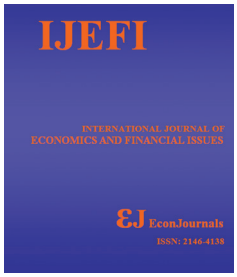

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Banking Crisis Prediction: Emerging Crisis Determinants in Indonesian Banks

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ABSTRACT

Many studies have been conducted in connection with revealing the determinants of a banking crisis but nothing addresses the exact causes of the crisis. This study aims at developing a model to discern a banking crisis prediction using Crisis and Default Index. The prediction was for 2015-2016 periods involving 21 variables that were classified into five major categories namely macroeconomic, internal banking condition, institutional quality, global aspect, and good corporate governance. Results showed that internal banking condition became the most influential factor toward the probability of existing banking crisis. Another finding depicted that management quality, ROE, BOPO, and LDR positively affected a banking crisis, therefore, the higher the values of the four elements, the higher the probability of the occurred banking crisis.

Keywords: Banking Crisis, Crisis Determinants, Causes of Crisis
JEL Classifications: E5, G2, H12

1. INTRODUCTION

The rapid growth of information and technology as well as the financial sector noted by globally integrated financial system bears no barriers of economic activities in term of transaction. Such condition potentially raises a domino impact if there is a financial instability occurred in a country, which further affects other countries and hypothetically gives rise to a global crisis (Raz et al., 2012).

In the latest two decades, global financial crisis happened and spread very fast due to the existing integrated financial system. Financial crisis can be noted when; (i) there is a failure in a finance market, (ii) finance institution may lose the larger part of owned assets, (iii) there are banking panics, loan default, and recession, and (iv) stock exchange drops and there is a continuous exchange rate depreciation (Nezky, 2013). As a susceptible finance sector, banking institution needs a serious attention to avoid a systemic risk of potential financial crisis.

An appropriate risk management indeed helps minimalize the probability of the occurred banking crisis. In regard to most studies that investigate possible factors causing a banking crisis, there are some categories of the factors involving macroeconomic, internal banking condition, institutional quality, and global aspects (Krugman, 1979; Demirgüç-Kunt and Detragiache, 1997; 2002; 2005; Beck et al., 2006; Boyacioglu et al., 2009; Davis and Karim, 2008; Klomp, 2010; Wong et al., 2010; Männasoo and Mayes, 2009; Musdholifah et al., 2013; Musdholifah, 2015; Wulandari et al., 2017; Kowanda et al., 2014; Kibritcioglu, 2002; Arena, 2008; Oktavilia, 2008; Poghosyan and Čihák, 2009; Bhattacharya and Roy, 2009).

In accordance with the initial crisis theory, financial crisis can happen due to a bad exchange rate and macroeconomic conditions. A decreasing and low economic growth causes a banking crisis from various ways (Demirgüç-Kunt and Detragiache, 2002; 2005; Beck et al., 2006; Davis and Karim, 2008; Wong et al., 2010; Musdholifah, 2015; Wulandari et al., 2017). On the contrary,

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some studies cannot reveal the significance of economic growth toward a crisis variable (Oktavilia, 2008; Männasoo and Mayes, 2009; Klomp, 2010). Demirgüç-Kunt and Detragiache (2005), Beck et al. (2006), Wong et al. (2010), and Musdholifah et al. (2013) explain that inflation rate has a significant influence on an existing banking crisis. Meanwhile, Musdholifah (2015) shows that inflation rate negatively influences on the occurrence of a banking crisis, of which such finding has been confirmed by some previous research (Demirgüç-Kunt and Detragiache, 2002; Oktavilia, 2008; Klomp, 2010; Wulandari et al., 2017). Rather, inflation rate is closely interconnected with interest rate, meaning that the higher the inflation, the higher the interest, in which the phenomenon eventually shows a mismanagement of macroeconomic (Demirgüç-Kunt and Detragiache, 2002; Demirgüç-Kunt and Detragiache, 2005; Klomp, 2010). On the contrary, Beck et al. (2006), Oktavilia (2008), Wong et al. (2010), Musdholifah (2015), and Wulandari et al. (2017) depict a different result in which interest rate does not affect a probable banking crisis. A continuously depreciated local currency, moreover, becomes the one that triggers a banking crisis (Demirgüç-Kunt and Detragiache, 1997; Oktavilia, 2008; Shehzad and De Haan, 2009). Unfortunately, still, several studies proved no influence of an exchange rate toward a probably existing banking crisis (Beck et al., 2006; Davis and Karim, 2008; Wong et al., 2010; Wulandari et al., 2017).

Poghosyan and Čihák (2009) used financial indicators to predict a banking crisis by measuring the capital adequacy, asset quality, management quality, earnings, and liquidity (CAMEL). Boyacioglu et al. (2009) gives an additional perspective that sensitivity to market risk also becomes a financial indicator in predicting a banking crisis. The financial indicators reflect an internal condition as well as bank's operational performance. The statement has been in line with the second crisis theory, which explains that a crisis is a part of liquidity holders' panic and a result of self-fulfilling prophecy that influences existing bank runs.

In addition, capitals calculated by comparing total shareholders and total assets negatively influence on a banking crisis prediction because the owned capitals might help once the bank experiences liquidity issues (Schaeck and Čihák, 2007; Almilia and Herdinigtyas, 2005; Poghosyan and Čihák, 2009; Mayes and Stremmel, 2014). Reversely, some scholars find a positive relationship between capitals and the cause of a banking crisis because the higher the capitals, the lower the proportion of a credit distribution, so that the condition possibly slows down the profitability (Boyacioglu et al., 2009; Musdholifah, 2015, Wulandari et al., 2017). However, Kurniasari and Ghozali (2013), Musdholifah et al. (2013), and Kowanda et al. (2014) argue that capitals are not significantly able to predict a crisis.

Asset quality can be measured by loan to asset ratio and non-performing loan. Credit or loan is a productive asset that produces an income and risk in the same times. Some research confirm that the increase of asset quality reflected on a credit will decrease the possibility of occurring a banking crisis because the higher total credits enhance the obtained interests and net profits (Musdholifah et al., 2013; Wulandari et al., 2017; Männasoo and Mayes, 2009). Meanwhile, Kowanda et al. (2014) and Poghosyan and Čihák (2009) argue that asset quality positively influences a banking crisis, of which the results have been relevant with other studies' results (Almilia and Herdinigtyas, 2005; Kurniasari and Ghozali, 2013; Musdholifah, 2015; Boyacioglu et al., 2009).

The comparison of labor cost ratio and total assets describes an actual management quality. By using different proxy, Almilia and Herdiningtyas (2005) shows that management type positively affects the probability of an existing crisis. On the contrary, Wulandari et al. (2017) uses an efficiency ratio to portray that management quality negatively influences the prediction of a banking crisis, of which the results also have been relevant with several studies (Boyacioglu et al., 2009; Männasoo and Mayes, 2009; Musdholifah, 2015; Kurniasari and Ghozali, 2013).

Profitability or earning reflects the efficiency of a banking performance in achieving the desirable profits. Musdholifah (2015) explains that earning positively influences on a banking crisis. However, other studies claim that there is a negative influence of earning on an existing crisis (Boyacioglu et al., 2009; Wulandari et al., 2017; Männasoo and Mayes, 2009; Musdholifah et al., 2013; Almilia and Herdinigtyas, 2005; Kurniasari and Ghozali, 2013).

Caggiano et al. (2014), Kowanda et al. (2014), Musdholifah et al. (2013), Boyacioglu et al. (2009), and Kurniasari and Ghozali (2013) find that liquidity positively affects the probability of a banking crisis. A high loan with a low deposit might cause a liquidity problem in a bank. Musdholifah (2015) states that liquidity negatively influences the probability of a banking crisis. Using another liquidity proxy, liquidity does not affect the prediction of a banking crisis (Boyacioglu et al., 2009; Musdholifah, 2015; Wulandari et al., 2017; Almilia and Herdinigtyas, 2005).

Boyacioglu et al. (2009) and Musdholifah (2015) convey that there is a positive impact of sensitivity to market risk on the prediction of banking crisis. Meanwhile, Männasoo and Mayes (2009), Musdholifah et al. (2013), and Wulandari et al. (2017) argue that sensitivity to the market risk does not affect the possibility of raising a banking crisis. Demirgüç-Kunt and Detragiache (2002) find that good institutional quality can limit the presence of moral hazard and regulation control can be more effective by minimalizing crisis risks (Nabiyev et al., 2016; Houston et al., 2010; Essid et al., 2014; Klomp and De Haan, 2014; Beck et al., 2006; Demirgüç-Kunt and Detragiache, 2005). Whereas, Musdholifah et al. (2013) state that institutional quality does not affect the prediction of crisis.

Global aspect takes another part of predicting a banking crisis concerning several issues in regard to global market and globally integrated financial system. Any business transaction existing in a global market might spread diverse risks into other countries rapidly. That is, a global aspect should be considered as a predictive factor of a banking crisis (Lestano and Kuper, 2003; Zhuang and Dowling (2002); Kaminsky and Reinhart (1999; 2000).

Furthermore, Farida et al. (2010) convey that the relationship between Bank Indonesia and other banks in Indonesia can be analogized as the principal with the agents, of which such typical bond is often close with different interests and conflict causation. Such unintended risks can be altered by using a good corporate governance (GCG). GCG is a set of regulations that manages the relationship among stockholders, creditors, government, employees, and internal and external stakeholders who are always interconnected with each of their rights and responsibilities, thus, the conducive situation creates additional values for all shareholders (Mayangsari and Andayani, 2015). Deviacita and Achmad (2012) portray that GCG that is measured by using board size is positively influential in predicting distress condition. However, Choirina and Yuyetta (2015) state that GCG is negatively influential in predicting distress. Andari and Wiksuana (2017) and Baklouti et al. (2016) also portray that GCG, conducted by using IBCG rating, is not significant in predicting a crisis condition.

In accordance with above phenomena, a banking crisis still happens eventhough numbers of studies have been undertaken to help invent solvencies. Such condition shows that banking crisis gets developed times-to-times in term of its characteristics. Hence, a study to reveal an initial detecting system in preventing tremendous future impacts of banking crisis is still indispensable to be conducted. This study aims to develop a model to predict a banking crisis in Indonesia using Crisis and Default Index (CD Index) proposed by Musdholifah (2015). The development of the model was conducted by using five predictive factors namely macroeconomic, internal banking condition, institutional quality, global aspect, and good corporate governance (GCG).

2. METHODS

This study aimed at investigating factors that influenced the possibility of occurring a banking crisis happened in Indonesia conventional banks in 2015-2016. The sources of the data were from the obtained data published by World Bank, Bank Indonesia, Financial Service Authority of Indonesia, macrotends.net, and each bank's official website used as samples of the study. There were 140 conventional banks in Indonesia used as the population of the study. Using purposive sampling, 18 banks were chosen as samples which met the criteria namely those which annually published their report from 2007 to 2016.

The dependent variable of this study was a banking crisis that was calculated by using Crisis and Default Index (CDI) approaching to the model proposed by Musdholifah (2015). CD Index used four major components of risks covering credit risk (Cr), liquidity risk (Dept), Investation risk (Inv), and exchange rate risk (FDebt). The formula of CD Index, then, could be drawn as follows:

$$CDI = \frac{\left(\frac{Cr_t - \mu_{credit}}{\delta_{credit}}\right) + \left(\frac{Inv_t - \mu_{Inven}}{\delta_{Investment}}\right) + \left(\frac{Dept_t - \mu_{de}}{\delta_{Deposit}}\right) + \left(\frac{FXDebt_t - \mu_{F.debt}}{\delta_{F.debt}}\right)}{4}$$

The analysis of CD Index was conducted using dummy variable. If CD Index was negative (CDI <0), the bank was considered facing crisis and given score 1. Meanwhile, if CD Index was positive (CDI >0), the bank was considered not experiencing a crisis, thus, given score 0.

There were five dependent variables used in this study including macroeconomic, internal banking condition, institutional quality, global aspect, and good corporate governance. Macroeconomic consisted of economic growth measured by real GDP progression (X1), inflation rate proxied with Consumer Price Index (CPI) (X2), interest rate proxied with real interest rate (X3), and exchange rate proxied with US Dollar exchange rate against IDR (X4). The internal banking condition was measured by CAMELS where capitals were revealed by approaching to CAR (X5), measuring assets using NPL (X6) and loan to asset ratio (X7), quantifying management by comparing labor total costs and average assets (X8), determining profitability proxied with ROA (X9), ROE (X10), NIM (X11), and BOPO (X12), measuring liquidity using loan to deposits ratio (X13) and the compassion of liquidity asset and the total assets (X14), and determining sensitivity to market risk by the comparison of foreign assets and debts (X15).

Moreover, institutional quality variable was proxied with Government Effectiveness Index (X16), of which the data were retrieved from The Worldwide Governance Indicators. Global aspect was proxied with four variables namely world oil prices (X17), US economic growth (X18), China economic growth (X19), and world gold prices (X20). The data of both US and China economic growths were obtained from World Development Indicator while the prices of world oil and gold were from macrotends.net.

Corporate governance variable was quantified using modified IBCG Rating (X21) developed by Hartono and Musdholifah (2019). There were 134 criteria in IBCG Rating that were classified into five major categories as seen at Table 1. The rating used yes and no responses and given score 1 for the desired information, while score 0 for the unintended information.

Furthermore, the formula to measure IBCG Rating could be drawn as follows:

$$IBCG\,Weighted = \left[\frac{Score}{Max.\,Points} \times 100\%\right] \times Max.\,Weighted\,Points$$

This study used logistic regression analysis to develop the predictive model of a banking crisis. The dependent variables were grouped into two classes namely *crisis*, scored 1, and *non-crisis*, scored 0. The following formula was determined to help work with logistic regression:

$$Ln\frac{p}{1-p} = b0 + b1X1 + b2X2 + b3X3 + \ldots bnXn.$$

3. FINDINGS

3.1. Measuring a Banking Crisis Using Crisis and Default Index (CD Index)

Table 2 showed the results of predictive measurement toward a banking crisis conducted by using CD Index. A bank was considered non-crisis if the main score of CD Index was more than 0 which was scored 0, while was in a crisis if the main score of CD Index was <0 which was then scored 1. In regard to the quantification results, there were nine banks considered crisis and nine banks considered non-crisis in 2015. Meanwhile, in 2016, there were 8 bank considered crisis and 10 bank considered non-crisis.

3.2. Assessing Governance Corporate Using Modified IBCG Rating

The measurement of governance corporate quality used a modified IBCG rating model proposed by Musdholifah and Hartono (2016). The rating model consisted of 134 criteria that were classified into five major categories. Based on Table 3, Bank Rakyat Indonesia got the highest IBCG index score in 2015 which was amounted of 73.30 while Bank Maybank got the highest IBCG index score in 2016 which was amounted of 78.36. The higher the IBCG index score, the more open the banks with the information regarding to the annual reports posted in their institution's website.

3.3. Prediction of Banking Crisis

In accordance with the results shown in Table 4, there were four variables that could be used as predictors of a banking crisis, covering management (X8), ROE (X10), BOPO (X12), and LDR (X13). That is, the logistic regression could be formulated as follows:

$$Y = -24,542 + 3,532\,MAN + 0,125\,ROE + 0,199\,BOPO + 0,001\,LDR$$

Table 1: Five major categories of IBCG Rating

IBCG category	Max. points	Max. weighted points
Shareholders	42	30
Transparency	38	30
Board of directors	26	15
Executive management	18	15
Technical accessibility	10	10
TOTAL	134	100

Source: Musdholifah and Hartono (2016)

4. DISCUSSION

4.1. The Influence of Macroeconomic on Banking Crisis

Economic growth that has been proxied with real Indonesia GDP statistically does not influence on predicting a banking crisis in Indonesia. Meaning that, the fluctuation of GDP is not significant at predicting a banking crisis. The changes of macroeconomic condition might affect the industry's decision that further leads to influencing the adjustment of the internal bank's policy to generate more investation (Poghosyan and Čihák, 2009). Moreover, government tends to issue a policy that can stimulate GDP growth (Oktavilia, 2008; Männasoo and Mayes, 2009; Klomp, 2010).

Inflation rate proxied with the percentages of changing Consumer Price Index (CPI) is statistically not influential to predict a banking crisis. When an inflation occurred, government tends to rise an interest rate up to decrease the existing inflation. A high inflation followed by the increase of interest rate gives two impacts on the increase of credit risk and total DPK. Once the DPK rises, consequently, bank's profitability get decreased due to the numbers of burdened interests (Caggiano et al., 2014; Musdholifah et al., 2013; Wulandari et al., 2017). In other sides, inflation is not a short-term issue so that, in a certain period, it does not directly affect the total DPK in the period when the inflation happens. Unfortunately, the impact might get worst for the upcoming periods (Mumtazah and Septiarini, 2016). That is, the result obtained in this study confirms several studies stating that inflation is not influential to the prediction of a banking crisis (Oktavilia, 2008; Shehzad

Table 2: Measuring a crisis using CD index

Samples	2015		2016	
	CD index	Main score	CD index	Main score
Bank Mandiri	1	−0.003	0	0.056
Bank Negara Indonesia	0	0.124	0	0.661
Bank Rakyat Indonesia	0	0.086	0	0.036
Bank Tabungan Negara	0	0.016	0	0.667
Bank Central Asia	1	−0.127	0	1.406
Bank CIMB Niaga	1	−0.228	1	−0.481
Bank Danamon Indonesia	1	−0.331	1	−0.271
Bank Woori Saudara Indonesia	0	0.265	0	0.293
Bank J-Trust Indonesia	1	−0.021	0	0.189
Bank Mayapada International	0	0.352	0	0.585
Bank Maybank Indonesia	0	0.991	0	0.507
Bank Mega	0	0.739	1	−0.409
Bank Nusantara Parahyangan	1	−0.286	1	−0.666
Bank Permata	1	−0.246	1	−1.039
Bank Commonwealth Indonesia	1	−0.356	1	−0.883
Bank Resona Perdania	1	−2.035	1	−0.406
Bank Ekspo Indonesia	0	0.781	1	−0.750
Bank KEB Hana Indonesia	0	0.280	0	0.505

Source: Researchers' documents

Table 3: Results of modified IBCG rating

Samples	IBCG index scores	
	2015	2016
Bank Mandiri	68.85	75.37
Bank Negara Indonesia	71.87	67.91
Bank Rakyat Indonesia	73.30	69.4
Bank Tabungan Negara	68.84	71.64
Bank Central Asia	61.48	70.9
Bank CIMB Niaga	60.32	71.64
Bank Danamon Indonesia	65.86	67.91
Bank Woori Saudara Indonesia	55.55	67.91
Bank J-Trust Indonesia	53.27	53.56
Bank Mayapada International	61.87	62.69
Bank Maybank Indonesia	68.75	78.36
Bank Mega	55.95	62.69
Bank Nusantara Parahyangan	62.96	60.45
Bank Permata	64.03	72.39
Bank Commonwealth Indonesia	54.85	53.67
Bank Resona Perdania	48.33	50.45
Bank Ekspo Indonesia	52.36	54.12
Bank KEB Hana Indonesia	55.05	54.74

Source: Researchers' documents

Table 4: Analysis results of assessing a predicting model of a banking crisis

Variable in the equation	B	Sig	Direction
Step 5[c] X8	3.532	0.015*	Positive
X10	0.125	0.090**	Positive
X12	0.199	0.059**	Positive
X13	0.001	0.021*	Positive
X15	0.030	0.407	-
Constant	−24.542	0.025*	Negative
Hosmer and Limeshow's goodness of fit test 0.378			
Nagelkerke's R square 68.7%			
Overall percentage 83.3%			

Source: Researchers' document. *: Significant tolerance at 10%, **: Significant tolerance at 5%, *: significant tolerance at 1%

and De Haan, 2009; Klomp, 2010; Caggiano et al., 2014; Prianti and Musdholifah, 2018; Wulandari et al., 2017). In addition, this study shows that interest rate does not statistically influence the probability of banking crisis. In other words, the changes of interest rate do not determine whether a bank is considered crisis (Beck et al., 2006; Oktavilia, 2008; Wong et al., 2010; Musdholifah, 2015; Wulandari et al., 2017).

Exchange rate that has been proxied with US Dollars and ID Rupiahs statistically do not influence the probability of raising a crisis. This fact shows that fluctuated IDR exchange is not significant at predicting a crisis. Some studies also confirm that there is no correlation between exchange rate and banking crisis prediction caused by a hedging policy of a central bank (Wulandari et al., 2017; Caggiano et al., 2014; Klomp, 2010; Davis and Karim, 2008; Wong et al., 2010; Demirgüç-Kunt and Detragiache, 2005; Beck et al., 2006; Wulandari et al., 2017).

4.2.The Influence of Internal Banking Condition on Banking Crisis

Capital ratio that has been proxied with CAR statistically does not influence the probability of a banking crisis. In other words, the fluctuated bank capitals do not cause a banking crisis to happen. The average CAR obtained in this study is 19.17, meaning that the ratio of bank capitals in Indonesia is good enough because the average score is bigger than the given score by the central bank. A high capital reserve can be used to deal with any liquidity problems, however, it also gives a particular burden that affects bank's profitability (Beck et al., 2006; Musdholifah, 2015; Wulandari et al. 2017). Besides, according to the regulation issued by Bank Indonesia as the central bank, all banks are obligatory to provide a minimum capital relevantly to the risk profile. As a result, banks with low capitals are mandated to get merged or choose acquisition to add more capitals. Henceforth, such condition makes the aspect of bank's capitals not compatible to being a crisis predictor (Kurniasari and Ghozali, 2013; Musdholifah et al., 2013; Kowanda et al., 2014; Demirgüç-Kunt and Detragiache, 2005).

In this study, asset quality is measured by NPL and loan to asset ratio. This study argues that asset quality does not influence the probability of raising a banking crisis. Non-performing loan illustrates the comparison between total problem loans and the total loans given by a bank. Meanwhile, loan to asset ratio shows the comparison between given loans and the total assets owned by the bank. Since non-performing loan and loan to asset ratio do not give significant influence, the NPL average score had by the sample banks is 3.04%, which is lower than the determined NPL score given by Bank Indonesia amounted of 5%. Some experts argue that a crisis tends to happen if the NPL ratio is equal or more than 10% % (Demirgüç-Kunt and Detragiache, 1997; 2002; 2005; Wong et al., 2010; Klomp, 2010). Therefore, problematic loans in most banks in Indonesia are still safe and the bank is considered capable to handle diverse risks and to accelerate profitability. Additionally, a high proportion of granted loans might indicate a banking crisis because the bank will expect more returns (Almilia and Herdinigtyas, 2005; Boyacioglu et al., 2009; Kurniasari and Ghozali, 2013; Musdholifah, 2015; Wulandari et al., 2017).

In this study, management quality has been proxied with the ratio of labor costs toward average assets. Results show that management quality positively affects a banking crisis in which the ratio of labor costs to average assets increases the probability of a crisis (Almilia and Herdinigtyas, 2005; Tatom, 2011). The increasing labor costs that are not supported by the increase of banking assets show inefficiencies, which further cause the rise of possible crisis. Louzis et al. (2012) consider that a low management quality can lead to the ability of credit appraisal that further makes a default risk increase.

In this study, earning quality is assessed based on the ratio of ROA, ROE, NIM, and BOPO. ROE statistically affects the probability of a banking crisis where the higher ROE the bank has, the more increasing the probability of a crisis. High bank profits reflect a high interest income. This means that the proportion of distributed credits is also high, of which it produces high returns but also increases a credit risk that trigger the risk of bankruptcy (Boyacioglu et al., 2009; Budiwati, 2011; Al-Khatib and Al-Horani, 2012). Moreover, BOPO is also statistically significant in predicting a banking crisis. The higher the BOPO ratio means that the bank is not able to do make its operations efficient so that it reduces a bank's profitability and increases a crisis risk (Kowanda et al., 2014; Kurniasari and Ghozali, 2013; Sofiasani

and Gautama, 2016). While ROA and NIM do not statistically affect the probability of a banking crisis, thus, low ROA cannot be used in predicting the crisis. In addition, in calculating ROA, almost 90% of the calculated assets experience a credit and liability risk so that the higher the ROA calculation, the higher the credit and liability risks (Musdholifah, 2015; Kowanda et al., 2014; Almilia and Herdinigtyas, 2005; Boyacioglu et al., 2009; Männasoo and Mayes, 2009; Kurniasari and Ghozali, 2013; Musdholifah et al., 2013). Furthermore, net interest margins have no effect in predicting a banking crisis regardless the fluctuated interest ratio. The right proportion of credit disbursement provides a high rate of net interest return, so that the net interest margin obtained by the bank also increases. However, a high NIM can reflect that an investment risk d an exchange rate borne by the bank is also high (Nugroho, 2012; Kristanti, 2014; Prasidha and Wahyudi, 2015; Siregar and Fauzie, 2015; Halim, 2016).

Liquidity is calculated by the loan to deposits ratio and the liquidity asset ratio to the total assets. LDR positively affects a banking crisis because high LDR ratio reflects low liquidity capability. The difference between the amount of credits and the third party's high funds indicates a high risk of banks in distributing credit, so that banks must provide a high amount of deposits to anticipate large-scale withdrawals (Kurniasari and Ghozali, 2013; Musdholifah et al., 2013). Meanwhile, the ratio of liquidity assets toward the total assets does not affect the probability of a banking crisis. Poghosyan and Čihák's (2009) only need couple of days to find out the liquidity problems that occur at banks, of which the results do not event show the relationship between crisis and liquidity (Männasoo and Mayes, 2009; Musdholifah, 2015). In addition, institution's role in regulating liquidity policies, one of which is Statutory Reserves that must be encountered by every bank, is considered able to reduce liquidity and loan limits. Moreover, the sensitivity to market risk proxied with the trading securities ratio to total assets has no effect on a banking crisis (Männasoo and Mayes, 2009; Musdholifah et al., 2013; Wulandari et al., 2017). Hence, bank's structured assets in Indonesia does not rely on market funding because the trading securities is relatively low (Wulandari et al., 2017).

4.3. The Influence of Institutional Quality on Banking Crisis

Institutional quality that has been proxied by the Government Effectiveness Index reflects the public service quality and the measures of freedom from political pressures, the quality of policy formulation and implementation, and the credibility of government's commitment to enforce policies or rules. Statistically, institutional quality does not affect the probability of a banking crisis. Meaning that, the ups or downs of Government Effectiveness Index do not affect a banking crisis (Nabiyev et al., 2016; Houston et al., 2010; Essid et al., 2014; Klomp and De Haan, 2014; Beck et al., 2006; Demirgüç-Kunt and Detragiache, 2005; 2002; Moyo et al., 2014; Maghyereh and Awartani, 2014; Musdholifah et al., 2013).

4.4. The Influence of Global Aspects on Banking Crisis

High world oil prices actually reflect an economic recession. Oil prices have no effect on the prediction of a banking crisis. The findings confirm the results of previous research conducted by Lestano and Kuper (2003) and Musdholifah (2015), who state that oil prices are not related to the prediction of a crisis. Moreover, the economic growth of the United States is also not statistically influential in predicting a banking crisis. Eichengreen and Rose (1998) emphasize that there is a relationship between economic growth and real interest rates and the crises occurred in developing countries. That is, while economic growth is slow, a crisis will occur in developing countries. A credit crunch in advanced countries also plays an important role in financial difficulties experienced by developing countries (Musdholifah, 2015).

Lestano and Kuper (2003) take global aspects into account in predicting a banking crisis. Some researchers only consider the economic growth of the United States as one of the determinants of a banking crisis. However, this study includes China's economic growth because it is considered as a new force that also affects Chinese economy. The results of statistical tests show that Chinese economy does not influence the prediction of a crisis. As a new model proposed in predicting a banking crisis, China's power in a global market has not been able to be used in predicting an existing banking crisis in Indonesia. Coudert and Raymond-Feingold (2011) and Tuysuz (2013) portray that the price of financial assets tends to decrease simultaneously during the period of financial crisis because losses in one market can spread the impacts into other markets and cause safer financial assets' flight to quality. Gold can function as a hedge for investors and become a safe haven asset when financial crisis happens. Safe haven assets are known as assets that are not related to other assets or portfolios when chaos in financial markets ensues (Baur and McDermott, 2010). Choudhry et al. (2015) explain the inability of gold as a safe haven during the period of global financial crisis regardless its usage as a hedge during the pre-crisis period. Such results are influenced by several reasons such as a nonlinear procedure investigating the relationships among variables, conducting bidirectional and multidirectional tests among variables, and involving investors' confidence (Choudhry et al., 2015).

4.5. The Influence of Good Corporate Governance on Banking Crisis Prediction

Good Corporate Governance (GCG) was proxied by Modified IBCG Rating. Statistically, GCG does not affect the prediction of a banking crisis (Baklouti et al., 2016; Hadi and Andayani, 2014), meaning that the rise or fall in the value of the IBCG Index does not affect the possibility of a banking crisis. Based on the second generation of a crisis theory, bank crises can occur due to self-fulfilling, which is a random event due to asymmetric information received by customers that cause bank runs (Musdholifah, 2015). No influence between GCG and a banking crisis in this study indicates that banks are considered to have revealed important information needed by stakeholders that are reflected by the high score of IBCG index even though banks with lower-than-zero CD Index scores. The assessment of IBCG as a proxy for GCG in predicting a banking crisis is an absolutely new idea.

5. CONCLUSION

This study uses Crisis and Default Index (CD Index) as a model to predict a banking crisis in Indonesia. The model includes five major

predictors involving macroeconomic, internal banking condition, institutional quality, global factor, and good corporate governance (GCG). In accordance with the results, macroeconomic, which covers variables of economic growth, inflation rate, interest rate, and exchange rate, does not influence the prediction of a banking crisis, so that, its fluctuated or unstable condition does not matter too much on the bad performance of banks in Indonesia. Moreover, internal banking condition becomes one of the predictive determinants of an existing crisis. The management type might also influence on predicting a crisis because the higher the labor cost ratio, the lower the profitability of a bank. That is, profitability, especially ROE and BOPO, is also influential to a banking crisis. A high ROE value indicates a high credit distribution due to the wish of high returns that might impact on enlarging credit risk and increasing a crisis probability. Further, a high BOPO also shows whether a bank cannot perform efficiently because the burdened operational costs are higher than the operational incomes. The condition, consequently, causes a decrease a bank's profitability. In other sides, capitals, asset quality, liquidity, and sensitivity to market risk do not give significant influence on a banking crisis. Since institutional quality is also insignificant to predict a crisis, Indonesia banking industries are extraneous to the government's effectiveness. Similarly, global aspects, which have been proxied with world oil and gold prices and USA and China economic growths, also do not show a significant influence on the prediction of a banking crisis. In other words, the stability of the banking industries in Indonesia has no connection with global fluctuated economic condition. At last, good corporate governance (GCG), which has been proxied with modified IBCG rating model, also do not indicate a positive influence on the prediction of a crisis.

REFERENCES

Al-Khatib, H.B., Al-Horani, A. (2012), Predicting financial distress of public companies listed in Amman stock exchange. European Scientific Journal, 8(15), 1-17.

Almilia, L.S., Herdinigtyas, W. (2005), Analisis Rasio camel terhadap prediksi kondisi bermasalah pada lembaga perbankan perioda 2000-2002. Jurnal Akuntansi Dan Keuangan, 7(2), 131-147.

Andari, N.M.M., Wiksuana, I.G.B. (2017), RGEC sebagai determinasi dalam menanggulangi financial distress pada perusahaan perbankan di bursa efek Indonesia. E-Journal Manajemen Unud, 6(1), 116-145.

Arena, M. (2008), Bank failures and bank fundamentals: A comparative analysis of Latin America and East Asia during the nineties using bank-level data. Journal of Banking and Finance, 32(2), 299-310.

Baklouti, N., Gautier, F., Affes, H. (2016), Corporate governance and financial distress of European commercial banks. Journal of Business Studies Quarterly, 7(3), 75-96.

Baur, D.G., McDermott, T.K. (2010), Is gold a safe haven? International evidence. Journal of Banking and Finance, 34(8), 1886-1898.

Beck, T., Demirgüç-Kunt, A., Levine, R. (2006), Bank concentration, competition, and crises: First results. Journal of Banking and Finance, 30(5), 1581-1603.

Bhattacharya, B., Roy, T.N.S. (2009), Forewarning Indicator System for Banking Crisis in India. Available from: http://www.ssrn.com/abstract=1906576.

Boyacioglu, M.A., Kara, Y., Baykan, Ömer K. (2009a), Predicting bank financial failures using neural networks, support vector machines and multivariate statistical methods : A comparative analysis in the sample of savings deposit insurance fund (SDIF) transferred banks in Turkey. Expert System with Applications, 36, 3355-3366.

Budiwati, H. (2011), Analisis rasio keuangan camel terhadap prediksi kepailitan pada bank umum swasta nasional di Indonesia periode 2004 - 2007. Wiga, 2(2), ???.

Caggiano, G., Calice, P., Leonida, L. (2014), Early warning systems and systemic banking crises in low income countries: A multinomial logit approach. Journal of Banking and Finance, 47, 258-269.

Choirina, P.M., Yuyetta, E.N.A. (2015), Analisis faktor-faktor yang mempengaruhi kinerja anggota. Diponegoro Journal of Accounting, 4(2), 1-9.

Choudhry, T., Hassan, S.S.U., Shabi, S. (2015), Relationship Between Gold and Stock Markets During the Global Financial Crisis: Evidence from Nonlinear Causality Tests. International Review of Financial Analysis. Available from: https://www.researchgate.net/public.

Coudert, V., Raymond-Feingold, H. (2011). Gold and financial assets: Are there any safe havens in bear markets? Economics Bulletin, 31(1), 1613-1622.

Davis, E.P., Karim, D. (2008), Comparing early warning systems for banking crises. Journal of Financial Stability, 4(2), 89-120.

Demirgüç-Kunt, A., Detragiache, E. (1997), The determinants of banking crises: Evidence from developing and developed countries. International Monetary Fund Working Paper.

Demirgüç-Kunt, A., Detragiache, E. (2002), Does deposit insurance increase banking system stability? An emperical investigation. Journal of Monetary Economics, 49(7), 1373-1406.

Demirgüç-Kunt, A., Detragiache, E. (2005), Cross-country empirical studies of systemic bank distress : A survey. International Journal of Empirical Finance. Working Paper No. 05/96.

Deviacita, A.W., Achmad, T. (2012), Analisis pengaruh mekanisme corporate governance terhadap financial distress. Diponegoro Journal of Accounting, 1(1), 1-14.

Eichengreen, B., Rose, A.K. (1998), Staying Afloat When the Wind Shifts: External Factors and EMerging-Market Banking Crises. NBER Working Paper No. 63.

Essid, Z., Boujelbene, Y., Plihon, D. (2014), Institutional Quality and Bank Instability: Cross-Countries Evidence in Emerging Countries. MPRA Munich Personal RePEc Archive. Available from: http://www.mpra.ub.uni-muenchen.de/56251.

Farida, Y.N., Prasetyo, Y., Herwiyanti, E. (2010), pengaruh penerapan corporate governance terhadap timbulnya earnings management dalam menilai kinerja Keuangan pada perusahaan perbankan di Indonesia. Jurnal Bisnis Dan Akuntansi, 12(2), 69-80.

Hadi, S.A.F., Andayani. (2014), Mekanisme corporate governance dan kinerja keuangan pada perusahaan yang mengalami financial distress. Jurnal Ilmu Dan Riset Akuntansi, 3(5), 1-17.

Halim, C. (2016), Analysis effect accounting ratio and market effect to predicting bank's bankruptcy with logistic regression model. JOM Fekon, 3(1), 1294-1308.

Hartono, U., Musdholifah, M. (2019), Corporate Governance Quality Assessment Based on Internet: Study of State-owned Enterprises and Regional Owned Enterprises in Indonesia. 1st International Conference on Economics, Business, Entrepreneurship, and Finance 2018. p280-286.

Houston, J.F., Lin, C., Lin, P., Ma, Y. (2010), Creditor rights, information sharing, and bank risk taking. Journal of Financial Economics, 96(3), 485-512.

Kaminsky, G.L., Reinhart, C.M. (1999), The twin crises: The cause of banking and balance-of -payments problems. The American Economic Review, 89(3), 473-500.

Kaminsky, G.L., Reinhart, C.M. (2000), On crises, contagion, and confusion. Journal of International Economics, 51(1), 145-168.

Kibritcioglu, A. (2002), Excessive Risk − Taking, Banking Sector Fragility, and Banking Crises. Working Paper oUniversity of

Illionis No. 02-0114. Available from: http://www.business.uiuc.edu/Working_Papers/papers/02−0114.pdf
Klomp, J. (2010), Causes of banking crises revisited. North American Journal of Economics and Finance, 21(1), 72-87.
Klomp, J., De Haan, J. (2014), Bank regulation, the quality of institutions, and banking risk in emerging and developing countries: An empirical analysis. Emerging Markets Finance and Trade, 50(6), 19-40.
Kowanda, D., Pasaribu, R.B.F., Firdaus, M. (2014), Financial Distress Prediction on Public Listed Banks in Indonesia Stock Exchange. In: The 3rd International Congress on Interdisciplinary Behavior and Social Science 2014. p364-370.
Kristanti, F.T. (2014), Prediksi kebangkrutan bank-bank yang terdaftar di bursa efek Indonesia. Jurnal Keuangan dan Perbankan, 18(1), 130-138.
Krugman, P. (1979), A model of balance-of-payments crises. Journal of Money, Credit and Banking, 11(3), 311-325.
Kurniasari, C., Ghozali, I. (2013), Analisis pengaruh rasio camel dalam memprediksi financial distress perbankan Indonesia. Diponegoro Journal of Accounting, 2(4), 1-10.
Lestano, J.J., Kuper, G.H. (2003), Indicators of Financial Crises Do Work ! An Early-warning System for Six Asian Countries. Available from: https://www.ssrn.com/abstract=480021.
Louzis, D.P., Vouldis, A.T., Metaxas, V.L. (2012), Macroeconomic and bank-specific determinants of non-performing loans in Greece : A comparative study of mortgage, business and consumer loan portfolios. Journal of Banking and Finance, 36(4), 1012-1027.
Maghyereh, A.I., Awartani, B. (2014), Bank distress prediction: Empirical evidence from the Gulf Cooperation Council cCountries. Research in International Business and Finance, 30(1), 126-147.
Männasoo, K., Mayes, D.G. (2009), Explaining bank distress in Eastern European transition economies. Journal of Banking and Finance, 33(2), 244-253.
Mayangsari, L.P., Andayani. (2015), Pengaruh good corporate governance dan kinerja keuangan terhadap financial distress. Jurnal Ilmu dan Riset Akuntansi, 4(4), 1-18.
Mayes, D.G., Stremmel, H. (2014), The Effectiveness of Capital Adequacy Measures in Predicting Bank Distress. SUERF - The European Money and Finance Forum Vienna 2014.
Moyo, J., Nandwa, B., Oduor, J., Simpasa, A. (2014), Financial Sector Reforms, Competition and Banking System Stability in Sub-Saharan Africa Jacob Oduor Financial Sector Reforms, Competition and Banking System Stability in Sub-Sahara Africa. In: RES-SPR Conference on "Macroeconomic Challenges Facing Low-Income Countries. Sub-Sahara Africa: International Monetary Fund.
Mumtazah, W., Septiarini, D.F. (2016), Analisis faktor-faktor yang mempengaruhi jumlah dana pihak ketiga pada bank umum syariah di Indonesia (Periode Triwulan I 2010-Triwulan I 2015). Jurnal Ekonomi Syariah Teori Dan Terapan, 3, 800-815.
Musdholifah. (2015), Using index for predicting banking crisis in Asian countries. International Journal of Empirical Finance, 4(3), 170-183.
Musdholifah, M., Ismail, M., Kaluge, D., Maskie, G. (2013), Predicting banking crisis in six Asian countries. European Journal of Business and Management, 5(28), 176-185.
Nabiyev, J., Musayev, K., Yusifzada, L. (2016), Banking competition and financial stability: Evidence from CIS countries. Central Bank of The Republic of Azerbaijan Working Paper Series No. 04/2016.
Nezky, M. (2013), Pengaruh krisis ekonomi amerika serikat terhadap bursa saham dan perdagangan Indonesia. Buletin Ekonomi Moneter dan Perbankan, 15, 1-16.
Nugroho, V. (2012), Pengaruh CAMEL dalam memprediksi kebangkrutan bank. Jurnal Akuntansi, 16(1), 145-161.
Oktavilia, S. (2008), Deteksi dini krisis perbankan Indonesia : Identifikasi variabel makro dengan model logit. Jejak, 1(1), 1-14.
Poghosyan, T., Čihák, M. (2009), Distress in European banks: An analysis based on a new data set. International Monetary Fund Working Paper.
Prasidha, D.K., Wahyudi, S.T. (2015), Dampak nilai tukar dan risk-based bank rating terhadap prediksi kondisi perbankan Indonesia. QE Journal, 4(3), 122-142.
Prianti, F., Musdholifah, M. (2018), Pengaruh RGEC dan variabel makroekonomi terhadap banking distress dengan menggunakan CD indeks di Indonesia. Jurnal Ilmu Manajemen, 6(3), 342-358.
Raz, A.F., Indra, T.P.K., Artikasih, D.K., Citra, S. (2012), Krisis keuangan global dan pertumbuhan ekonomi: Analisa dari perekonomian Asia timur. Buletin Ekonomi dan Moneter dan Perbankan, 15(2), 37-56.
Schaeck, K., Čihák, M. (2007), Banking Competition and Capital Ratios. IMF Working Paper 07/216.
Shehzad, C.T., De Haan, J. (2009), Financial Liberalization and Banking Crises. Working Paper.
Siregar, R.I., Fauzie, S. (2015), Analisis manfaat rasio keuangan dalam memprediksi financial distress pada perbankan (2007-2012). Jurnal Ekonomi Dan Keuangan, 2(12), 716-726.
Sofiasani, G., Gautama, B.P. (2016), Pengaruh CAMEL terhadap financial distress pada sektor perbankan Indonesia periode 2009-2013. Journal of Business Management and Enterpreneurship Education, 1(1), 136-146.
Tatom, J. (2011), Predicting Failure in the Commercial Banking Industry. Munich Personal RePEc Archive. Available from: hppts://www.mpra.ub.uni-muenchen.de/34608.
Tuysuz, S. (2013), Conditional correlations between stock index, investment grade yield, high yield and commodities (gold and oil) during stable and crisis periods. International Journal of Economics and Finance, 5(9), 28-44.
Wong, J., Wong, T.C., Leung, P. (2010), Predicting banking distress in the EMEAP economies. Journal of Financial Stability, 6(3), 169-179.
Wulandari, Y., Musdholifah, M., Kusairi, S. (2017), The impact of macroeconomic and internal factors on banking distress. International Journal of Economics and Financial Issues, 7(3), 429-436.
Zhuang, J., Dowling, J.M. (2002), Causes of the 1997 Asian financial crisis: What can an early warning system model tell us? ERD Working Paper Series, 26(26), 1-21.