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Tigor Sitorus*
Universitas Bunda Mulia, Jakarta

THE STUDY OF RISK-WEIGHTED ASSETS ON THE EFFECTS OF LOAN EXPOSURE VALUATION TOWARDS CREDIT DEFAULT

(AN EMPIRICAL STUDY ON MIDDLE AND TOP LOCAL BANKS LISTED IN INDONESIA STOCK EXCHANGE PERIOD 2008– 2012)

Keywords: Loan, Valuation, Risk.

J E L Classification: G210.

Abstract: This study aims at investigating and testing the mediated effect of risk-weighted assets on the effects of loan exposure valuation towards credit default at the local banks listed in Indonesian Stock Exchange from the period of 2008 to 2012. The Structural Equation Modelling by Amos Software 21.00 was used to analyze the data, and the result shows high goodness of fit while the simultaneous and individual tests generate significant result. The result of analysis shows that: (1) the loan exposure valuation does not give significantly positive influence to credit default; (2) the loan exposure valuation gives significantly positive influence to risk-weighted assets; (3) the risk-weighted assets give significantly positive influence to credit default. Therefore, the mediated effect of risk-weighted assets on the effects of loan exposure valuation towards credit default has more strength compared to the direct effect of loan exposure valuation to credit default.

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* Contact information: sitorus_tigor@yahoo.com, Universitas Bunda Mulia, Jakarta, Magister Management Department, phone: 6281514054090.

1. Introduction

1.1. Background of study

Bank is a type of business organization, which is placed in the area of uncertainty. Various environmental factors, such as customers, intermediaries, competitors, government and other environmental factors can provide both positive and negative influence to the bank. Positive influence means more opportunities or encouragement while negative influence equals to barriers or threats to the bank. When a positive or negative effect influence the bank, all the determinant factors must then be considered, analyzed and diagnosed in order to predict the likelihood that a risk will occur.

Empirical evidence showed that Bank of Indonesia recorded a credit growth in the banking sector by the end of 2012, and that credit growth was lower compared to the previous years'. It is even below the threshold of the Bank Business Plan, which is at the level of 23% (Johansyah 2013). On the other hand, the credit default has increased approximately 0.12% compared to the previous year, which is 2.70%. Fitch, which is a rating agency, warned that the current economic global conditions are not conducive, and the potential non-performing loan (NPL) will increase in 2013 from its lowest level in 2012. (Megasari 2012).

According to the reality that is faced by the banking industry, especially for the middle and top local bank listed in Indonesian Stock Exchange, there is always uncertainty. This means that every person involved in the management of the bank should seek to address the risks that occur or are likely to occur. Furthermore, they should also seek to minimize or eliminate the loss when the risks and uncertainties occur by implementing good risk management.

The implementation of good risk management will minimize the loss faced by banks (Indonesia Central Bank No. 5/8/PBI/2003). As a result, the bank can maintain its viability, develop itself into a larger bank, and achieve success in business. Banks that do not implement good risk management might face the possibilities of loss, and this requires serious attention from the management of the banks.

Through serious attention and proper analysis and diagnosis, the management of a bank is expected to predict the risk imposed on other banks so that the management will be able to minimize the loss when something unexpected happens. In the future, it is hoped that the bank will be able to make prediction

regarding to this matter and devise the steps which are in accordance to the principle of prudent in order to deal with this problem.

One of the most fundamental aspects in the implementation of the precautionary principle is capital adequacy. It is a major focus of the entire banking supervisory authorities around the world. Capital owned by the bank basically should be sufficient in covering all the business risks faced by the bank. The main risks include the bank's credit risk, market risk, operational risk and liquidity risk. Measurement of risk is very important in this case in order to provide sufficient financial analysis in respect to the management of substantial funds from the public.

As an intermediary institution, a bank is highly dependent on the extent of trust placed by the public. One of the important aspects in the analysis of financial risks in the banking industry is risk-weighted assets. There are many variations in calculating the risk-weighted assets (RWA) in the banking sector. RWA differences in various countries have led to reduced confidence and reliability on RWA and capital ratios, and if this condition is left untreated, it can affect the credibility of the banking industry in general (Le Leslé, Avramova 2012).

1.2. Originality

This research tried to develop the effect of loan exposure valuation with variance amount realized through credit, investment, and placement on the third parties towards credit default. This research is different from the study conducted by Aziz and Charupat (1998), which calculated credit exposure by using Monte Carlo Simulation (BIS 1998). Furthermore, Aziz and Charupat's study shows the significant effect in setting the capital reserves whereas this study tried to increment a variable in the relationship of the loan exposure and credit defaults in some banks in Indonesia. The variable of this research is risk-weighted assets (RWA), more specifically every balance sheet assets and off-balance sheet that give the appropriate weight levels of credit risk inherent in every account.

1.3. Problem Formulation

Based on the phenomenon in the banking business and the research gap described above and according to the regulation of Indonesian Central Bank No. 5/8/PBI/2003 (dated May 19, 2003) about Implementation of Management

Risk in decreasing default risk, the author formulated "***How to decrease the credit default"*** as the research problem.

1.4. Research questions

According to the problem formulation, this study tried to answer some questions, which are:

1) Does the loan exposure valuation influence credit default?
2) Does the loan exposure valuation influence risk-weighted assets?
3) Does the risk-weighted assets influence credit default?

1.5. Research Objectives

Based on the problem formulation and research questions, this research aims at:

1) Identifying and analyzing the effect of the loan exposure valuation on credit default .
2) Identifying and analyzing the effect of the loan exposure valuation on risk-weighted assets.
3) Identifying and analyzing the effect of risk-weighted assets on credit default.

1.6. Research Output

This research will give contribution for academics area and organizational practitioners in the form of recommendations and the development of theoretical model and empirical model about the concepts of risk-weighted assets.

a. Academic implications

   This research will provide support for the development of the theory of performance and the theory of risk by observing the influence factors of credit default from a wider perspective by suggesting:

   1) how the credit default could be minimized by decreasing the risk-weighted assets,
   2) how the risk-weighted assets could be decreased by increasing loan exposure valuation.

b. Practical Organizational implications

This research will provide guidance in valuating loan exposure in order to decrease the credit default. The practitioners should therefore precisely calculate the risk-weighted assets when giving the credit, investing in securities, or placing the money on the third parties.

2. Literature Review

2.1. Contingency Theory

The purpose of establishment of a company concerns with the creation of revenue and profitability and improving social welfare. This purpose – whether it is short-term, medium-term, or long-term purpose – is prepared in the planning and control stage of the company, and the company has to track this purpose in order to achieve their objectives.

Behavioral research in accounting was originally designed by some researchers to explain the universalistic approach. Some of the examples include the research conducted by Argyris (1952), Hopwood (1972) and Otley (1978). Universalistic approach that includes a control system can be applied to all characteristics of any firm and environmental conditions. Universalistic approach is based on the scientific management theory.

Contingency theory can be used to analyze the design and management control systems in order to provide information that can be used by companies for various purposes and to face competition (Otley 1978). On the other hand, Merchant (1982) argued that there is no universal control system that can always be applied to the entire organization in each state. Control systems will vary in every organization based on its organizational and situational factors.

2.2. Control Theory

Anthony and Govindarajan (2005) stated that management control activities include Plan, Coordinate, Communicate, Evaluate, Decide, and Influence, and the control system elements include detector, assessor, effector, and communication networks.

Huezynski and Buchanan (1991) explained that management control is as a process through which the implemented plans and goals are achieved through the establishment of standards and measurement database. Management control must address the issues by comparing actual performance with the stand-

ards and by determining corrective action and feedback needed. Furthermore, Huezynski and Buchanan (1991) explained that the control of the organization is a meaningful and important activity because if the control activities in an organization do not run properly, the operating activities will be impaired and wasted (in terms of efficiency).

Snell (1992) defined the controls as any process that helps in aligning the actions of the individual with the interests of the organization that hires him or her. Furthermore, Snell (1992) divided the controls into 3 (three) types of typology, which are control systems of behavior, control systems of results, and input control system.

2.3. Concept of Banking and Credit

According to the Circular Letter of Bank of Indonesia (SE BI) No.26/4/BPPP (dated May 29, 1994), earning assets (loans) are all assets in dollars and foreign currencies held by the bank in order to earn revenue according to function. The types of earning assets are amount of credit, letter of credit, placement with banks and non-banks, and investments.

The term 'credit' can be defined as "the provision of money or bills that can be similar with that, based on an agreement between banks with other parties that requires the borrower to repay the debt after a certain period of time with interest" based on the Basic Banking Act 10 of 1998. In other words, credit is the transfer of funds from the lender to the borrower.

Assessment on the principles in the provision of credit or in determining the collectability of loans-earning assets in the form of credits is specified in 5 (five) categories in the Regulation of Bank of Indonesia No.8/19/PBI/2006 (dated October 5, 2006), which include; fluent, special mention, doubtful and loss.

2.4. Concept of Management Risk

Smith (1990) stated that management of risk is a process of identification, measurement and control of a risk that may threat the asset and revenue of a company or a project, which may result in damaged assets or company loss.

Noshworthy (2000, 600) stated that management of risk is an implementation of measures aimed at reducing the likelihood of those threats occurring and minimizing any damage if they do. Risk analysis and risk control form the

foundation of risk management where risk control is the application of suitable controls to gain a balance among security, usability and cost.

Stoneburner et al. (2002) explained that management of risk controls and mitigates risks, which are related to information system, and encompasses risk assessment through cost-benefit analysis and the implementation, test and security evaluation of safeguards.

2.5. Credit Risk, Weighted Risk and Loan Exposure

According to the Regulation of Bank of Indonesia No. 14/18/PBI/2012, credit risk is a risk due to the failure of the debtor and/or other party in fulfilling obligation to the bank. Banks are exposed to credit risk due to the nature of their lending-based business while the bank's debt and capital ratio is highly leveraged. The source of credit risk can come from any functional activities of the bank, such as lending of the loan, placement and investment. Credit risk still dominates the bank activities in Indonesia. This happens because besides the potential loss occurred from large credit exposure; the margin received by banks is relatively small.

Joel Bessis (1998) defined credit risk as the loss that is caused by the default of the debtor or due to a decline in the credit quality of borrowers. The decline in credit quality reflects the increase in credit risk. On the other hand, Kountur (2006, p. 3) defines "risk" as the possibility of adverse events. The more complex the activity is, the greater the risks are.

Risk Weighted Assets (RWA) is the banking assets in the balance sheet which are taken into account by a certain percentage weight as a risk factor. The provisions about percentage of risk factors in each asset as the basis for the calculation of risk-weighted assets have been determined by the Bank of Indonesia in accordance to the Circular Letter No. 5/23/DPNP (dated September 29, 2003). In calculating risk-weighted assets for credit risk, the bank can use 2 (two) types of approaches, Standardized Approach and / or Internal Rating Based Approach.

Loan Exposure is the cost of replacing or hedging the contract at the time of default. The cost is the maximum value that will be lost if the counter party to that contract default (Aziz, Charupat 1998).

Bielecki and Rutkowski (2002) defined default risk as a possibility that a counter party in a financial contract can not fulfil a contractual commitment or meet his/her obligations stated in contract.

From the various explanations and theoretical framework about decreasing credit default described above, in this paper, the author proposed the proposition as follows:

Proposition: Risk-weighted assets are the risk of all bank assets placed on the third parties in the form of loans, investment, placement and other forms of credit. If the risk is calculated properly, it can potentially decrease the credit default.

3. Research Methodology and Research Process

3.1. Population and Research Sample

The sampling method used in this research is purposive sampling (Ferdinand Augusty, 2006). This sampling method was chosen after considering all information related to the research problem. The population in this study is the banks that are listed in Indonesian Stock Exchange from 2008 to 2012 while the samples are the middle and top fifteen local Indonesian banks listed in the Indonesian Stock Exchange from 2008 until 2012. The reason why the middle and top fifteen local Indonesian banks were chosen as the samples of this study is because the data is more reliable while the process of recording a bank listed in Indonesian Stock Exchange is conducted through a careful evaluation and feasibility study.

3.2. Operational of Variables

Basically, the necessary data in this study can be categorized into 3 (three) groups of variables, which are Independent Variable, Dependent Variable, and Intervening Variable. The first variable (EXP) is the loan exposure valuation. This variable is independent variable, which is indicated through the amount of credit, placement and investment. The second variable is risk-weighted assets (ATMR). This variable is the intervening variable with indicated amount of risk-weighted assets. The third variable (NPL) is the credit default. This variable is the dependent variable with proxy or non- performing Loan. The model can be formulated as follows:

$$NPL = f(EXP) + e \quad (1)$$

$$NPL = f(EXP) + f(ATMR) + e \quad (2)$$

$$ATMR = f(EXP) + e \quad (3)$$

3.3. Data Collection Techniques

The data required for this study can be categorized as primary data and secondary data. The primary data required in this study were collected by conducting field research by directly visiting the banks, which are listed in Indonesian Stock Exchange. The secondary data were collected through library research.

3.4 Method of Analysis

In this study, the author used Structural Equation Modeling (SEM). SEM is a method of analysis, which can provide information about the simultaneous causal relationship between the variables. It provides information about the load factors and measurement of errors. SEM can be used to analyze the relationship between latent variables with indicator variables, the relationship between latent variables with another, as well as knowing the size of the measurement error (Ghozali, 2008). To support Structural Equation Modeling, the author used software Amos 21:00.

4. Results and conclusions

4.1.Testing The Feasibility Of Research Model

1) Normality and Linearity
   Normality test is done by using the skewness test, which shows almost all normal variables, are at the level of 0.01 (1%). This is reflected in the value of skewness CR, which is below ± 2.58 (Arbuckle 1997, 78). Multivariate value used in testing multivariate normality is kurtosis coefficient. If the results are still below the limit of ± 2.58, it means that there are data used for multivariate normal distribution.

2) Extreme numbers (Outliers)
   Outliers are observations that appear to be an extreme case in both univariate and multivariate values due to the combination of its unique cha-

racteristics, and they look very much different from the other types of observation. In this study, the model proves that no outlier is generated.

3) Multicollinearity

Multicollinearity can be detected from the determinant of the covariance matrix (Cooper, Emory 1996, 324). The small value of determinant of covariance matrix indicates multicollinearity problem. In the table, it can be seen that the correlation between the independent variables is less than 1 (r <1), which means that the independent variables have no symptoms of multicollinearity.

Furthermore, a feasibility test is conducted after meeting the following assumptions. To test the feasibility of the structural equation model, some eligibility index models were used. According to Arbuckle (1997), AMOS can also be used to identify the proposed model by meeting the criteria of a good structural equation model. Those criteria are:

a) Positive degrees of freedom

The output results and the degree of freedom must be equal to 4 in order for the developed model to meet the criteria as a good model.

b) X2 (chi-square statistic) and probability

The likelihood ratio chi-square statistic is the fundamental test equipment to measure the overall fit. Significant level of acceptance is recommended if $p \geq 0.05$ (Hair et al. 1998, 389), which means the actual input matrix is not statistically different from the predicted input matrices (Wheaton, 1977). Amos output results showed that the ratio of chi square is 3.3328 or less than 591 (3 x 197).

Besides ratio chi-square, Hair et al. (1998, 340) recommended to use the value of CMIN / DF. CMIN / DF is the value of conformity which can be used to decide whether the model is accepted or not. For a model to be accepted, the value of CMIN / DF has to be less than or equal to 2.0 or 3.0. In this study, it was found that the value of CMIN / DF is 0.8307, which is less than 2.0. Based on the result of calculation, it can be concluded that this model is acceptable and can be used.

c) Goodness of Fit Index (GFI)

This index reflects the overall suitability of the model, and it is calculated from the residual quadratic model that predicts and compares the actual data. The value of Goodness of Fit Index is 0.9826, or it usually ranges from 0 to 1. The larger the sample size, the greater the va-

lue of GFI. The closer the value of GFI to 1, the better the agreement the model has (Hair et al. 1998, 387). Good value of GFI is equal to or greater than 0.90.

d) Adjusted GFI (AGFI)
AGFI is an analogue of R2 (R square) in a multiple regression. Fit Index can adjust the degree of freedom available to test whether the model is accepted. Amos output results showed that the AGFI has coefficient of 0.9347 or 93.47%. An acceptance rate is recommended if the value is equal to or greater than 0.9.

e) Tucker-Lewis Index (TLI)
TLI is an alternative incremental fit index that compares a model that is tested against a baseline models. It is a fit index, which is less affected by the sample size. A value closer to 1 indicates a very good fit. From the calculation in this study, Amos output results showed that the TLI has coefficient of 1.00 or 100%. An acceptance rate is recommended if the value is equal to or greater than 0.9.

f) CFI (Comparative Fit Index)
CFI, which is known as the Bentler Comparative Index, is an incremental suitability indices, which compare the null model, tested and estimated models. Hair et al. (1998, 289) stated that CFI is a good index to measure the suitability of a model because it is not affected by sample size. The value of CFI which is equal to or greater than 0.90 means that the model is good. In this research, Amos output results showed that the CFI coefficient is 1.00 or 100%, which means that the model is a good model.

g) RMSEA (Root Mean Square Error of Approximation)
RMSEA values indicate the goodness of fit expected when the model is estimated in the population. RMSEA is an index of measurement that is not influenced by the size of the sample so that the index is usually used to measure the fit model on large sample numbers. For a model to be acceptable, the RMSEA index should be less than or equal to 0.08 or 8.0%. From the calculation in this study, Amos output results showed the RMSEA index is 0.00 or 0%. This means that the model showed a close fit, and it was based on the degree of freedom. The indices that are used to test the feasibility of a model can be summarized in the table below.

Table 1. Goodness of Fit Model Loan Exposure Valuation, Risk Weighted Asset, Credit

Default

Goodness of Fit Index	Cut off Value	Result	Evaluation Model
χ2 Chi square	< 591	3,328	Good
Hoelter (0.05)	> 120	212	Good
Significance Probability	≥ 0,05	0,5053	Good
GFI	≥ 0,90	0,9826	Good
AGFI	≥ 0,90	0,9347	Good
CMIN/DF	≤ 2,00	0,8307	Good
TLI	≥ 0,90	1,000	Good
CFI	≥ 0,90	1,000	Good
RMSEA	≤ 0,08	0,000	Good

S o u r c e : Results Output Full Amos 21:00.

Table 2. The Effect on Loan Exposure Valuation towards Credit Default

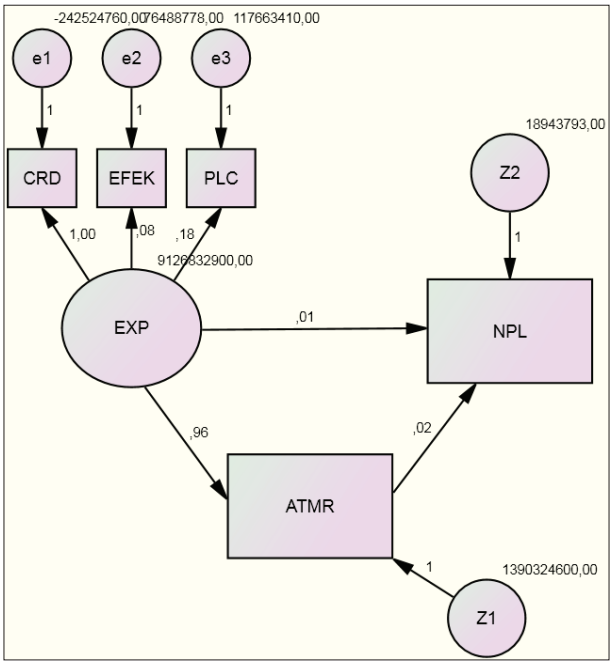
			Estimate	S.E.	C.R.	P
ATMR	<---	EXP	,9562	,0468	20,4234	***
CRD	<---	EXP	1,0000			
EFEK	<---	EXP	,0803	,0106	7,5742	***
PLC	<---	EXP	,1757	,0134	13,1096	***
NPL	<---	EXP	,0094	,0126	,7480	,4545
NPL	<---	ATMR	,0209	,0124	1,6818	,0092

S o u r c e : Amos ver. 21.00.

Notes:
ATMR = Risk Weighted Asset
EXP = Loan Exposure
CRD = Credit Realized
EFEK = Investment
PLC = Placement
NPL = Non Performing Loan

4.2. Hypotheses Testing

Figure 1. Pictograph on Loan Exposure Valuation, Risk Weighted Asset, Credit Default



FIT MODEL TESTED:
χ2 Chi square = 3,328
Significance Probability = 0,5053
GFI = 0,9826
AGFI = 0,9347
CMIN/DF = 0,8307
TLI = 1,0000
CFI = 1,0000
RMSEA = 0,0000

S o u r c e : Amos ver. 21.00.

Hypothesis 1: **Loan Exposure *has positive effect* on Credit Default**

The statistical tests on this hypothesis (Table 2) showed that loan exposure has the positive coefficient of 0.0094 on influencing the credit default despite the fact that it is not quite significant. On the other hand, the value of P is 0.4545, which is greater than 0.05. This means that hypothesis 1 is not accepted. In oth-

er words, it can be concluded that loan exposure valuation has no significant effect on credit default.

This study provides support for the study conducted by Aziz and Charupat (1998) which stated that calculating credit exposure using Monte Carlo Simulation has significant effect in setting capital reserves.

This study differs from the research conducted by Duffie and Singleton (1999) which classify the models for risky assets (bonds) into two categories. The first branch is referred to as "Structural models," and it requires specific inputs from the firm to model the default process. Typically, the cause of default bond is a decline in the value of a firm's assets below a fixed threshold. The second branch is referred to as "Reduced form models," and it estimates the risk of neutral probability of default over a given interval from actual credit spreads without necessarily identify the cause of the default.

Hypothesis 2: **Loan Exposure *has positive effect* on Risk-Weighted Asset**
The statistical tests on this hypothesis (Table 2) showed that the loan exposure has the positive coefficient of 0.9562 on influencing the risk-weighted average asset, and the result is significant. The value of P is 0.00, which is below 0.05. This means that hypothesis 2 is accepted, and loan exposure has direct significant effect on risk-weighted asset.

This study supports the study conducted by Andersen et al. (2012) which stated that higher risk weights can mitigate systemic risk to a certain extent as banks might both set aside more capital and reduce lending and investment that generate systemic risk.

Hypothesis 3: **Risk-Weighted Asset *has positive effect* on Credit Default**
The statistical tests on this hypothesis (Table 2) showed risk-weighted asset has the positive coefficient of 0.0209 on influencing the credit default, and the result is significant. The value of P is 0.009, which is below 0.05. This means that hypothesis 3 is accepted. This shows that risk-weighted average asset has direct significant effect on credit default. It proves that the mediated effect of risk-weighted average asset is 0.1998 or greater than the direct effect of loan exposure on credit default with the coefficient of 0.0094.

This study agrees with the research conducted by Sonali Das and Amadou N.R. Sy (2012), which is entitled "How Risky Are the Bank's Risk Weighted Assets: Evidence from the Financial Crisis." They argued that banks with lower

RWA will perform better during the crisis, which means that credit default or NPL must be low in order for the bank to obtain better return.

This study also agrees with the findings by Bradley et al. (1991) who found that RWA for banks, respectively, are positively related to the bank probability of failure.

4.3. Conclusion

1) The coefficient of loan exposure is 0.0094 on influencing the credit default despite the fact that it is not quite significant. On the other hand, the value of P is 0.4545, which is greater than 0.05. This means that hypothesis 1 is not accepted. In other words, it can be concluded that loan exposure valuation has no significant effect on credit default.
2) The coefficient of loan exposure is 0.9562 on influencing the risk-weighted assets, and the result is significant. The value of P is 0.00, which is below 0.05. This means that hypothesis 2 is accepted, and loan exposure has direct significant effect on risk-weighted asset.
3) The coefficient of risk-weighted assets is 0.0209 on influencing the credit default, and the result is significant. The value of P is 0.009, which is below 0.05. This means that hypothesis 3 is accepted. This shows that risk-weighted average asset has direct significant effect on credit default. It proves that the mediated effect of risk-weighted average asset is 0.1998 or greater than the direct effect of loan exposure on credit default with the coefficient of 0.0094.

4.4. Implication

1) Academic Recommendation
   This study contributes to the academic area in the form of recommendation and the new theoretical model of loan exposure valuation in influencing the credit default. This study has implications for academic research by providing support in the development of contingency theory and the theory of organizations from a wider perspective, namely: 1) by suggesting that loan exposure valuation has no significant effect on the credit default and that loan exposure valuation cannot increase credit default, so this variable must be mediated by other variables in order to decrease credit default; 2) by proposing the usage of indirect effect of

loan exposure valuation on credit default mediated by risk-weighted assets that are precisely calculated since it has stronger and more positive coefficient than direct effect.

2) Practical Recommendations
   The result of this research also provides guidance for banking practitioners in improving the loan exposure when processing a credit application. Loan exposure must be built adequately by an organization. Moreover, the practitioner must implement organizational learning to build and develop a credit system and control. This study can give implications to the practitioners by suggesting the creditors to use RWA as an indicator of credit risk and precisely calculate the RWA when giving the credit, investing in securities, or placing the money on the third parties. Most banks with higher risk-weighted assets implement bad credit management.
3) Future Research Recommendation
   For future research, it is suggested that the object of the research is not limited to only middle and top banks but also to all banks that are listed in the Indonesian Stock Exchange, Jakarta so that the samples are distributed more widely.

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