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THE EFFECT OF CREDIT RISK AND INTEREST RATE RISK ON MICROFINANCE INSTITUTION'S FINANCIAL SUSTAINABILITY: THE CASE OF MIDDLE JAVA CONVENTIONAL *BANK PERKREDITAN RAKYAT* WITH THREE DIFFERENT CATEGORIES OF ASSETS

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Abstract – Bank Perkreditan Rakyat *(BPR) play very important role in Indonesian economy. Therefore, it is accelerated to always be "healthy". Financial sustainability is one of the critical aspects in microfinance and financial performance is highly correlated with integration and coordination across risk. Therefore, it is important to study the impact of risks towards BPR's financial sustainability. Major risks in MFIs are asset-liability management risks, which include credit risk, liquidity risk, interest rate risk, and foreign exchange risk. However, BPR do not perform foreign exchange transactions and there are no available data for liquidity risk. But the indicators analyzed and proposed by the author may be used by BPR to monitor their performance. Therefore, the author examines the relationship between credit risk and interest rate risk towards financial sustainability, from 2010 until 2012, in Middle Java BPR with asset below 10 billion rupiah (type A), between 10 to 100 billion rupiah (type B), and above 100 billion rupiah (type C). To determine the relationship, the author uses canonical correlation analysis with cross-sectional data. The result shows that Non-Performing Loan, representing credit risk, has negative and medium significant relationship with financial sustainability in all the cases. Reserve Ratio, representing credit risk, has negative and medium significant relationship with financial sustainability in BPR Asset Type A and C; and negative and low significant relationship in BPR Asset Type B. Net Interest Margin, representing interest rate risk, has positive and low significant relationship with financial sustainability in all the cases. BPR should focus more on managing credit risk.*

Keywords: Credit Risk, Liquidity Risk, Interest Rate Risk, Asset Liability Management, Microfinance, Bank Perkreditan Rakyat*, Financial Sustainability*

Introduction

Sectors of SMEs (Small Medium Enterprises) have a significant role compared to big enterprises when speaking of undertaking national and local economic growth, and they are also resistant to various economic crises. The finance institution that has had played a significant role in credit and development of SMEs is People's Credit Bank (*Bank Perkreditan Rakyat).* (Prianto Daniel Sihombing, 2008). BPR is considered an important business for enhancing Indonesian economy. Therefore, it is accelerated to always be "healthy". Financial sustainability is one of the critical aspects in microfinance (Meyer, 2002; Morduch, 2000). Financial performance is highly correlated with level of integration and coordination across risk. Risk directly affects company's performance objectives and risk-informed performance indicators make smarter management decisions. (Ernst&Young, 2012). Proactive risk management is essential to the sustainability of Microfinance Institutions (MFIs) (National Bank of Ethiopia, 2010). Hence, it is important to study and measure impact of risks towards BPR's financial sustainability.

The financial vulnerability of an MFI is summarized in asset and liability risks, and it is the standard risk assessment to address financial health of a bank or any other financial institutions. Asset and liability risks include credit risk, liquidity risk, interest rate risk, and foreign exchange risk. (Churchill & Coster, 2001). However, due to BPRs not performing foreign exchange transactions, foreign exchange risk is not included. And due to unavailability of data, which will be explained furthermore below, liquidity risk will not be examined in this study. Therefore, the author examines the relationship between credit risk and interest rate risk towards financial sustainability in Middle Java BPR with asset below 10 billion rupiah (type A), between 10 to 100 billion rupiah (type B), and above 100 billion rupiah (type C). By measuring effect in these three categories, it addresses less questionable matter regarding the effect. And also to conclude whether emphasize on different sizes of bank is an important factor or not in this relationship. It also shows a deeper analysis regarding the effect. The author will also give recommendation what step and action would be needed to improve the BPR performance for each type. This knowledge is important for, of course, the company, but also to Indonesian economy and government and surround society and the poor. The better the internal performance of BPR, the more ability it has to provide better financial services and financial benefits for the surrounding society especially the poor.

Literature Review

BPR

BPR is a Bank performs business activities in a conventional or sharia based, which in its activities do not provide services in payment traffic. BPR business activities are primarily intended to serve small businesses and communities in rural areas. (BPR Development History, Bank Indonesia). A Conventional BPR business activities include: (1) Collecting fund from society in the form of savings, which includes the forms: deposit, savings, and/or any other form that is used interchangeably with it; (2) Providing credit; and (3) Placing fund in the form of *Sertifikat Bank Indonesia (SBI)*, deposit, deposit certificates, and/or savings in another bank. (Taswan, 2010).

The Importance of Credit Risk, Interest Rate Risk, and Financial Sustainability

Credit risk is the most common and often the most serious vulnerability in a MFI, while interest rate risk in MFIs has grown in importance in recent years (Churchill & Coster, 2001). The partial shift in borrowing from commercial or semi-commercial sources at fixed rates of interest to variable interest rates has contributed to this. Accepting interest rate risk is a normal part of microfinance institutions business and can be an important source of profitability and shareholder value. (National Bank of Ethiopia, 2010).

The “critical microfinance triangle” proposed by Meyer (2002) presents a conceptual framework about three overarching objectives: outreach to the poor, financial sustainability, and welfare impact. Strong financial performance underpins MFI’s ability to pursue its social objectives, and conversely, achieving social goals enhances financial performance (Microfinance Bulletin, 2008b). Sustainability and outreach is a widely discussed issue in the field of microfinance (Morduch, 2000).

Financial Sustainability, Asset and Liability Management Risks

Financial sustainability refers to the ability of an MFI to cover all its costs from its own generated income from operations without depending on external support (Ledgerwood, 1999). It implies that a loss making MFI (MFIs with poor financial performance) will not be classified as financially sustainable. Again, a profit making MFI, whose profitability is determined after covering some of the operating costs by subsidized resources or funds, will also not be considered as financially sustainable. (Nyamsogoro, 2010).

Risk lies in how variable our costs and revenues really are (Crouhy, Galai, & Mark; 2006). Credit risk is the deterioration in loan portfolio quality that results in loan losses and high delinquency management costs. Also known as default risk, credit risk relates to client failure to meet the terms

of a loan contract. Interest rate risk rises when the terms and interest rates of the MFI's assets and liabilities are mismatched. For example, if the interest rate on short-term liabilities rises before an MFI can adjust its lending rate, the spread between interest earnings and interest payments will narrow, seriously affecting the MFI's profit margin. Liquidity risk involves the possibility of borrowing expensive short-term funds to finance immediate needs such as loan disbursement, bill payments, or debt repayment. And MFIs are most vulnerable to foreign exchange risk if they have to repay loans in a foreign currency that they have converted to local currency and therefore are earning revenue in the local currency. (Churchill & Coster, 2001)

Methodology

The method in this research involves the following steps.

Problem Discovery and Definition: Define Research Objectives

At the beginning of the research, the purpose was to determine the relationship between asset-liability management risks (credit risk, liquidity risk, and interest rate risk) and financial sustainability of Conventional BPR in Middle Java for three categories of assets; and to give recommendation regarding the improvement of performance for each category of BPR.

Problem Discovery and Definition: Selection of Exploratory Research Technique

In defining the measure of risks and financial sustainability, the author uses previous research as the exploratory research technique. The author proposes Non-Performing Loan, Loan Loss Ratio, Reserve Ratio, and Loan Provision to Net Charge-off as credit risk; Quick Ratio, Liquidity Ratio, Liquid Assets to Total Liabilities, Idle Funds, and Loan to Deposit Ratio as liquidity risk; and Net Interest Margin and Standardized GAP as interest rate risk. For financial sustainability, the author proposes Operational Self-Sufficiency, Return on Business, Gross Financial Margin, Earnings Ratio, and Ratio of Operating Profit or Loss to Total Income. However, there are unavailable data for a few indicators and all the liquidity risk indicators. Therefore, liquidity risk will not be examined.

Planning the Research Design: Problem Definition

The problem definition is:

(1) To know the relationship between 'credit risk and interest rate risk' and financial sustainability of conventional BPR in middle Java for three categories of assets;
(2) To know the difference between these effects for each categories of assets; and
(3) To give recommendation regarding which step and action would be needed to improve the BPR performance for each category of asset.

Proxies Used for This Study

The independent variables used in this study are: NPL, Reserve Ratio, and LPNC as credit risk; and NIM as interest rate risk.

Table 1. Independent Variables Indicators

No.	Proxy for Credit Risk and Interest Rate Risk As Independent Variables		
1.	Credit Risk	NPL	Non-performing loan = Non-performing loan (loans categorized as 'Less Well', 'Doubtful', and 'Loss') / Total loans
2.		Reserve Ratio	Reserve ratio = Loan loss reserve for doubtful loans / total loans
3.	Credit Risk (Additional Proxy)	LPNC	Loan provision net charge-off = Loan loss provision / Net charge-off. Net charge-off = Gross charge-off minus Recoveries.
4.	Interest Rate Risk	NIM	Net interest margin = (Interest revenue minus Interest expense) / Total performing assets

NPL is a worldly known measure for credit risk. *Non-Performing Loan* is a loan that involves payments of interest and/or prinpical past due by 90 days or more (Statistics Department of

International Monetary Fund, 2004). NPL or value of PAR 90 is the value of loans that may often occur trough, have liquidation problems faced by debtor, occur in interest capitalization, have guarantees that are unable to be cashed in a reasonable value, and occur in operational losses (Veithzal Rivai, 2006). *Reserve Ratio* represents the approximation by the management regarding current loans amount that will not be collected, involving calculation of charge-off, recoveries, and provision (Walter, 1991). LPNC is a credit risk measure that has been tested by Samad (2012) to be significant for predicting bank failures. And a useful indicator for monitoring interest rate risk is the net interest margin, commonly called the spread.

The dependent variables used for this study are: Operational Self-Sufficiency (i), Return on Business, Gross Financial Margin, Earnings Ratio, and Ratio of Operating Profit or Loss to Total Income.

Table 2. Dependent Variables Indicators

No.	Proxy for Financial Sustainability As Dependent Variables		
1.	Financial Sustainability	OSS	Operational Self-Sufficiency = Revenue / (Operating costs + Financing costs + Loan loss provision)
2.	Profitability	ROB	Return on business = After-tax profits / [(Total assets + Total liabilities) / 2]
3.	Financial Sustainability and/or Profitability (Additional Proxy)	GFM	Gross financial margin = (Operating revenue minus Financing costs) / Total performing assets
4.		ER	Earnings ratio = Revenue / Operating costs
5.		ROPLTI	Ratio of operating profit or loss to total income = After-tax profits / Total income

OSS reflects whether the revenue is enough to cover operational costs, financing costs, and loan loss provision. It is suitable for MFIs that do not borrow or receive funds to be able to operate, because there it calculates all the operational costs but not including adjusted cost of capital. Adjusted cost of capital is considered to be the cost of maintaining the value of the equity relative to the inflation and the cost of accessing commercial rate liabilities. (Ledgerwood, 1999)

Return on Business (ROB) is a dual-activity approach of Return on Assets (ROA) that accounts for dual activity (collecting savings and loans) of its operations. It is relevant for MFIs that mobilise deposits in a large measure. (Ledgerwood, 1999). Both OSS and ROB are suitable for BPR because they no longer borrow or receive grants to operate their business. GFM, ER, and ROPLTI are additional proxies that account for different stages and situations: (1) when financing costs is the most important, (2) start-up stage condition, and (3) income towards revenue condition.

Profitability indicators can be used as a financial sustainability indicator because profit may be considered as a residual; therefore profitability can be used as a measure of financial sustainability as it considers covering all costs incurred in earning income plus any costs necessary to at least maintain the current level of operation. Profitability is also the ability to provide financial rewards sufficient to attract and retain financing. (Nyamsogoro, 2010)

Data Gathering and Sampling

The author uses secondary data from Central Bank of Indonesia official website (www.bi.go.id). The complete data available are from 2010 until 2012, therefore three years period for the object is used.

The method of sampling is non-probability sampling, using a combination of purposive and convenience sampling. Purposive sampling is selecting a sample on the basis of your own knowledge of the population, its elements, and the nature of your research aims. And convenience sampling is including available information from readily source. (Latham, 2007)

Regarding appropriate sample size for canonical correlation, which is the method to determine the relationship, it is encouraged to maintain at least 10 observations per independent variable (Hair, Black, Babin, Anderson; 2009). The sample size for this research are:

For Asset Type A: 36 BPR times three years = 108
For Asset Type B: 95 BPR times three years = 285
For Asset Type C: 24 BPR times three years = 72

Data Processing and Analysis Using Canonical Correlation Analysis
In conducting this research, to measure the relationship between independent variables and dependent variables, the author uses Canonical Correlation Analysis. Canonical correlation analysis is a multivariate statistical model that facilitates the study of interrelationships among sets of multiple dependent variables and multiple independent variables (Hair, Black, Babin, Anderson; 2009).

One set of variables is referred to as *independent variables* and the others are considered *dependent variables*; a canonical variate is formed for each set (Hair, Black, Babin, Anderson; 2009). Based on the theories by Hair, Black, Babin, Anderson (2009) and Green and Carroll (1978), the author analyzes that the strict assumptions used in canonical correlation analysis are multicollinearity and linearity. The assumption tests and canonical correlation interpretation are done using SPSS 19 Program. Linearity is tested using *Analyze Compare Means* and Multicollinearity is tested by seeing the amount of VIF and Tolerance (SPSS 19 Program Tutorial; and Imam Ghozali, 2011).

Drawing Conclusions: Interpretation of Findings
After obtaining and analyzing the result of the data processing, the author then draws conclusion by explaining the answers relating them to the research objectives.

Data Gathering, Processing , and Analysis

Overview and Comparison Data Analysis of Independent Variables
The author collects data of financial statements from Bank Indonesia website and calculates the variables. Below are the summary of independent variable data collected by the author from the object of this research, which consists of three types of BPR: BPR Asset Type A (small assets), BPR Asset Type B (medium assets), and BPR Asset Type C (large assets) from 2010 until 2012. It shows the overall Mean, Maximum, and Minimum value of independent variables measured in this research, also along with the analysis and comparison between each type of BPR.

Table 3. Descriptive Data Comparison of Independent Variables (Overall Year 2010 – 2012)

Independent Variables	NPL	RR	LPNC	NIM
Asset A				
Mean	13.86%	4.09%	50.38	15.14%
Max.	64.93%	50.28%	88,208.00	37.33%
Min.	0.00%	0.51%	-85,962.00	-5.24%
Asset B				
Mean	8.32%	2.81%	806.99	12.93%
Max.	62.65%	30.12%	102,367.00	29.05%
Min.	0.05%	0.53%	-107.52	6.34%
Asset C				
Mean	5.85%	2.59%	0.83	10.95%
Max.	29.43%	19.44%	23.45	17.16%
Min.	0.19%	0.64%	-68.86	5.86%

(a) Data Analysis of Non-Performing Loan (Credit Risk Indicator)

The best standard of NPL for BPR is below 5% with a tolerance limit of 10% (Infobank Research Bureau Team, 2012). As we can see that NPL quality in BPR Asset Type A is low, because the Mean is 13.86%. They need to increase their performance because it is considered a high and untolerable percentage. In BPR Asset Type B, looking at the Mean, overall it is considered a tolerable value of NPL. By looking at the overall Mean, Maximum, and Minimum value, we can conclude that BPR Asset Type C has the best performance of NPL and BPR Asset Type A has the worst.

(b) Data Analysis of Reserve Ratio (Credit Risk Indicator)

Comparing the values of RR with NPL, there is no similar pattern or direct relationship between NPL and RR. In the author's opinion, these matters happen because each company has different methods, capabilities, and situations to determine loan loss reserve.

(c) Data Analysis of Loan Provision to Net Charge-off (Additional Credit Risk Indicator)

We can see from the table above that the range from minimum to maximum are very wide. The data of LPNC in BPR Asset Type C are fairly random, but has a much thinner range than the case in BPR Asset Type A and B. LPNC is very different then NPL and RR, and values are very random.

(d) Data Analysis of Net Interest Margin (Interest Rate Risk Indicator)

The best value of NIMis 10%. However, the higher the NIM, the better. In contrary, the lower the NIM, the worse. The calculation of NIM is achieved from dividing the interest profit with the average productive assets. (Infobank Research Bureau Team, 2012). Looking at all the cases, all the Mean are considered great because they are all above 10%. However, different from the other indicators, BPR Asset Type C has the worst average value of NIM and BPR Asset Type A has the best average value.

4.2 Overview and Comparison Data Analysis of Dependent Variables

Below are the summary of dependent variable data collected by the author from the object of this research, which consists of three types of BPR: BPR Asset Type A (small assets), BPR Asset Type B (medium assets), and BPR Asset Type C (large assets) from 2010 until 2012. It shows the overall Mean, Maximum, and Minimum value of dependent variables measured in this research, also along with the analysis and comparison between each type of BPR.

Table 4. Descriptive Data Comparison of Dependent Variables (Overall Year 2010 – 2012)

Dependent Variables	OSS	ROB	GFM	ER	ROPLTI
Asset A					
Mean	115.56%	1.82%	19.57%	192.88%	3.53%
Max.	183.50%	12.30%	52.52%	480.32%	40.53%
Min.	30.30%	-75.12%	-0.89%	47.06%	-260.78%
Asset B					
Mean	127.18%	3.91%	16.27%	240.77%	15.49%
Max.	254.44%	38.98%	54.74%	652.18%	56.67%
Min.	38.04%	-40.84%	4.47%	78.24%	-163.02%
Asset C					
Mean	132.18%	3.42%	13.07%	283.34%	16.93%
Max.	159.56%	5.68%	19.08%	435.93%	25.25%
Min.	76.08%	-7.31%	7.05%	162.33%	-32.58%

(a) Data Analysis of Operational Self-Sufficiency (Main Indicator)

According to Microfinance Information Exchange (March 2010), the benchmark value of OSS for MFIs in Indonesia is 123.80%. In the case of BPR Asset Type A, there are seven out of 36 BPR that perform after-tax loss (did not achieve financial sustainability), because the value is below 100%. And the overall Mean is still below 123.80%, therefore they still need to increase their performance. In the case of BPR Asset Type B, their average value has surpassed the benchmark value and only

four out of 95 BPR that did not achieve financial sustainability. On the other hand, BPR Asset Type C has exceeded the benchmark value. Only one time there is a BPR that performed after-tax loss.

(b) Data Analysis of Return on Business (Main Indicator)

Overall, all of the average value from 2010 until 2012 keeps increasing. This shows that the profitability of BPR in Middle Java keeps increasing. BPR Asset Type B has the best profitability and BPR Asset Type A has the worst. However, BPR Asset Type C has its own excellence. Their range of the data is much thinner compared to BPR Asset Type A and B, which is only from -7.31% to 5.68%.

ROB and OSS do not share similar pattern. However, the data shows that the value of OSS below 100% has a definite value of ROB below 0%. The after-tax loss value in ROB is when it is minus. This relates to the theory by Nyamsogoro (2010) that loss-making companies will not be able to cover all costs and is considered not financially sustainable.

(c) Data Analysis of Ratio of Gross Financial Margin (Additional Indicator)

The value of GFM for a certain BPR should be higher than NIM, because the GFM is the difference between all revenue and financing costs while NIM is the difference between interest revenue and financing costs. All the data for BPR Asset Type A, B, and C supports that theory. The condition of GFM is similar to NIM, only it is larger. Furthermore, as of NIM, the higher the GFM, also means the better the performance. By looking at the average value in all types of BPR, the same with NIM, GFM in BPR Asset Type A has the largest amount and in BPR Asset Type C has the smallest amount.

Meanwhile, on the opposite, the total liabilities' portion towards an MFI's assets in BPR Asset Type A is the smallest amount and in BPR Asset Type C is the largest amount. The author calculates the liabilities' portion and finds that the average of total liabilities per assets (liabilities' portion) in BPR Asset Type A is 77%, in BPR Asset Type B is 83%, and in BPR Asset Type C is 86%. This relates to the theory that dual activity may increase operational costs or financing costs. Additional financing costs may be a part of the cause for the spread becoming narrower. By this case, the larger the liabilities' portion, the smaller the financing costs, and vice versa.

(d) Data Analysis of Earnings Ratio (Additional Indicator)

ER is an additional measure of financial sustainability, particularly suitable for MFIs in the start-up stage. As OSS is the revenue's ability to cover all costs, ER is the revenue's ability to cover operating costs. Therefore, the value of ER should be larger than OSS. And the data for all ER in BPR Asset Type A, B, and C support that theory.

(e) Data Analysis of Ratio of Operating Profit to Total Income (Additional Indicator)

According to Microfinance Information Exchange (March 2010), the benchmark value of Profit Margin, which is defined as adjusted net operating income divided by adjusted revenue, for MFIs in Indonesia is 14.8%. The ROPLTI in BPR Asset Type A keeps increasing each year. However, overall, the average value is still below the benchmark value (14.8%). The condition of ROPLTI in BPR Asset Type B is overall great. Their overall Mean it exceeds the benchmark value of Profit Margin, with a percentage of 15.49%, although in 2010 still shows a percentage of 12.07%. As for the case in BPR Asset Type C, overall has a great performance. The ROPLTI average value exceeds the benchmark value for all three years period.

4.3 Classical Assumptions Test Result

Based on the linearity, there are variables that are eliminated due it being non-linear. For BPR Asset Type A, the independent variables eliminated are LPNC; and the dependent variables are GFM and ER. As for BPR Asset Type B, the independent variable eliminated for this study are LPNC; and the dependent variables are only GFM. And for BPR Asset Type C, the independent variables eliminated are LPNC; and the dependent variables are LPNC and GFM.

Based on multicollinearity, all of the data in BPR Asset Type A and B do not perform multicollinearity, either in the independent variables or the dependent variables. However, in the data of BPR Asset Type C there happens to be multicollinearity between two of the dependent variables: ROB and ROPLTI. The author chooses to eliminate ROPLTI and still use ROB for this study, because ROPLTI is an additional proxy while ROB is a main proxy. Therefore, the conceptual framework applied for BPR Asset Type A, B, and C in this study are changed into: { OSS, ROB } = f { NPL, RR, NIM }.

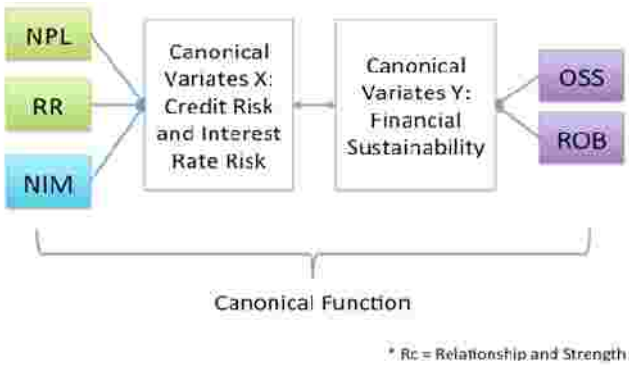

Figure 1. Conceptual Framework of Canonical Correlation Analysis for BPR Asset Type A, B, and C

By this diagram, the author shows that this study determines the effect of credit risk towards financial sustainability, where the credit risk is presented by NPL (Non-Performing Loan) and RR (Reserve Ratio), interest rate risk is presented by NIM (Net Interest Margin), and financial sustainability is presented by OSS (Operational Self-Sufficiency) and ROB (Return on Business). Below are the result and discussion of this study.

Canonical Correlation Analysis and Result

Canonical Correlation Result in BPR Asset Type A

In interpreting canonical correlation, the author uses the knowledge from Imam Ghozali (2011). To interpret canonical correlation, the author runs Syntax in SPSS 19 Program. The canonical cross-loadings, which are the result of canonical correlation coefficient that shows the effect or contribution against the opposite variate. The canonical cross-loadings are achieved by multiplying canonical loadings and canonical correlation.

Cross-loadings facilitate the transformation of a canonical model to a single latent construct, which resembles Structural Equation Modeling (SEM) (Hair, Black, Babin, Anderson; 2009). Therefore, the author concludes that although canonical cross-loading is a development from canonical loadings, since canonical cross-loadings adopts SEM, then canonical correlation analysis may be interpreted using regression formula (which is also the fundamental equation for SEM).

Therefore, the canonical correlation formula for BPR Asset Type A is:

$$(0.61 \times OSS) + (0.74 \times ROB) + e_y = (-0.57 \times NPL) + (-0.62 \times RR) + (0.46 \times NIM) + e_x \text{ , or}$$

$$\text{Financial Sustainability} = (-0.57 \times NPL) + (-0.62 \times RR) + (0.46 \times NIM) + e$$

According to Imam Ghozali (2011), regarding the value of loadings, the more it steers from 0, the more significant the contribution. On the opposite, the amount much closer to 0 means it is more insignificant. And an inverse value between each independent variable and dependent variable indicates an inverse relationship, while the same value indicates a direct relationship (Hair, Black, Babin, Anderson; 2009). Hair, Tatham, Anderson, Black (1998), Hair, Black, Babin, Anderson (2009) and Setyo Hari Wijanto (2008) considers a canonical cross-loading or standardized loading for SEM that has a value of $\geq$ 0.70 exhibit high correlation between the variable and the opposite variate. A

value of < 0.50 but still ≥ 0.30, may still be put in the model, but considered to have a low correlation. However, a loading value of < 0.30 should be erased from the model. (Setyo Hari Wijanto, 2008).

Therefore, as we can see that the canonical cross-loading for NPL is -0.57, which means the effect of NPL towards financial sustainability is considered not high or low significant; it is medium significant. And the minus value shows inverse relationship, which means when NPL increases, the financial sustainability decreases, and vice versa. The canonical cross-loading for RR is -0.62, which is a value between 0.50 and 0.70, showing a medium significant effect towards financial sustainability. And the minus value shows an inverse relationship as well. The canonical cross-loading for NIM is 0.46, which is a value below 0.50, showing a low significant effect towards financial sustainability. And the positive value shows a direct relationship, that when NIM increases, financial sustainability also increases, and vice versa.

Canonical Correlation Result in BPR Asset Type B

The result of canonical cross-loading is showed in the table below. It represents the contribution of the variables in this model. The calculation is by multiplying canonical loadings with canonical correlation.

The canonical correlation formula for BPR Asset Type B is:

$$(0.53 \times OSS) + (0.63 \times ROB) + e_y = (-0.53 \times NPL) + (-0.45 \times RR) + (0.40 \times NIM) + e_x, \text{ or}$$

$$\text{Financial Sustainability} = (-0.53 \times NPL) + (-0.45 \times RR) + (0.40 \times NIM) + e$$

Therefore, as we can see that the canonical cross-loading for NPL is -0.53, which means the effect of NPL towards financial sustainability is considered not high or low significant; it is medium significant. And the minus value shows inverse relationship, which means when NPL increases, the financial sustainability decreases, and vice versa. This condition is the same as in the case of BPR Asset Type A.

The canonical cross-loading for RR is -0.45, which is a value below 0.50, meaning a low significant effect towards financial sustainability. And the minus value shows an inverse relationship. This is unlike in the case of BPR Asset Type A where the RR is medium significant. The canonical cross-loading for NIM is 0.40, which is a value below 0.50, showing a low significant effect towards financial sustainability. And the positive value shows a direct relationship, that when NIM increases, financial sustainability also increases, and vice versa.

Canonical Correlation Result in BPR Asset Type C

The result of canonical functions, which represents the contribution of the variables in this model. The canonical correlation formula for BPR Asset Type C is:

$$(0.61 \times OSS) + (0.74 \times ROB) + e_y = (-0.56 \times NPL) + (-0.62 \times RR) + (0.45 \times NIM) + e_x, \text{ or}$$

$$\text{Financial Sustainability} = (-0.56 \times NPL) + (-062 \times RR) + (0.45 \times NIM) + e$$

Therefore, as we can see that the canonical cross-loading for NPL is -0.56, which means the effect of NPL towards financial sustainability is considered not high or low significant; it is medium significant. And the minus value shows inverse relationship, which means when NPL increases, the financial sustainability decreases, and vice versa. This condition is the same as in the case of BPR Asset Type A. The canonical cross-loading for RR is -0.62, which is a value below 0.50, meaning a low significant effect towards financial sustainability. And the minus value shows an inverse relationship. This condition is the same as in the case of BPR Asset Type A, and the values are even same (-0.62).

The canonical cross-loading for NIM is 0.46, which is a value below 0.50, showing a low significant effect towards financial sustainability. And the positive value shows a direct relationship, that when NIM increases, financial sustainability also increases, and vice versa. This condition is the same as in

the case of BPR Asset Type A and B, but the value is almost the same as in the case of BPR Asset Type A (0.46).

Result and Discussion Regarding the Effect of Credit Risk and Interest Rate Risk on Financial Sustainability in BPR Asset Type A, B, and C

From the explanation beforehand, we can conclude that all of the credit risk (presented by NPL and RR) have medium significant and inverse relationship with financial sustainability, except for RR in the case of BPR Asset Type B that has a low significant relationship with financial sustainability. And their interest rate risk (presented by NIM) has low significant and direct relationship with financial sustainability in all the cases.

The result in BPR Asset Type A and C are very close. And the effects in BPR Asset Type B have smaller values compared to BPR Asset Type A and C. The one effect that is different from all of the BPR types is the low effect of RR towards financial sustainability in BPR Asset Type B, while in BPR Asset Type A and C are medium significant. In addition, BPR Asset Type A and C have a Reserve Ratio that is larger than its NPL.

(a) Discussion Regarding Effect of Credit Risk towards Financial Sustainability
   - Overall Effect of Credit Risk towards Financial Sustainability – Why Credit Risk has Only Medium Significant Effect?

Based on previous studies, which measures effect of NPL towards financial performance or profitability in commercial banks and Bank Perkreditan Rakyat, all of them tested to have a statistically significant relationship. The financial performance of profitability indicator used was Return on Assets (ROA), a similar profitability indicator to the financial sustainability used in this study (ROB).

Mawardi (2004) measure the factor that affected the financial performance (ROA) in commercial banks in Indonesia and found that NPL is negatively significant towards ROA. Olweny and Shipho (2011) tested banking sectoral factors on profitability (ROA) in Kenya commercial banks and found that NPL is negatively significant towards ROA.

In this study, the result of NPL towards OSS and ROB in all the cases of BPR types are negatively medium significant. The negative value means that when NPL increases, financial sustainability decreases, and vice versa.

Credit risk (presented by NPL and RR) shows medium significant relationship with financial sustainability in all types of BPR, except RR in the case of BPR Asset Type B. Credit risk is considered the greatest risk in MFI (Churchill & Coster, 2001). How come the effect is only medium significant? This might happen because financial sustainability in BPR relies on other important things as well, such as: management of financing activities, operating activities, and strategy. And also because the BPR in Middle Java, Indonesia, already have achieved financial sustainability.

For MFIs in Indonesia that have not achieved financial sustainability yet, the credit might have higher effect on financial sustainability. For MFIs that still receive external funding from investor, there will be more costs (an addition of adjusted cost of capital due to external support) to fulfill. Also, when the credit risk arises or becomes high, the investor will think twice to invest in the MFI and might draw back their grants or subsidies. And for MFIs that receive grants, when credit risk arises, they might not have enough money to fulfill other obligations that may arise.

For MFIs outside of Indonesia, the effect relies on the condition in the country. However, the author thinks that credit risk will always be an important factor towards financial sustainability everywhere. Because, not getting the payment that the MFI should receive definitely will lower revenue.

On previous studies, the effects of Reserve Ratio (RR) towards banks' financial performance are random; there are insignificant and significant effect. Alkhatib (2012) found in his study that reserve ratio has an insignificant effect towards ROA in Palestinian commercial banks. Kosmidou (2008) found in his study that reserve ratio has negatively significant effect towards ROA in Greece commercial banks. And Samad (2012) found in his study that reserve ratio is a significant determinant for bank failures in US. In this study, the effect of Reserve Ratio towards financial sustainability is also random. As explained before, the effect in the case of BPR Asset Type A and C are negative and medium significant. And the effect in the case of BPR Asset Type B is negative and low significant. The reason for BPR Asset Type A and C having medium significant, perhaps, are the same with NPL because NPL and RR are basically alike. But how come the RR in BPR Asset Type B has low contribution? This will be explained furthermore below.

- Why Reserve Ratio is a low contributor in BPR Asset Type B and why Reserve Ratio is a higher contributor than NPL in BPR Asset Type A and C

Reserve Ratio is calculated as (Walter, 1991):

Reserves for loan losses (end of year)

= Reserves for loan losses (beginning of year)

less: charge-offs during the year

plus: recoveries during the year of loans previously charged-off

plus: provision for loan losses in the year

So, basically RR is an estimation of credit risk by the company's judgment, in the form of accumulation of net charge-off, provision, and reserves; that subtracts net charge-off. Reserve Ratio is the credit risk estimation on the aspect of managing financial needs and abilities. Therefore, if the company can estimate the provision correctly, their credit risk management on on-going financial management is good.

Why is Reserve Ratio a low contributor in BPR Asset Type B? The author analyzes that there may be two reasons for this happening. First, it might happen because the estimation of reserve ratio is not accurate. Probably because BPR Asset Type B is a growing company that still have difficulties in figuring out clients' 5C (Character – Capacity – Capital – Collateral – Conditions). According to Ledgerwood (1999), loan loss reserve should decrease as the MFI improves its delinquency management. And according to CGAP (1998), an accurate loan loss allowance on the balance sheet gives a good initial indication of the competence with which the MFI is managing the riskiest aspect of its business—loan delinquency.

This theory shows that a good delinquency management, which is one of the important aspects in credit risk management, reflects to an accurate loan loss reserve. It means that probably BPR Asset Type B do not have good delinquency management. This might happen because BPR Asset Type B are growing companies that might have trouble in managing their human resource to establish good delinquency management. Good delinquency management has a lot to do with the human resources management. The key points in delinquency management are (Churchill and Coster, 2001):

(1) Does the program have a culture that is intolerant of delinquency?
(2) Is there a formal orientation of clients and staff to expectations, policies and procedures?
(3) Are loan officers well trained in effective delinquency management strategies?
(4) Are delinquency penalties and loan contracts enforced?
(5) Are staff members properly rewarded to maintain high standards of portfolio quality?
(6) Does the MFI have an appropriate and transparent rescheduling policy?

The second possible reason is that according to Ledgerwood (1999), loan loss reserve ratio can be misleading if the MFI is growing at a fast rate or if loan sizes are increasing, because the denominator is likely to be growing faster than the numerator. BPR in Type B are probably growing at a fast rate, making the reserve ratio a misleading measure for credit risk.

Next discussion question: why is Reserve Ratio a higher contributor than NPL in BPR Asset Type A and C? There are two very opposite possible reasons for this happening. According to Walter (1991), there are a few controversial techniques used to determine loan loss reserve, such as: (1) the desire to smooth reported profits and (2) to lower taxes.

Banks can smooth variations in reported income through their choices of when to take provisions for loan losses. By taking small provisions during periods of poor operating income and large provisions when income is high, a bank can shift reported income from prosperous to depressed times, thus smoothing its reported income stream. (Walter, 1991)

To lower taxes, banks can use the adjustment from loan loss reserve. When additions to the reserve for loan losses were tax deductible beyond actual charge-offs or loan loss experience, bank income taxes were lowered in high income years by taking larger provisions for loan losses. When income was down, and tax benefits were not as valuable, provisions were decreased. Banks can still produce some tax benefits through shrewd use of the reserve account. (Walter, 1991)

The author concludes that these techniques can help increase financial sustainability through loan loss reserve, but definitely decrease the accuracy of loan loss reserve as a credit risk measure. Therefore, the high contribution of RR towards financial sustainability might be because of these misleading techniques to determine RR.

The second reason is simply because loan loss reserve might be an excellent measure of credit risk. For BPR Asset Type A, the scope of customers is still small. Therefore, their credit risk estimation could tend to be more precise. And for BPR Asset Type C, are already in a stable condition and excellent performance. They might already know many things regarding what a great credit risk management should be performed. According to Walter (1991), there are good techniques to determine credit risk using loan loss reserve, which are by:

(1) Constant Percentage of Loans Rule: This technique requires that the bank decide on some target level for the ratio of reserves to total loans and then add to the reserve account whenever the ratio falls below target.
(2) Peer Equivalent: In its most basic form the peer equivalent technique involves setting the reserve for loan losses equal to or near the level maintained by a bank's peers.
(3) Loss History: Most banks use prior years' history of loan losses to help them determine current reserves for loan losses.
(4) Loan Analysis: Banks generally divide loans into categories and then apply differing analyses to each category to estimate the reserves needed for each category.

Regarding whether the BPR have implemented a good strategy on determining loan loss reserve, the author must find out how it is done in each BPR. There will be needed a much further and detailed research about it, which is beyond the author's study. However, it may be a suggestion for future research to determine the best way in managing loan loss reserve for BPR.

Nevertheless, overall, credit risk is still an important factor in managing financial sustainability in Middle Java BPR.

(b) Discussion Regarding Effect of Interest Rate Risk towards Financial Sustainability
- Overall Effect of Interest Rate Risk on Financial Sustainability – Why Reserve Ratio in BPR Asset Type B has Low Effect?

In previous study, conducted by Mawardi (2004), the result of interest rate risk (presented by Net Interest Margin) relationship with its financial performance (presented by Return on Assets) is positively significant. Return on Assets (ROA) is a similar profitability indicator to the financial sustainability used in this study (ROB).

Meanwhile, in this study, for all of the cases of BPR Types, Net Interest Margin (NIM) has a positive and low significant (insignificant) relationship with financial sustainability. The positive relationship means that when NIM decreases, financial sustainability also decreases, and vice versa. How come the interest rate risk in this study has low effect towards financial sustainability?

Firstly, the author finds NIM as an interest-rate-based result in company's profitability. As explained before, the best value of NIM is 10%. However, the higher the NIM, the better. In contrary, the lower the NIM, the worse the interest rate risk is.

In the case of all the BPR types, BPR Asset Type C actually has the narrowest NIM but the highest Operational Self-Sufficiency (OSS). On contrary, BPR Asset Type A has the highest NIM but the lowest OSS. NIM is the spread between interest income and interest expense, while OSS is how much the revenue can cover all expenses. Most of the revenue of BPR comes from interest income. Therefore, this shows that BPR Asset Type C, which has the largest liabilities' portion, has a large cost on financing costs due to its narrowest NIM. But their revenue can very much cover all the expenses better than BPR Asset Type A and B who have higher NIM. Because the condition of NIM in Middle Java BPR remains great (average values are above 10%), the interest rate risk barely happens, making interest rate risk a low contributor. NIM becomes a risk only on certain values (when it is below 10%).

For the effect from interest rate risk also might be higher for financial sustainability in the case of microfinance institutions in Indonesia that have not achieved financial sustainability yet. Because, the interest rate of liability due to providing subsidies are harder to manage compared to interest rate of liability for deposits. Interest rate of deposits and loans can be managed and adjusted by the firm, providing a spread desired. But interest rate of subsidies are determined by a third-party, therefore the interest rate risk will be more in danger and make the financial sustainability lower. However for the effect of MFIs outside Indonesia, it depends on the condition of the country.

- High Interest Rate

According to Tempo (2009), the Central Bank of Indonesia's Director of Credit, BPR, and SME stated that the interest rate on BPR is still too high and is concerned for a slow economic growth. The average value of credit interest rate is around 22.35% to 35.56% and the deposit interest rate is around 11.65%. Therefore, the interest rate risk barely happens also because of the very high interest rates. BPR should increase their equity to be able to expand credit more and also should efficient the loan distribution cost. Therefore, the BPR can still perform great even though the interest rates are being lowered. If the BPR only "plays" on increasing interest rates, it is worrying that the social mission will not be achieved, but just the financial mission.

(c) Other Findings: Financial Sustainability is a Bigger Contributor towards the Risks

On the other hand, in fact, the financial sustainability affects the risks more than the risks affect financial sustainability, especially in the case of BPR Asset Type A and C. In BPR Asset Type A and C data, the canonical cross-loadings for financial sustainability have high and nearly high values, especially the profitability indicator (ROB). The possible reason for this is perhaps because profitability not only provides the ability to cover costs, but one step more advance than that. Therefore, to manage the risks itself, managing financial sustainability becomes an important factor.

Conclusion and Recommendation

Conclusion

1. Non-Performing Loan (NPL) has negative and medium significant relationship with financial sustainability in all the cases of the BPR Types (BPR Type A, B, and C).
2. Reserve Ratio (RR) has negative and medium significant relationship with financial sustainability in the case of BPR Asset Type A and C, and has negative and low relationship with financial sustainability in the case of BPR Asset Type B.
3. RR has larger contribution than NPL in BPR Asset Type A and C. This is a new knowledge since the main credit risk indicator has always been NPL for BPR in Indonesia.
4. Credit risk (presented by NPL and RR) shows medium significant relationship with financial sustainability in all types of BPR, except RR in the case of BPR Asset Type B – Credit risk still considered an important factor towards financial sustainability management.
5. Interest rate risk (presented by NIM) shows positive and low significant relationship with financial sustainability in all of the cases of the BPR Types (BPR Type A, B, and C) – Interest rate risk is not such an important factor towards financial sustainability.

Recommendation for Management in BPR

1. BPR should focus more on managing credit risk.
2. BPR should lower their interest rate to be able to achieve social mission, not just financial mission.
3. Managing financial sustainability becomes an important factor to manage the risks itself, especially its ROB.
4. BPR may use the other proxies proposed by the author to monitor the risks and financial sustainability.

Recommendations for Future Research

1. Find available data and add in research all of the liquidity risk indicators concluded by the author (Liquid Asset to Total Liabilities, Quick Ratio, Liquidity Ratio, Idle Funds Ratio, and Loan to Deposit Ratio), Loan Loss Ratio as main credit risk indicator, and Standardized Gap as additional interest rate risk indicator.
2. Add Loss Provision to Net Charge-off (LPNC) as an additional credit risk indicator, Gross Financial Margin (GFM) as an additional financial sustainability indicator, and Earnings Ratio (ER) in the research. Due to its non-linearity, the research may transform the data or use multiple non-linear regression analysis.
3. ROPLTI has a multicollinearity problem with ROB in the case of BPR Asset Type C. The further research may use ROPLTI as a financial sustainability indicator in a separate regression analysis.
4. Increase the sample of the research, by years and in quarterly or monthly terms. For liquidity risk, it is best to measure the risks in a period of months or quarters. And if the sample size is still not appropriate, panel data regression analysis may be used in the method of research.
5. Perform further research on managing reserve. Because the interesting findings that RR is a larger contributor than NPL for BPR Asset Type A and C and RR is a low contributor for BPR Asset Type B, the analysis of loan loss reserve should be furthermore studied.

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