
CIR	71	59.252	2.312	53.200	65.664	Level
NPF	71	2.005	0.184	1.671	2.552	1st Diff
ROA	71	0.003	0.001	-0.001	0.006	1st Diff
LEVERAGE	71	517.171	62.044	414.755	598.731	1st Diff
LLR	71	2.014	0.185	1.671	2.552	1st Diff
ASSETMGM	71	9.617	4.817	1.464	17.997	1st Diff
CAR	71	17.163	1.997	14.745	21.403	1st Diff
INFLATION	71	6.147	2.602	2.410	12.140	1st Diff
BIRATE	71	6.845	1.023	5.800	9.500	1st Diff

Table 3: Stationary test based on wilkinson test

Variable Obs	Sample	W	V	Z	Prob>z
LTA	71	0.99	0.53	-1.38	0.92
CIR	71	0.98	1.11	0.24	0.41
NPF	71	0.93	4.38	3.22	0.00
ROA	71	0.94	3.84	2.93	0.00
LEVERAGE	71	0.86	8.99	4.78	0.00
100					
LLR	71	0.94	3.73	2.87	0.00
ASSETMGM	71	0.95	2.86	2.29	0.01
CAR1	71	0.88	7.37	4.35	0.00
INFLATION	71	0.92	4.99	3.50	0.00
100					
BIRATE	71	0.88	7.53	4.39	0.00

Table 4: ARIMAX Model (Risk Taking)

Variable	Coeff	SE	Z-Stat	p-value
CIR	0.02	0.04	0.62	0.54
NPF	38.59	3.67	10.52	0.00
ROA	-70.93	30.15	-2.35	0.02
LEVERAGE	-0.13	0.01	-18.14	0.00
LLR	-37.33	3.84	-9.72	0.00
ASMGM	-0.36	0.02	-17.66	0.00
CAR	-4.34	0.17	-24.84	0.00
INF	-0.06	0.06	-0.92	0.36
BIRATE	0.52	0.25	2.07	0.04
_cons	0.01	0.04	0.35	0.73
ARIMA				
L1. Ar	-0.890	0.174	-5.120	0.000
L1.ma	0.725	0.254	2.850	0.004
/sigma	0.328	0.042	7.800	0.000

coefficient means that any increase in efficiency, bank tends to take more risk. Although the CIR is not significant, there is a tendency among bankers to gamble by increasing risk taking in the hope that it pays off. It is in line to Berger and De Young (1997) known as skimping hypothesis where problem loans may be caused by short-run cost savings on the initial credit evaluation and loan monitoring ("skimping").

NPF has positive sign meaning when performing finance increase, the bank takes more risk. There are two reasons for this behaviour. The first is for accounting window dressing. By increasing the size of loan, Islamic rural banking can cover the problem loan because the ratio is still low. The second is for moral hazard motive. In this framework, the only way to recover the cost of non performing finance is by making more loan. In this situation, moral hazard behavior exists and it can damage the bank's capital if the new loan becomes the sour. Godlewski (2006) applied a two step logit model approach to study the impact of the regulatory and institutional environment on excessive risk and they found a strong relationship between risk taking and bank's default.

Interestingly, ROA is negative, meaning that the profit pressure is not there. There is tendency that Islamic rural banking reduces its risk taking when the profit is high. Referring to the loan to asset ratio is already 77.4% on average and the maximum is around 82%, taking more risk is regarded as a not good choice.

Leverage is negative and significant. It means Islamic rural banking aware that they have to play safe when their leverage is already 5 times. They prefer to invest in non loan when their leverage achieve at maximum level. Every 1% change in leverage, Islamic rural bank will reduce 0.13% of its lending. However, other non lending business is value destruction for banks as the only profitable business is making loans or financing. Investing in the bank account is costly because the bank pays profit sharing higher to customer than income from the commercial bank.

Interestingly, Loan Loss Reserve (LLR) is negative and significant. It means when banks have to provide a loan loss reserve, they tend to reduce exposure. The regulation here is quite straight forward. Any loan disbursed must be covered by 1% capital or income as a reserve for the potential loan problem.

Asset management (ASMGM) is negative and significant. It indicates better asset management, reduce risk taking. It is consistent with profitability variable (ROA) that better asset management improves bank risk taking. The Capital Adequacy (CAR) is a measure for bank capital position. Higher CAR means the higher capital ratio to its risky position. Higher CAR means two things. It is because the capital is bigger or banking take less risk. It seems that banks take less risk when their capital position is higher.

As our data is based on aggregate or industry level, It seems that there is an agreement among Islamic rural banker to take less risk to maintain their capital position. Sulaiman and Ramzan (2013), concluded that well capitalized banks take less credit risk so face lower expected bankruptcy costs and this advantage "translate" into better profitability. The reason is because the growth of Islamic banking is quite fast around 1.8% every month. It requires well capital management. In Asean banking, Mongid *et al*. (2012) find an inverse relationship between capital and risk taking. It means well capitalised bank take less risk.

We expect that inflation rate will have a significant result of this model. However result shows that it is negative but not significant. The result shows that higher inflation will reduce bank risk taking, The explanation is simple because during higher inflation, the business is slower so that demand for financing is also slower. At the same time as a response to the increase of inflation, cost of borrowing is also increasing. It is matter as most of financing is based on mudharabah contract. Only 12% of financing are in profit loss sharing.

BI-Rate is the policy rate issued by an Indonesia central bank. It is a reference rate for almost all financial transactions. The higher BI rate has a positive impact on bank risk taking. It is reasonable because the Islamic rural bank, the lending rate is relatively stable. Comparing to conventional banking, the impact of BI-rate is less significant, implying there is borrowers migration from conventional rural banking. One percent increases in BI-Rate, the risk taking increase by 0.52%. Bonfim (2009) supports the finding that there are links between credit risk and macroeconomic variables such as economic growth, interest rate and inflation when aggregate data is used in the study. However, their definition of risk is default event.

Reffering to AR (1) we find the coefficient is negative (-0.890) and significant at 1%. It means the IRB tend to take less risk compared to previsous risk taking. It indicates that IRB is very prudent in financing process. The MA (1) is positive (0.725) and significant at 1%. It means MA(1) influenced 73% of risk taking. Sigma as indicator for error is 0.328 and significant at 1%. It means error term is persistent and significant.

CONCLUSION

This study attempts to fill the gap in Islamic banking literature, especially in the Islamic Rural Bank (IRB)

industry. This study examines the factors that affecting the credit risk taking of IRB using time series data. The unique nature of the IRB, which only allow to do deposit taking and providing financing, provides different insights from other conventional or commercial Islamic banks. We apply ARIMAX model that is a combination of time series technique with multiple regression.

This study investigates the determinant of IRB's risk taking. The results indicate that risk taking are determined positively by NPF and BI-rate. It means when NPF is high, IRB tend to take more risk to compensate the cost of bad debt. This indicates the existence of moral hazard behaviour. When the BI-Rate increases, IRB has also increased its risk taking to compensate the cost of funding. This action increase NPF in the future. When leverage is high, the risk taking is lower providing support of prudential behaviour in one side and the ability of a banking regulator to restraint risk taking when leverage is already high. When asset management is better, the risk taking lower, indicating the support efficiency hypothesis. Stronger capital position measured by CAR is negative, indicating self interest hypothesis. When banking industry capital position strength, they tend to take less risk. The future of Islamic rural banks will depend to a large extent on how well they manage its risk taking behaviour.

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