ERASMUS UNIVERSITY ROTTERDAM
ERASMUS SCHOOL OF ECONOMICS
Master Thesis Financial Economics

THE EFFECT OF 2008 FINANCIAL CRISIS TO BANK LENDING IN INDONESIA

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ABSTRACT

This thesis tries to see the effect of bank lending during 2008 crisis in the case of Indonesia. The variables used for this thesis are variables that represents bank characteristics and external conditions of Indonesian market as the independent variables with the lending and NPL as the dependent variable. This thesis used the time frame from 2006 to 2010. Based on the model, this thesis finds that crisis has a negative effect on bank lending. Bank characteristics are significant in affecting bank lending. When the separation of public banks and private banks added, the result shows that deposits to total ratio, return on assets, and also non-performing loans can affect the crisis for the lending of private banks. For the public banks, the only variable that can affect the lending is the deposits to total assets ratio. This shows that bank characteristics can affect bank lending during crisis while external conditions may affect certain variables. For the case of external conditions, this thesis also finds that integration of the market has a significant relationship with the bank lending. But when this thesis uses the NPL model, this thesis finds that both variables that represent external conditions such as integration and interest rate is significant in affecting NPL.

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1. INTRODUCTION

This thesis tries to see the effect of the 2008 financial crisis on bank lending in Indonesia. It also asks about what factors can affect bank lending during the crisis in Indonesia. To see the effect of the crisis and the factors that can affect bank lending, I will use regression that consists of total loans as dependent variables and the variables that represent the internal condition of the banks and also external conditions in Indonesia as independent variables. The variables that represent the internal condition of the banks are bank characteristics such as equity to total assets ratio, deposit to total assets ratio, return on assets, and non-performing loans. The variables that represent the external conditions are the net foreign asset to gross domestic product ratio to represent integration with the global market and also interest rate to represents the monetary policy made by the government. These variables then interacted with the crisis time to see the effects of each variable during the crisis can affect bank lending. This thesis considered crisis is happened during 2008 until the second quarter of 2009.

This thesis also adds other regressions by adding a dummy variable and change the dependent variable. One regression is a regression model with lending as the dependent variable and the addition of the dummy that represents the private ownership of the banks (banks with the ownership other than state-owned banks). The reason for this separation is to see whether there are any differences in bank lending done by private banks during crisis and public banks (state-owned banks). The other model is the model with the NPL as the dependent variable.

The first model, which is the general model with lending as dependent variable and no separation between ownerships of the bank, shows that 2008 financial crisis affect negatively and significantly to bank lending. But on that general model, there is no significant bank characteristics and external conditions related variables. It means that even though the crisis is significant in affecting bank lending, but in general there are no one-fits-all variables that always have a significant correlation with bank lending.

The result of this thesis is the 2008 financial crisis harms bank lending and some variables are significant in affecting bank lending. But bank characteristics only significant in affecting bank lending by different effect related to the ownership of the banks. The bank characteristics variables that are significant in affecting bank lending during the crisis are deposits to total asset ratio, equity to total assets, and non-performing loans.

Each interaction terms bring a different effect to the same coefficient during regular time. The crisis impacts the negative and the positive effect of each variable by dampening the effects.

This means that the lagged value and non-lagged value have the different coefficient even though both are significant.

The variable deposits to asset ratio have a positive value during non-crisis time but the interaction between this variable with the crisis has a negative value, which means that the crisis dampened the positive impact of deposits owned by the banks. But the deposits to total asset ratio in the previous period give a negative effect but then the impact is reduced during the crisis since the interaction term between crisis and the deposits to total asset ratio in the previous period is positive.

The variables of external conditions only significant when the dependent variable is non-performing loan. With both variables are significant even though they have different coefficient, it means that the way external conditions of the market can affect bank lending through affecting the value of non-performing loans which is related to the repayment of the loan.

This thesis finds that some variables are significant in affecting lending more of private banks during crisis but not for public banks such as return on asset (ROA), non-performing loans (NPL), and the lagged value of deposits to total assets. This is based on the coefficient of the interaction term between crisis variable, private banks dummy, and also the variable. ROA has positive and significant value while NPL and deposits to total assets has a negative and significant value.

This thesis aims to understand how a financial crisis can affect bank lending. The other aim is to know the factors significant for affecting bank lending. This thesis can contribute to the literature about the effect of the financial crisis on bank lending by giving some perspectives on what happened to the developing countries when there is a crisis. This thesis also put some non-bank externals variables such as market integration and also monetary policy to enhance the findings of what happened to bank lending during the crisis. It is because in the crisis period, what the government and central bank have done as the way to mitigate the crisis and handling it is also important in affecting the situation during the crisis, in this case, it is bank lending. Especially with the consideration that sometimes developing countries do not have the same developed market as developed countries. With considerations of many variables, this thesis can be used to become an additional source of knowledge and considerations to policymaking, especially in mitigating the damage of the crisis in terms of making bank lending more stable. It could be used by Indonesian government or other developing countries to prepare if there another occasion of crisis that can affect economic condition, especially in terms of the stability of bank lending.

2. LITERATURE REVIEW

The general consensus about the effect of financial crisis to bank lending is that crisis give a negative effect to bank lending, albeit using different variables. From the research about 2008 financial crisis in USA, Ivashina (2009) concluded that 2008 crisis makes the new loan decreased. This means that during crisis, there will be less lending done by the bank. Different from Ivashina (2009) who uses new loans, Kwan (2012) uses loan spread to determine how a crisis would affect lending. Kwan (2012) finds that loan spread is higher during crisis, with a lower tightening in the small loan. The negative effect of the crisis to bank lending is not only affecting lending inside the country itself, but also the cross-border bank lending as mentioned by some other earlier researches.

Takats (2010) reports the similar effect in the cross border lending, which is also reported in other literatures about the effect of a crisis to cross-border lending. The other aspect of cross border lending affected is the rise of home bias for lending, which means that the effect to bank lending is there in terms of the direction of how banks will do their lending activities. Giannetti and Laeven (2012) found that when the bank affected by crisis, there will be more shift of lending done by the bank to domestic borrowers compared to foreign borrowers. The banks with the less stable funding source will have higher shift to domestic lenders or higher flight home effect. Albertazzi and Bottero (2014) and Brei and Schclarek (2013) gives the same conclusion based on the ownership of the bank. Using the data of foreign banks and domestic banks, Albertazzi and Bottero (2014) found that foreign banks give less loan compared to domestic banks during crisis. De Haas and Van Horen (2013) also talked about cross-border lending. With their finding is complementing what Giannetti and Laeven (2012) find, De Haas and Van Horen (2013) finds that banks lend more to the countries that they are near to. So based on these researches whether it is about cross-border lending or lending inside the country, the general effect of crisis is that the condition of crisis will affect negatively to bank lending.

While many researches focus on how crisis affect bank lending in terms of supply, Cole and Damm (2020) focus on the loan demand. The research of loan demand by Cole and Damm (2020) found that during crisis, the demand of loan from small business in United States of America is declined. This is expanded more with their result which stated that the demand of small business reduced higher than the overall business in USA. So it means that during crisis, not only supply that is affected, but demand for credit is also affected. But it seems that the literatures are mainly talked about the effect to supply, not the demand.

2.1 EFFECTS OF BANK CHARACTERISTICS TO LENDING IN FINANCIAL CRISIS

Generally speaking, there is an importance of supply-side effect in bank lending. This means that characteristics that affect the supply of loans can in turn affect the provision of bank lending. Some researches refer to capital as the loan supply. Fang et al. (2020) find that this effect of capital is stronger when the economic growth is lower. It seems that in crisis, there is also an importance of the supply side effect. Several papers agree that the supply side of loans are important in affecting bank lending during crisis. Takats (2010) explained that the supply factors are more impact in affecting bank lending during the crisis compared to the demand factors. Leony and Romeu (2011) with the research of Korean banks found that funding is not constraining bank lending. Berger and Bouwman (2013) found that capital increase survival rate and market share of small banks, where these banks engaged more on relationship lending. Relationship borrowers will gravitate more to banks with high capital because higher capital increase the survival rate for small banks. But for medium and large banks, capital helps to improve the market share during banking crises, but not significantly affect during market crises and normal times. Puri, Rocholl, and Steffen (2011) also points out the supply-side effect of the crisis which makes bank reject more loan application compared to the non-affected banks. Cornett also puts emphasis that banks with dependence on core deposit and equity financing lend more compared to other banks. The reduction of the bank lending during crisis according to Cornett is because of the exposure to liquidity risk. This is also the same result from Kapan and Minoiu (2018). Banks with more strength ex-ante in their balance sheet, especially in the part of common equity, is better on maintain the credit supply (Kapan and Minoiu (2018)). Government-owned banks may have tolerated the risk better compared to private-owned banks as they have easier access to new capital funding in the form of equity using government funds or debt issuance (Brei and Schclarek (2013)).

There are mixed conclusions about whether bank characteristics can affect bank lending during crisis or not: Some researchers agree that bank lending can be affected by bank characteristics and some do not agree with that statement. Profitability is the characteristics that can affect bank lending, as Cole and Damm (2020) and Allen et al stated. Using the ratio of net income to assets (Return on Asset/ROA) as the measure of profitability, Cole and Damm (2020) researched the profitability with the demand side of lending, which in their case is in small business lending. Cole and Damm (2020) found that profitability has a significant negative relationship with lending by small businesses. Cole and Damm (2020) put the explanation of

deposit insurance as the reason while Allen, Jackowicz, and Kowalewski (2013) put profitability and relate it with the credit growth of the bank during normal times and crisis periods. Using the same type of variable with Cole and Damm (2020) which is Return on Asset/ROA, Allen, Jackowicz, and Kowalewski (2013) find that profitability positively and significantly correlated with the growth of bank loans. Cull and Martinez Peria (2013) also finds that characteristics of the parent bank affect bank lending on their subsidiaries in Eastern Europe. Using many types of characteristic such as size, capital, liquidity, funding structure, and profitability, Cull and Martinez Peria (2013) finds that in Eastern Europe, the characteristics of parent bank drive the foreign bank lending. But different conclusion about profitability is earned by Kwan (2012). Kwan (2012) found that bank profitability, using Return on Asset/ROA as the variable represents profitability, is insignificant in affecting bank lending.

Deposits also a characteristic that influence bank lending. The aspects of deposits that mainly talked to reach the conclusion are how much deposits had, the growth of deposit, and also the access for deposit. Choi et al mainly stated this effect in terms of how bank depends much on deposits and its effect to the reduction of the bank lending during crisis, which means that banks that depends more on deposit will have less reduction on bank lending during crisis. Allen et al found that deposit growth affected credit growth during normal economic times and crisis period, whatever the type of the crisis (market, banking, etc.). With the Choi, Gutierrez, and Martinez Peria (2016) using the data of foreign bank and Allen et al and also Brei (2013) using government and private banks beside foreign bank, it means that this effect of deposits is general. Even regulation wise, tighter capital requirements is recommended during the crisis, especially when the quality of regulators is poor. The importance of capital requirement gives another layer to how important the capital is to affect bank lending.

Comparing between deposits base which represents bank supply and revolving credit line as the representative for demand for lending, Kwan found that bank with stronger deposit base will cut lending less than banks with weak deposit base. Kwan using types of variables of bank lending to see whether deposits affecting bank lending such as total number of loans and the total amount of loan where banks is the lead bank. The coefficient is positive, which means that the deposit has positive relationship with the loan. But Kwan (2012) also mentioned other researches such as Kashyap et al (2002) which explained that banks that has more deposit financing also extend the credit line. Cull and Martinez Peria (2013) also talked about deposit with the relation of funding structure. With deposit to total liabilities as the representative of funding structure, Cull and Martinez Peria (2013) finds that deposits bring negative effect to

lending growth. Based on the earlier researches, it is possible that using the deposits as a share of total liabilities like Cull and Martinez Peria (2013) did and as a share of total assets like what Kwan did bring different results.

In addition, it is possible that these results also affected by the level of loan growth. Tran also finds that banks with more reliance in stable funding such as deposit turns out will reduce their bank lending. With the usage of deposits to total asset in the previous period, Tran finds that the effect of deposits to bank lending is not uniform. With the bank with lower loan growth, the deposits have a positive effect to bank lending before getting lower as the increase of quantile.

It is possible to get different results regarding the significance of bank characteristics. On the research about Italian banks, Bofondi (2013) found that bank characteristics is insignificant in affecting bank lending during crisis. The characteristics used are Tier 1 capital, ratio of wholesale funding to total asset, ratio of sovereign securities from European troubled countries (GIIPS) to total assets. But Bofondi (2013) et al guessed that this result must come from a specific effect in Italy that is experienced by Italian banks compared to foreign banks in Italy which is that even though there is the same capital position and the same capital structure to foreign banks, they will still tighten their credit.

One of the aspects of the Bank that affect bank lending supply is the amount of the capital. This is what Gambacorta and Mistrulli (2003) and Košak et al. (2015) et al explained on their research. Gambacorta and Mistrulli (2003) explained that a well-capitalized bank can protect their lending from shocks in monetary policy because they have more access to the uninsured funding. And Košak et al. (2015) has the conclusion of lending growth faster for the bank with the higher capital. But Košak et al. (2015) and Gambacorta and Mistrulli (2003) puts different definition of capital. While Košak et al. (2015) use and separate Tier 1 capital and Tier 2 capital to see whether they have effect to bank lending, Gambacorta and Mistrulli (2003) defines capital as the capital above the minimum required to meet the standards. It means that the capital in general will affect loan supply, especially in protecting banks against distress period and shocks. Košak et al. (2015) also emphasize the quality of capital on the research, using Tier 1 capital as the indicator. While Gambacorta does not do that because the research of Gambacorta is about the amount of capital. Košak et al. (2015) also separates the capital to Tier 1 capital and Tier 2 capital while Gambacorta does not separates the types of capital. Košak et al. (2015) also use the ownership while Gambacorta does not use ownership variables. The different result from Košak et al. (2015) is earned by Bofondi et. al. (2013). Bofondi et.al. (2013) found that bank characteristics, with one of the bank characteristics mentioned is the

Tier 1 capital, are insignificant in affecting by lending in the case of Italian banks. In the case of Italy, it means that the credit growth does not driven by bank characteristics. But looking also to Gambacorta and Mistrulli (2003) which also use the Italian banks, both results seems to be contradict each other.

But some research gives another perspective with the importance not just on the supply, but also on the credit demand. This opinion stated by Blaes (2011) in his research about German banks. Blaes (2011) stated that the effect of supply only showed relatively small until 2009 but then increasing afterwards. Blaes (2011) also detected some lags in the dampening of the impact of bank supply factor. So it could be said that demand could be important. Cole and Damm (2020) also record the phenomenon of credit demand on their research. But then Cole and Damm (2020) also puts the policy implication of the adequate capital affecting bank lending, hence there should be higher capital requirements. So it means that even though the crisis also affects the credit demand, but there is more priority to improve the supply of credit.

The other source of funding for the banks are also wholesale funding, which is funding that is not come from core deposit. One of the source of wholesale funding is Equity to Total Asset. Foos, Norden, and Weber (2010), as quoted by Cucinelli (2015), explained that equity to total asset ratio can be used to measure total solvency. Foos, Norden, and Weber (2010) also refers equity to total assets ratio as the indicator of bank's ability to cover any unexpected losses. The other aspect of the bank that can affect bank lending is the capital that the banks have. Kapan and Minoiu (2018) puts importance on the equity held by the bank. It is said that if the banks held more common equity, it will be better in maintaining their credit supply when they faced by liquidity shock during crisis because tangible common equity, which Kapan and Minoiu (2018) and Minoiu used on their research, has the high potential in loss-absorbing so bank can reduce their loan less. Cull and Martinez Peria (2013) also finds that equity to total asset ratio is significant in affecting the grow of the loan portfolio of the banks. They will be able to lend money as they have a better solvency.

Credit risk is also important in determine bank lending behavior and it can be measured by some variables like non-performing loans and credit ratings. Using credit risk ratings, Kwan (2012) finds that credit risk is significant in affecting positively to loan rate made by the bank. Regarding the situation during crisis, the finding by Cucinelli (2015) stated that the non-performing loans in previous years may affect bank lending negatively.

Other researches focused on the effect of non-performing loans in general, without considering whether it is the time of crisis or not. Using the data of Balkanic countries, Alihodžić and Ekşi (2018) using the growth rate of NPL as the measure of credit quality to conclude that NPL

affect negatively to lending. So it means that the more non-performing loans that bank have, it will reduce bank lending. And Tracey (2011), using data from Jamaica and Trinidad and Tobago also finds that higher level of non-performing loans make the banks will make the banks more risk averse when giving loan. Different from other papers, Tracey (2011) use quadratic term of the non-performing loans as the variable to determine the threshold range of the impact of NPL. When the interest rate is above the maximum threshold, the growth in loan declines. But the country with no experience of financial crisis will use higher maximum threshold. So it means that the NPL will affect the provision of bank lending since it will make banks become more risk averse but the effect will be depended on the experience of a country regarding crisis.

The relationship between loan and NPL also works in reverse. Foos, Norden, and Weber (2010) finds that loan growth have negative effect to equity to total assets ratio. This indicates the reduction of bank's solvency. Foos, Norden, and Weber (2010) hypothesizes that it is expected that equity to total assets have negative relationship because banks with rapid loan growth may not be able to increase their capital proportionally.

2.2 EFFECT OF THE EXTERNAL FACTORS TO BANK LENDING IN FINANCIAL CRISIS

There is an external factor or factor that are not related to the bank that can affect bank lending. While sometimes it is not directly told about crisis, but in general there is monetary policy that affect bank lending through supply capital. Bank lending channel of monetary policy is that monetary policy can affect bank lending by affecting the supply of loanable funds which then have a consequence to the loan made by the bank (Bernanke and Gertler 1995))). The argument of bank lending channel of monetary policy has been proven to be there in many countries such as Farinha and Robalo Marques (2003) who researched banks in Portugal and Goeltom (2008), who see this phenomenon in Indonesia. In Indonesian, the bank lending channel of monetary policy has been observed by Goeltom (2008) which told that there is a decrease in loan supply in Indonesia. In the pre-crisis period, bank lending in Indonesia is not affected by the monetary policy, but during the crisis period and after crisis period there is a higher sensitivity that experienced by bank lending from tighter monetary policy. This is mainly caused by tight money that bank experienced makes bank's unwillingness to lend worsen given their weakening balance sheet and amidst low economic prospect. This condition make the bank's financial position worsen and increase the probability for default. The monetary policy also

considered as important in affecting bank lending (Abuka et al. (2019), Altunbas, de Bondt, and Marques-Ibanez (2004)). Abuka et al. (2019) puts importance of monetary policy in affecting bank lending, especially in developing countries. The result from Abuka et al. (2019) is that monetary policy decrease loan granting. The increase of interest rate by one standard deviation will reduce the likelihood of loan granting by 1.2 to 2.8 percentage points. During crisis period, monetary policy may affect how bank respond to the crisis. Altunbas, de Bondt, and Marques-Ibanez (2004) explained that lending behavior of least capitalized banks is more responsive to the change in monetary policy compared to the well capitalized banks. The factor that affecting respond of the bank for the change of monetary policy is the loan level. Monetary policy gives negative/positive effect for bank lending. For the case of Indonesian banks, Hamada (2017) explained that well-capitalized banks can increase their loan supply as long as they do not respond to the monetary policy.

Compared to Abuka et al. (2019) and Altunbas, de Bondt, and Marques-Ibanez (2004) which using the variables that related to the amount of loan, Kwan (2012) used the Fed fund rate to see whether monetary policy can affect lending. Kwan (2012) used the relationship between time effect and the Fed fund rate to see that monetary policy is fully transmitted to Fed fund rate. Altunbas, de Bondt, and Marques-Ibanez (2004) also only use GDP as the control variable while Abuka et al. (2019) use many macroeconomic variables such as interest rate, GDP, exchange rate, and fiscals. Heryán and Tzeremes (2017) also finds that monetary policy can affect bank loans. Using the data from old and new EMU countries, it is found that lending channel are affected by the changes of the short term interest rate and the monetary aggregate M2.

Elekdag and Han (2015) finds that domestic monetary policy is important in driving credit growth in Asia. Elekdag and Han (2015) explains three ways monetary policy may affect lending: (1) higher interest rate suppress consumption, which in turns reduce demand for credit;(2) appreciation of the exchange rate restraining economic demand, which in turns affect the demand for credit; and (3) higher interest rate reduce asset price which can decrease the collateral value and affect the equity of financial intermediaries. What Elekdag and Han (2015) finds is different from the other papers since they mainly focus on the exogenous shocks to monetary policy, not the endogenous response of monetary policy.

While integration may not affect directly to bank lending, but the effect of integration to crisis can affect factors that affect bank lending. In the research of the impact of crisis to cross border banking in Central and Eastern Europe, Allen et al. (2011) found that there is a huge reduction in a cross border bank lending if there is a crisis. And also, there is another connection between

integration and bank lending, but this is an indirect connection. The connection between the bank lending and integration is in the effect of integration to the capital. Takats (2010) explained that with cross border bank lending, the effect of supply factor may affect more of bank lending compared to demand factors. With foreign capital is more mobile than domestic capital, this means that the capital outflows can affect the supply of capital.

The other factors of how integration can affect bank lending is to make the capital outflow. But it is more into the risk that comes with the integration. Grabel (2003) explained about fragility and flight risk. Fragility risk is that when vulnerability of borrowers to shocks that can jeopardize the ability to meet the payment obligation. And flight risk is happened when holders of an asset seek to sell their holdings which then reduce the value of their assets and increasing economy's risk. The flight risk can affect the capital. The fragility risk can affect bank lending if there is no mechanism from the government that coordinate the volume, allocation, and/or the prudence of lending and investing decision.

The literature about integration is mainly talked about how this will affect the cross border bank lending. De Haas and Van Horen (2013) suggested that with their findings that bank continue to lend more to the countries that are geographically close, where they are integrated in a network of domestic co-lenders, deeper financial integration is associated with more stable cross-border lending during crisis.

On the other hand, Pham (2015) finds that integration directly affect bank lending, it is also explained that integration can make a country exposed to shocks. This exposure to shocks can reduce lending supply. Pham (2015) found that integration has a negative effect to bank lending, which means that higher integration means lower credit supply.

Based on what we had found on the literature about integration, it seems that there is a huge gap in terms of the how integration affect bank lending during crisis. The literature above mainly talked from indirect effect (Grable (2003)), using general case and not specific crisis period (Pham (2015)) or cross border lending even though it is in crisis (Takats (2010)). But the gap is on the research about how integration directly affect crisis and what is the effect of integration to the bank lending within a country during crisis, not just to cross-border lending as what Takats (2010) found.

2.3 HYPOTHESIS

This thesis focused on see the effect of financial crisis to bank lending in Indonesia and also what factors that may affect bank lending during crisis in Indonesia. To answer these research

question, I put three hypotheses in this research. One hypothesis is about the effect of financial crisis to bank lending since and the other is about the significance of the variables since it could become consideration in case the crisis is happened again and government need to pay attention to these variables.

The first hypothesis of this research is:

H_0: *Crisis has no effect to bank lending in Indonesia*

H_a: *Crisis has effect to bank lending in Indonesia*

With 2008 financial crisis affect markets in developed countries, we want to see whether it also has some effect Indonesia. The reason is that Indonesia market is not as developed as the markets in USA and Europe, which is the place where the crisis primarily happened. If there is some effect to bank lending in Indonesia, this means that the effect of crisis that happened in developed markets also can spread to developing country.

The second hypothesis of this research is:

H_0: *The variables that represents bank characteristics are not significant*

H_a: *The variables that represents bank characteristics are significant*

And the third hypothesis of this research is:

H_0: *The variables that represents external conditions are not significant*

H_a: *The variables that represents external conditions are significant*

There are two types of variables represented in this thesis. This thesis has the variables that represents bank characteristics such as deposits to total asset, equity to total assets, return on assets, and non-performing loans. This thesis also has the variables that represents external conditions of the country such as monetary policy and integration. We want to see whether each of this variables are significant in affecting bank lending. Knowing which variables that are significant in affecting bank lending could help government to see which variables need to be considered to be paid attention into and to mitigate the damage of the crisis. The hypothesis can be observed by seeing the coefficient for each variable to see whether each variable has an effect or not.

3. DATA

This section will explain about the data used for this thesis. The data for this thesis are obtained by Bank Indonesia which is the central bank of Indonesia and the Financial Service Authority. For the bank related variables, the data is obtained from the *Otoritas Jasa Keuangan* (Indonesia Financial Service Authority). *Otoritas Jasa Keuangan* is a regulatory body made to supervise and make regulations for financial market. I obtained data of third party fund, total equity, non-performing loans, and return on assets.

Rather than using the percentage change of total numbers of loan as Ivashina (2009) done or Kwan (2010) which use the interest rate for the loan, we use growth rate of logged value of total lending such as what Heryán and Tzeremes (2017) and Košak et al. (2015) uses on their research. Using an interest rate of loans may be effective due to the general correlation with the bank loan, but the problem in using an interest rate of loans is that there might be a chance that there will be a negative correlation in one case and positive correlation in another case between the interest rate of loans and amount of loans. And using the interest rate will cause another problem because we cannot see how much the loan grew from a quarter to the next quarter.

The interest rate data are taken from the monthly data of interest rate as stated by Bank Indonesia (BI)/ Indonesia Central Bank. The interest rate that is used in this research is BI rate, which is the base rate used by Bank Indonesia to shape their monetary policy. Abuka (2019) also use the similar variable of the monetary policy measure which is the 7-day interbank rate. But since Indonesia just use the 7-day rate (7-day repo rate) from 2016, which is beyond the timeframe used in this thesis, I used the BI Rate which is still used during the timeframe of this thesis.

This thesis also uses the NFA data and GDP data from Bank Indonesia. These data are collected to form the variable of *nfagdp* as the measure of integration, which is NFA itself is considered as the measure of integration by Bank Indonesia. Pham (2015) considered integration as a factor that affect bank lending. But the variable used by Pham to consider the integration is capital account openness. The variable of *nfagdp* is used instead of capital account openness since it is considered as the change in current account, which represents how much money in and out of the country. The more integrated the country, the more the share of NFA to GDP.

This thesis uses two types of source of funding which are deposits to total assets and the equity to total assets. Deposits represents the stable source of capital (Ivashina 2009). This

thesis uses the variable deposits to total assets, not deposit to total liabilities such as Cull and Martinez Peria (2013). The reason for this is because this thesis uses deposits to represents one of the sources for capital, which in turns meaning that this is related to bank-related supply factors that can affect the loan provision. But in this case, we use third party funding data which has demand deposits, time deposits, and saving deposits as its component. The assumption is that the more third party fund implies more deposits which means more funding for the bank.

The second type of source of funding is equity to total assets. This represents the wholesale funding which is the funding from the source other than deposits. The other reason why I use equity to total asset ratio is that beside can be considered as the source of capital, equity to total assets ratio can also represents total solvency (Cucinelli (2015)) and also the ability to cover unexpected losses (Foos, Norden, and Weber (2010)).

This thesis also uses the return on assets (ROA) as other variable that represents bank characteristics. This variable represents the profitability of the bank (Cole and Damm (2020); (Kwan (2010)). ROA may affect the growth of the loan positively. Kwan (2010) using this variable as one of independent variable and expected it to be positively affect the lending since profitability could means more supply for funding, even though in the end it did not has any significance. Cole and Damm (2020) also stated the same effect, albeit for the demand for lending and it is significant. This thesis tries to see whether the effect of ROA is significant enough to affect bank lending in Indonesia during crisis.

One of the risk that comes with the crisis is credit risk. There are some researches that using credit risk as the variables that may affect bank lending. Some of measures used are credit risk rating (Kwan 2010) and NPL (Cucinelli 2015). To measure credit risk, this thesis uses non-performing loans (NPL) as the measure of credit risk. This is in accordance to what Cucinelli (2015) use as the measure of credit risk.

We use the quarterly data of banks in Indonesia from the beginning of 2006 to the end of 2010. The reason for the use of this timeframe is to make sure there is a comparison between the time when a crisis is happened and the time when there is no crisis happened (2006, 2007, 2010).

Variables	Description	Source
Credit	The growth rate of logged value of total lending	*Otoritas Jasa Keuangan*
Deposits to Total Assets	The ratio of the third party fund which includes deposits to total assets	*Otoritas Jasa Keuangan*
Interest Rate	BI Rate	Bank Indonesia
Equity to Total Assets	The total equity of a bank divided by the total asset of the bank	*Otoritas Jasa Keuangan*
Net Foreign Assets to Total GDP	The ratio of net foreign assets by the total GDP of Indonesia	Bank Indonesia
Non-Performing Loans	The total of non-performing loans (NPL) of the bank	*Otoritas Jasa Keuangan*
Return on Assets	The indicator of the profitability of the banks related to the total assets	*Otoritas Jasa Keuangan*
Crisis dummy	Dummy equals to 1 if the time is during crisis (2008 until the 2nd quarter of 2009) and 0 if otherwise	*Bank Indonesia (2010)*
Private banks dummy	Dummy equals to 1 if the bank is not a state-owned banks and 0 if otherwise.	*Otoritas Jasa Keuangan*
Total Assets	The logged value of the total asset of the bank.	*Otoritas Jasa Keuangan*

Table 1: Overview and Description of Each Variables.

The dataset from Indonesia Financial Service Authority has 111 banks in total. But there are some companies that do not have complete data since they are merged with other banks or already closed throughout the period I use in this thesis. So after dropping some banks with incomplete data, we have 79 banks on this dataset. These banks are the banks with completed data which means that they have the completed data for each variables from the first quarter of

2006 until the fourth quarter of 2010 and still active until the periods ends which means that they are not merged with another banks.

The crisis dummy for this thesis is from the beginning of 2008 until the second quarter of 2009. The reason for the consideration of the crisis time is from 2008 until the second quarter of 2009 is because 2008 is the year when Indonesia gets affected by the crisis and the second quarter of 2009 is the quarter when according to Bank Indonesia (2010), the second quarter of 2009 is when Indonesia starts to recover from the crisis. When the economy started to recover, the effect of crisis is not as big when it is at peak.

Variable	Mean	Std Deviation	Min	Max
Credit Growth	.4370241	1.041695	-7.332281	23.15516
Return on Assets	.8409712	.7987344	-4.60517	2.356126
Interest Rate	2.109451	.2116826	1.871802	2.545531
Equity to Total Assets	9.384778	17.97418	.0038468	444.338
Crisis dummy	.2	.4001283	0	1
Net Financial Assets to Total GDP	.4399829	.0386104	.3664776	.5099425
Non-Performing Loans	2.317488	2.068556	0	14.58439
Deposits to Total Assets	.8057424	.1617067	.2022628	2.537269
Private banks dummy	.6202532	.4854774	0	1
Total Assets	2.09e+07	5.32e+07	68213.67	3.84e+08

Table 2: Summary Statistics

4. METHODOLOGY

This thesis tries to answer the question whether financial crisis may affect bank lending in Indonesia and to see the factors that are significant in affecting bank lending in Indonesia during 2008 financial crisis. To answer both questions, I will do regressions with the dataset of Indonesian banks and using the factors from bank characteristics and external condition of Indonesian economy.

There are some researches that use bank characteristics as the consideration. Kwan use bank characteristics to see how and why bank tightens its credit. But the different thing that this thesis does compared to what Kwan has done is that Kwan uses the bank characteristics to be regressed against the loan rate while this thesis uses bank characteristics to be regressed against the total lending of each banks. Cull and Martinez Peria (2013) also use the bank characteristics to see whether there is a drive of growth in bank lending.

This thesis use panel data regression using data on Indonesian banks. The panel data is used since there are many banks observed and the observation consists of many years. The panel data regression method has been used in the researches regarding bank lending during crisis or the factors that affect bank lending during crisis (Kwan 2019, Košak et al. 2015, Heryán and Tzeremes 2017). There are some benefits in using panel data regression as Hsiao (2005), quoted by Baltagi (2005), explained: the control of individual heterogeneity; more variety, more degree of freedom, less collinearity in the data; better to study dynamic of adjustment; better in able to identify and measure effects that are not detectable in pure cross-section or time series; allow to construct more complex behavioral model; and reduced bias from the aggregation over individuals.

Panel data regression requires the model is chosen between fixed and random effect. In Fixed Effect, the unobservable individual specific effect is assumed to be fixed and the other disturbance is identically and independently distributed. Fixed effect controls for unobserved heterogeneity in the banks (Cucinelli (2015)). It also has the advantages as Fixed Effects allow the specific individual or time-specific events to be correlated with explanatory variable (Hsiao 2007).

On the other hand, Random effect can avoid the loss of degree of freedoms and too many parameters (Baltagi 2005)). It also has other advantages such as the numbers of parameters can be constant even though the sample size is increased, allows the derivation of estimators that use both within and between variations, and allows the estimation of time-invariant variable (Hsiao 2007).

The regression also added the lagged values of bank characteristics. This is the expansion and adaptation from the result from Blaes (2011) about the dampening impact that occurs in the proceeding periods for the bank related supply factors. With the relation , so this thesis add variables that could represents balance sheet and access to financing such as return on assets, deposits to total assets, and equity to total assets ratio. This thesis tries to see whether this also might happen for the variables that are not supply factors such as non-performing loans.

We also use log of total assets to be the control variable. The usage of total assets as control variable is similar to what Cull (2013) has done to the research. This variable controls for the bank size, which means that in this thesis, I assume that the size of the banks is constant and unchanged during the research timeframe.

Adding lagged value can reduce endogeneity bias but there might be some consideration that I use both lagged and non-lagged value. Cucinelli (2015) only use the lagged value without the non-lagged value to reduce this bias. But with the findings of Blaes (2011) about the time lags that can limit the impact of bank-related supply factors such as balance sheet constraint which consists of capital position and ability to access market financing or liquidity situation, this thesis tries to see whether each variable either lagged or non-lagged value will bring different impact to bank lending during crisis.

The result also can be affected since there are some dropped companies from the dataset. The data consists of 79 banks after some companies are dropped due to the incomplete years and the companies itself already defunct during the timeframe. This may affect how the result goes.

4.1 MODEL

To examine the impact of crisis to bank lending. this thesis will use this regression model:

$$\Delta \ln(credit) = \alpha + \beta_1 X_{it} + \beta_2 X_{i,t-1} + \beta_2 X * Crisis + \beta_3 X_{i,t-1} * Crisis + \beta_4 Y_{it} + \beta_5 Y_{it} * Crisis + \in \quad (1)$$

The dependent variable in this model is the growth rate of logged value of credit. The independent variables are in the form of vectors, with X is a vector of bank characteristics of each banks and Y is a vector of external conditions. The bank characteristics featured in this vector are:

1. *roa*, which is the return on asset of a bank on each quarter. This variable represents the profitability of the bank.
2. *depoasset,* which is the ratio of the third party funds such as demand deposits, time deposits, and saving depositis to the total asset of a bank. This variable represents the deposits. This thesis uses this variable since deposits is a stable source of capital.
3. *eqta,* which is the ratio of the equity to the total asset of a bank. This variable represents the alternative source of funding or capital for the bank.
4. *npl,* which is the total non-performing loans for each bank. This variable represents the credit risk for each bank.

And for the external condition of Indonesia, this thesis featured:

1. *intrate*, which is the variable of interest rate to represents monetary policy. The rate used for this is BI Rate, which is the base rate used by Bank Indonesia as the central bank to shape the monetary policy. This is similar to what Abuka (2019) used as the measure of monetary policy.
2. *nfagdp*, which represents how integrated the Indonesian economy and market with the global economy and market. This variable is the net financial asset (NFA) per quarter divided by GDP in each quarter.

I also include the interaction term between the crisis and each variable in both vectors to see whether the impact of each variables is become larger or smaller during crisis compared to non-crisis time. The smaller or larger impact for each variable can be seen from the total sum of the coefficient between the variables during regular time and the variables during the time of crisis.

But for deposits to total assets ratio, we only have the data on third party fund and total assets. So to get the variable of deposits to total assets ratio, I divided the third party funds by total assets. Which is also the similar thing I do to total equity since this model needs the total equity to total assets ratio. In the case of equity to total assets ratio, I divided total equity to the total assets of each banks.

With the type of the dataset is panel data, it should be taken into consideration about which type of effect that this model will be regressed into between Fixed Effect and Random Effect. This can be decided by looking at the characteristics of the dataset. This dataset consists of banks with variety of characteristics, whether it is ownership, capital, and size. With these varieties, there must be a chance that the lending provision become different for each banks. This could happen especially during the crisis. So based on the characteristics of the banks, we will use the Fixed Effects model.

To strengthen my argument about what kind of model should be used, I also conduct some tests to see whether fixed effect or random effect will be used. Usually it is done by doing Hausman test. The main rationale for Hausman test is the fixed effect (FE) is the entity and the error term of the constant is not correlated with each other (Torres-Reyna 2014). But for this case, it is not possible to do the Hausman test in this case due to the failure of the model to meet the assumptions of the Hausman test.

chi2(7) =	73.69
Prob > chi2 =	0.0000

Table 3:Wald Test Result.

Because of the failure to meet the assumptions of the Hausman test, I used Wald test to see whether there is a heteroscedasticity or not. In this case, I use the Stata command xttest3 to do the Stata test. I use this command since the model has groupwise heteroscedasticity. Groupwise heteroscedasticity is happened because the assumption of error process is identifically and independently distributed is violated (Baum 2001). The null hypothesis is the main variance is same across units. In other words, there is a constant variance among units. Baum also stated about how the assumption of normality in the errors can be violated. So the Wald statistics here is workable according to Baum.

Using the Wald test, it can be concluded that there is a heteroskedasticity. This conclusion is achieved as we reject the null hypothesis of constant variance as in Table 1. It means that Hausman test cannot be used in this case due to this heteroskedasticity. So to determine which type of model will be used, we will use Mundlak test to see whether the specification used will be Random Effect or Fixed Effect.

Mundlak test, invented by Mundlak (1978), is about checking whether time-invariant covariates and the regressors are related. The null hypothesis of the Mundlak test is that there is no correlation between time-invariant covariates and the regressors.

chi2 (79) =	38.41
Prob>chi2 =	0.0000

Table 4:Mundlak Test Result.

The result of the Mundlak Test said that the Fixed effects model can be used for this research since we reject the null hypothesis of the Mundlak test. This means that the time-invariant unobservables are related to the regressors. Hence we can use fixed effects in this thesis.

So both tests conclude that in this research, we will use a Fixed Effect Model. This means that it is assumed that there are the same bank-invariant effects across banks. And because there is heteroscedasticity on these models, the regression will use the clustered regression. This is done to control the presence of heteroscedasticity.

With certain researches has discussed about the difference between the public banks and private banks (Brei 2013, Cull 2013), this thesis also tries to see whether there is any differences between the bank lending provision of public banks and private banks. The way this thesis answer this question is by using the regression model with dummy for the banks with private ownership.

This thesis will use this model to see the separation between public banks (state-owned banks) and private banks (non state-owned banks):

$$\Delta \ln(credit) = \alpha + \beta_1 X_{it} + \beta_2 X_{i,t-1} + \beta_3 X * Crisis + \beta_4 X_{i,t-1} * Crisis + \beta_5 X_{it} * Private + \beta_6 X_{i,t-1} * Private + \beta_7 X * Crisis * Private + \beta_8 X_{i,t-1} * Crisis * Private + \beta_9 Y_{it} + \beta_{10} Y_{i,t-1} + \beta_{11} Y * Crisis + \beta_{12} Y_{it} * Private + \beta_{13} Y * Crisis * Private + \beta_{14} Private + \in$$

Compared to the earlier model where there is no separation between the government or state-owned and private owned bank, this model use dummy variable to separate between each types of banks. The dummy then interacted by the other dummy such as crisis and also other variables such as bank characteristics and external conditions.

I used different type of regression for this model. While the model with no separation use fixed effect regression, for this model I use Random Effect regression. The reason is that with the differences of each banks featured in the dataset, compared to the model with no separation, I take into account the differences in the bank ownership for this model. Since the difference in ownership is taken into account, it means that there is individual effect that is acknowledged. The assumption is that there is no correlation between the individual effects and the explanatory variables. It means that the other individual effects which are not included on the variables (dummy or not) is not correlated with the explanatory variables.

Beside the model that employs lending as dependent variable, this thesis also employs a model with non-performing loans as the dependent variable. The reason for this is because non-performing loans is the variable related to lending, albeit it is about the repayment of the loans by borrowers, and also it is related to credit crunch (Cucinelli 2015).

For the model with the NPL as the dependent variable, this thesis used this regression model:

$$NPL = \alpha + \beta_1 X_{it} + \beta_2 X_{i,t-1} + \beta_2 X * Crisis + \beta_3 X_{i,t-1} * Crisis + \beta_4 Y_{it} + \beta_5 Y_{it} * Crisis + \in$$

The difference with the other models is that for the vector of bank characteristics, the only variable related to NPL that is included in the model is only the lagged value of NPL. This model still adds the other bank characteristics and external condition, lagged value and current value.

For the decision whether Fixed Effect or Random Effect will be used, we can use the same reasons as the earlier model. With the banks are different in the characteristics (size, capital, ownership), to focus on the general effect of crisis and each variable to NPL, I assume that there is a chance that different characteristics can affect the NPL of each banks. So to get the general effects, this thesis also uses Fixed Effect model.

chi2 (9) =	274.16
Prob>chi2 =	0.0000

Table 5:Mundlak Test Result for the NPL model.

This decision is also strengthened by the result of the Mundlak test. The result for the Mundlak test for the NPL model states that this model should be Fixed Effect model.

5. RESULT

5.1 REGULAR AND WITH PRIVATE BANK DUMMY

Variable	(1)	(2)
Constant	-.3590279	-1.709159 ***
	(-0.07)	(-2.01)
Crisis	-2.534643***	.3235384
	(-2.32)	(-0.15)
Return on Assets	-.0208918	-.0480612
	(-0.66)	(-0.90)
Crisis*Return on Assets	.2105345	-.0575252
	(1.31)	(-0.53)
Return on Assets $_{t-1}$	-.0151072	.0365388
	(-0.52)	(0.71)
Crisis* Return on Assets $_{t-1}$	-.0945422	.1107445
	(-0.65)	(1.05)
Net Foreign Assets to GDP	2.080017***	2.823078***
	(3.15)	(2.39)
crisis* Net Foreign Assets to GDP	2.796062	-.8071426
	(1.25)	(-0.26)
Interest Rate	-.0898988	.0676488
	(-0.26)	(0.31)
Crisis* Interest Rate	-.1514121	-.4231654
	(-0.26)	(-0.59)
Equity to Total Assets	-.0315167	.0116427
	(-1.48)	(0.21)
Crisis* Equity to Total Assets	.0335794	.0551623
	(1.24)	(0.48)
Equity to Total Assets $_{t-1}$	.037928***	-.0169212
	(2.45)	(-0.32)
Crisis* Equity to Total Assets $_{t-1}$	.0221006	-.0572899
	(0.94)	(-0.52)
Non-Performing Loans	-.0474432	-.0351811

	(-1.12)	(-0.51)
Crisis* Non-Performing Loans	-.4464861	-.0287382
	(-1.16)	(-0.26)
Non-Performing Loans $_{t-1}$	.0175452	.0480419
	(0.54)	(0.73)
crisis* Non-Performing Loans $_{t-1}$	.4605176	.0223818
	(1.15)	(0.20)
Deposits to Total Assets	3.483196***	3.775772***
	(5.16)	(11.31)
Crisis* Deposits to Total Assets	-.4700458	-1.896425***
	(-0.41)	(-2.36)
Deposits to Total Assets $_{t-1}$	-1.782789**	-2.817668***
	(-1.96)	(-8.15)
crisis* Deposits to Total Assets $_{t-1}$	1.487349	2.933647***
	(1.51)	(3.70)
Private		.4389592
		(0.45)
Crisis*Private		-4.410135
		(-1.64)
Private* Return on Assets		.0449283
		0.56
Crisis*Private* Return on Assets		.5590847 ***
		(3.71)
Private* Return on Assets$_{t-1}$		-.0457897
		(-0.58)
crisis*Private* Return on Assets $_{t-1}$		-.450086 ***
		(-3.04)
Private* Equity to Total Assets		-.0510013
		(-0.93)
Crisis*Private* Equity to Total Assets		-.0039389
		(-0.19)
Private* Equity to Total Assets $_{t-1}$		.0616187
		1.15

crisis*Private* Equity to Total Assets $_{t-1}$		.0584635
		0.52
Private* Non-Performing Loans		-.0456834
		(-0.58)
Crisis*Private* Non-Performing Loans		-.6064004 ***
		(-4.37)
Private* Non-Performing Loans $_{t-1}$		-.0445827
		(-0.58)
Crisis*Private* Non-Performing Loans $_{t-1}$		.674749***
		(5.01)
Private* Deposits to Total Assets		-1.470701***
		(-3.02)
Crisis*Private* Deposits to Total Assets		3.275586 ***
		(3.24)
Private* Deposits to Total Assets $_{t-1}$		1.52623 ***
		(3.02)
Crisis* Private* Deposits to Total Assets $_{t-1}$		-3.452121***
		(-3.45)
Private* Net Foreign Assets to GDP		-.5673113
		(-0.38)
Crisis*private* Net Foreign Assets to GDP		7.675985***
		(1.99)
Private* Interest Rate		-.027457
		(-0.10)
Crisis*Private*Interest Rate		.1042217
		(0.12)
Ln(Total Assets)	-.0809133	-.0040895
	(-0.27)	(-0.28)
R-Squared	0.2832	0.3616

*Table 6: Regression Result for the general model (1) and the model with the separation of ownership (2). The ***,**,* represents significance of 1%, 5%, and 10% respectively. The number inside the bracket is the coefficient of the T-value and the number outside the bracket is the coefficient of the variable. The dependent variable is the growth rate of the log of total credit given by the bank.*

This thesis includes two regressions related to the effect of crisis to bank lending. The regression (1) is the regression model which represents the general condition of the banks, where the banks are considered as having the same characteristics such as ownership even though in reality there might be some differences because there is no dummy for private and public banks. The dummy for crisis variable is negative and significant. This means that in general, the banks will give less loan to the public during crisis. Even though there are some variables that are significant on their own during normal times, this model also shows that during crisis, bank characteristics are not significant in affecting bank lending in general. So there must be a difference in the banks' lending provision if there is some differentiation between banks featured.

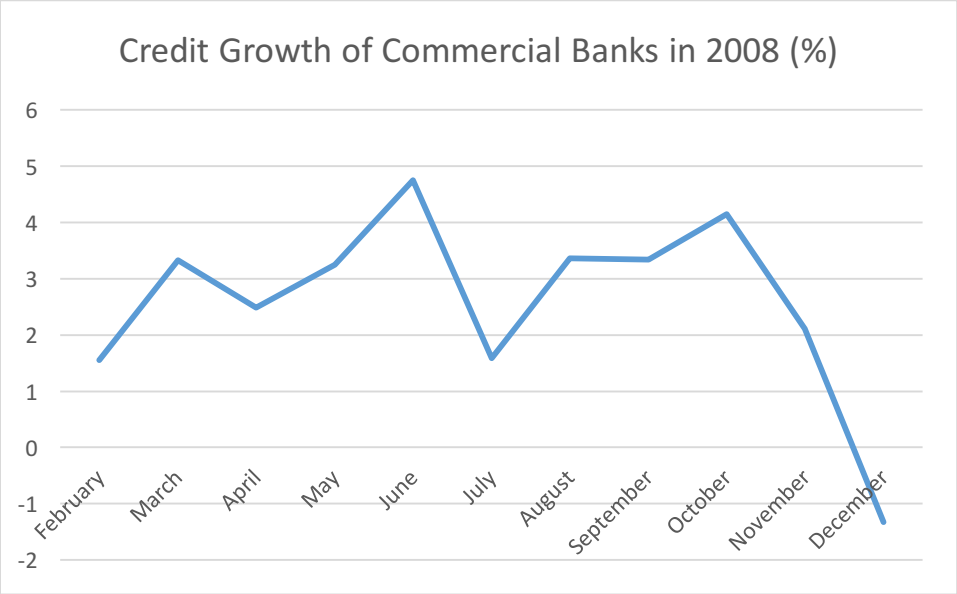

Figure 1: Credit Growth of Commercial Banks in 2008 (%). Source: Bank Indonesia (2009)

This result also can be seen from the graph about credit growth in 2008. In 2008, the credit growth of commercial banks is in lower trend from January to December, even though it had some peaks as in June. With 2008 is the year when there was a crisis, it means there can be effect of crisis to bank lending growth.

For the model (2), this thesis introduces the separation between private banks and public banks. This model results in crisis is not significant. With the dummy in this model is for private banks, it means that for the case of public banks, there is no significant increase or decrease in lending provision. This is similar to what Brei (2013) finds about the lending provision of public banks using a random-effect model. This means that during crisis, public banks still provide loans and it is not really affected by the crisis. There might be some possibilities why

this condition could have happened according to Brei (2013): (1) public banks tolerate more risk in lending, (2) easier access to capital for public banks, and (3) depositors perceive public banks as safer banks.

For the general case, which means for the condition holds whether it is crisis or not, the variables that are affecting lending are equity to total asset (lagged value or non-lagged value), deposits to total assets, non-performing loans (lagged value or non-lagged value), integration, and interest rate.

But since this thesis focus on the lending during crisis, the focus is shifted to the interaction term between crisis dummy and the variable itself. For the public banks itself, this thesis finds that only deposits to total assets can be considered as a significant variable to affect bank lending. This can be seen from the negative and significant coefficient for the interaction term between crisis and the current deposits to total assets ratio, which means that this negative relationship happened for the public banks. This is different with what Brei (2013) explained which is banks that rely more on deposits will lend more. Bank Indonesia stated that deposits are the source of the funding for bank which explained the conservative characteristics of Indonesian banks. On the other hand, Bank Indonesia (2009) has recorded that the credit growth in 2008 is more than the growth of deposits, with the time deposits has the highest growth compared to demand deposits and saving deposits. It is possible that the deposits earned by the public banks are allocated to other priorities other than lending, such as money market. Especially when government banks can be considered as safer banks compared to private banks.

Bank Indonesia (2009) reported that tighter money market makes bank more aggressive in mobilizing funds from depositors. Banks can choose to allocate the funds from deposit to either lending or money market. With the time deposit interest rate of public banks is lower than the private banks, public banks may have a lower deposit compared to private banks. It can be connected with the findings of Brei (2013) which does not find that there are shift of deposits from the private banks to public banks which rooted from the perception that the public banks are safer than private banks. With no perception of how public banks are safer than private banks, it means that public banks may get a lower deposit since they offer a lower deposit rate. Hence public banks might focus on buying BI Certificate, which is a type of government bond, compared to allocate their deposits to lending since it means that public banks get less return from their deposit.

With the addition of dummy that represents private banks, we can separate the variables significant for private banks and public banks. There are some variables that are significant in

affecting lending by private banks during crisis but not for public banks such as return on asset (ROA), non-performing loans (NPL), and the lagged value of deposits to total assets. This is based on the coefficient of the interaction term between crisis variable, private banks dummy, and also the variable. The case of ROA is different compared to what Allen, Jackowicz, and Kowalewski (2013) find on their research. Allen, Jackowicz, and Kowalewski (2013) finds that ROA as the measure of profitability is not significant even though it is higher for public banks compared to private banks while this thesis finds some significance especially if there is interaction term between ROA, private bank dummy and crisis variable. This could be caused by more profitability means more supply of capital for the banks, especially private banks. Private banks may rely more on the profitability as one of the source of funding during crisis since it is less easy for them to get support from the government when the crisis happens. For the private banks, the ROA as the profitability affect positively to bank lending during crisis. But for the lagged value of ROA, it has negative effect. It is similar to what Blaes (2011) said about the dampening impact of bank related supply factor.

For the case of private banks, the current value of NPL has a negative coefficient while the lagged value of NPL has a positive coefficient. This is different from the result of Cucinelli (2015). The reason for the negative relationship between NPL and lending may be that with more NPL, there will be less reasons for the private banks to give more lending since they cannot get more funding from loan repayment. It could be caused by the more loan given to spread and mitigate the risk. On the other hand, the lagged value of NPL has a positive relationship with the bank lending. This relationship may be caused by the banks' behavior when they have more NPL. The reason is taking some cues from the reason stated by Cucinelli which is the effect of more NPL to lending strategy of the bank. When the private banks find that they have more NPL in the earlier period, it could affect the lending strategy of the bank by making they focused on getting more loans in hope that the new loans can cover the non-performing loans which means that the new loans are able to be repaid.

There are also some variables that are more done by the private banks compared to public banks in normal time such as deposits to total assets, equity to total assets, and return on asset. This is based on the sum of the coefficient of regular variable and the interaction term between each variable with the dummy that represents private banks.

Different with earlier models, in this model there are some variables that affect bank lending for private banks more or less compared to public banks. These are return on assets (lagged value or not), equity to total assets (lagged value or not), non-performing loans (lagged value or not), and deposits to total assets (lagged value or not). These can be seen from the interaction

term between the private bank dummy and the variable itself. Those variables are different in the value for the lagged variable and non-lagged variable. There are some variables that had negative coefficient for the lagged value but had positive coefficient for the current value and vice versa. This also prove what Blaes (2011) stated about the dampening impact of bank related supply factor. The dampening impact means that the impact of the variable is become limited since they have different coefficient of the lagged value and non-lagged value.

The deposits to total assets ratio has negative value for the lagged value for the private banks. This is similar to what Blaes (2011) said. To see why there is a negative value for deposits to total asset ratio as the source of funding has negative relationship with lending, this could be explained by the amount of undisbursed loans or client credit facilities that are not yet withdrawn by the banks in Indonesia.

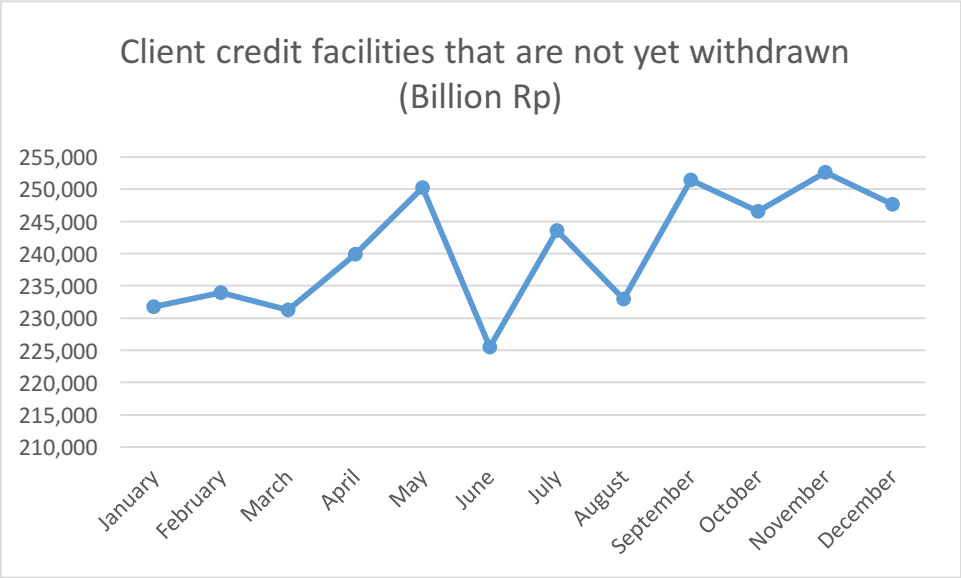

Figure 2: Client credit facilities that are not yet withdrawn (Billion Rp). Source: Bank Indonesia (2009)

The increasing trend of the undisbursed loan means that there is some effect to the loan demand since it means that even though the banks has more deposit which means more supply of funds, the borrower are reluctant to draw their loans since it become more expensive to draw.

But the current value of deposits to total assets ratio is significant and positive in affecting bank lending during crisis, based on the coefficient of the interaction term between crisis variable, private banks dummy, and the variable itself. This may be caused by the situation during crisis. During crisis time, government and central bank may focus more on the public banks. Public banks may have easier access to additional funding by the government during crisis compared to private banks. So it means that private banks need to use other sources for funding compared

to government's help. Private banks with more deposits means more supply of capital for the private banks to do the bank lending which means that those banks will lend more.

The other factors that affect lending of private banks significantly and positively during crisis is the integration, which is one of the external conditions featured in the model. Bank Indonesia (2009) stated that integration may increase market liquidity. Besides that, integration of the market also can increase the presence of offshore capital. If this statement is combined with the hypothesis of Brei (2013) which is the public banks may get easier access to capital compared to private banks, which indicates that private banks may not get easier access to capital, it means that private banks may seek other sources of capital, which possibly comes from the outside of Indonesia.

This thesis finds that there is no significant difference on how private banks and public banks doing their lending provision during crisis, assuming that the bank's internal condition is still the same. If this finding is combined with the other findings that this thesis found earlier such as certain variables can affect bank lending of either private or public banks during crisis, it means that the crisis can affect bank lending in Indonesia if there is more change in the bank's internal condition.

If the results of Brei (2013) wants to be compared which said that private banks slow down their lending during crisis, we find that it is not the same for the case of Indonesia since the coefficient of the interaction between crisis and the dummy of private banks is not significant. This means that there is no difference in general between public banks and private banks in terms of the overall lending that they give during crisis. But when both banks have a different situation of bank characteristics, the difference would be seen.

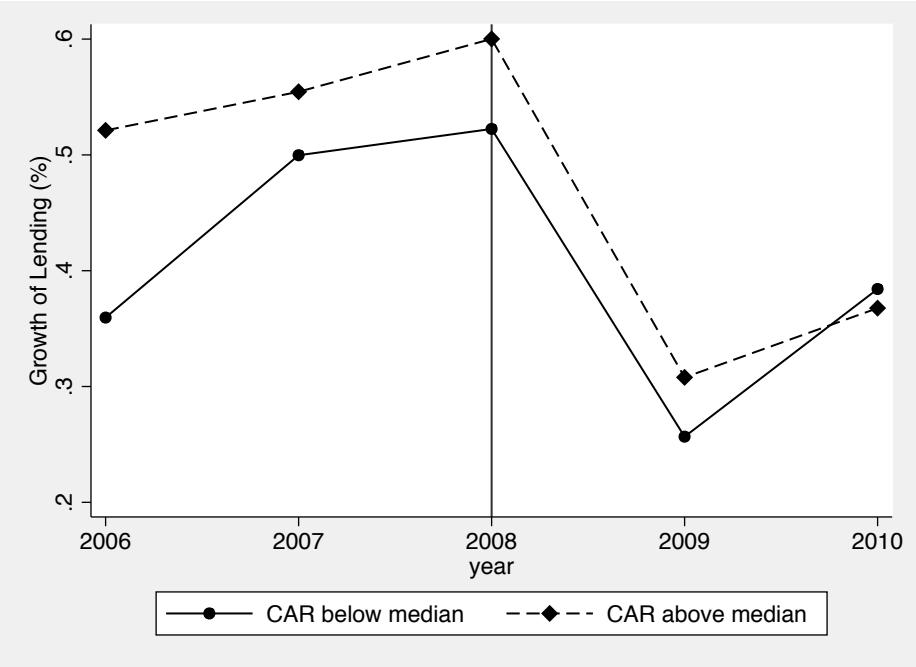

Figure 3: Difference-in-Difference Graph of Lending Growth for Banks with Capital Adequacy Ratio(CAR) above median and below median.

For further analysis, we also put some difference-in-difference graph to see how there is some difference in what happened to the lending of banks with the variety of characteristics. The first graph which is Figure 3 is about the difference between the growth of lending for banks with capital adequacy ratio (CAR) above the median and banks with capital adequacy ratio (CAR) below the median. The growth of lending has some differences for both types of banks. The gap of lending seems to getting smaller before the crisis and the differences between the lending given by these types of banks is smaller after the crisis compared to before the crisis. After the first quarter of 2008, which is when the crisis started, the second quarter of 2008 showed that banks with CAR above-median have experienced the highest point of growth and higher growth compared to banks with CAR below the median. But then, in 2009 the growth

of lending is lower than the time before crisis. This may show that the crisis brings some lasting effect to the bank lending in Indonesia.

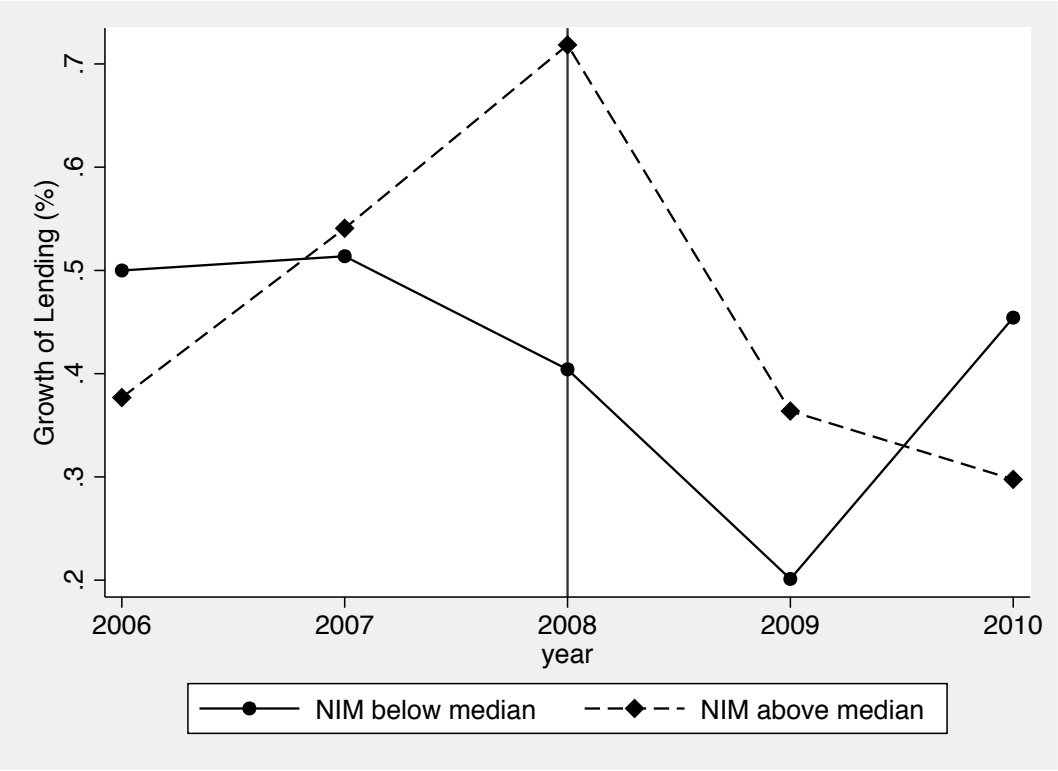

Figure 4:Difference-in-Difference Graph of Lending Growth for Banks with Net Interest Margin (NIM) above median and below median.

We also have the figure which is the Figure 4 about the difference between the growth of lending for banks with net interest margin (NIM) above the median and banks with net interest margin (NIM) below the median. There is also a same phenomenon which is the amount of lending after the crisis is lower from the amount before crisis in the time after the crisis. But it seems that during the crisis (from 2008 to second quarter of 2009 when Indonesia starts to recover), there is some consistency which is the banks with NIM above median will give higher lending or growth their lending higher compared to banks with their NIM below the median, even though after that the lending starts to growing lower than the banks with NIM below the median.

5.2 NPL Model

Variable	Coefficient
cons	-.1152774
	(-1.66)
Crisis	2.198505 ***
	(2.49)
Deposits to Total Assets	-.6003619 ***
	(-2.53)
crisis* Deposits to Total Assets	.499078
	(0.68)
Deposits to Total Assets $_{t-1}$	-.1070595
	(-0.28)
Crisis* Deposits to Total Assets $_{t-1}$	-.0726883
	(-0.21)
Non-Performing Loans $_{t-1}$	.7012479 ***
	(13.85)
Crisis* Non-Performing Loans $_{t-1}$	-.0809063***
	(-3.15)
Equity to Total Assets	-.000308
	(-0.09)
Crisis* Equity to Total Assets	.033499***
	(2.65)
Equity to Total Assets $_{t-1}$	-.0002398
	(-0.11)
Crisis* Equity to Total Assets $_{t-1}$	-.038663
	(-2.55)
Interest Rate	.7636723***
	(3.57)
Crisis*Interest Rate	-1.842499***
	(-6.10)
Net Foreign Assets to GDP	-.6786531*
	(-1.85)

Crisis* Net Foreign Assets to GDP	4.028039 ***
	(3.50)
Return on Assets	-.1152774
	(-1.66)
Crisis* Return on Assets	.075846
	(0.93)
Return on Assets $_{t-1}$	-.0355769
	(-0.83)
Crisis* Return on Assets $_{t-1}$	.1028217
	(1.28)
Ln(Total Assets)	.2024516
	1.24
R-squared	0.8074

*Table 7: Regression Result for the NPL model. The ***,**,* represents significance of 1%, 5%, and 10% respectively. The number inside the bracket is the coefficient of the T-value and the number outside the bracket is the coefficient of the variable. The dependent variable is the Non-Performing Loans (NPL).*

The model using NPL as the dependent variable finds that the condition of crisis will have a positive effect to NPL, which means that more NPL during crisis. This is similar to what earlier researches has found (Ari, Chen, and Ratnovski 2019; Rosenkranz and Lee 2019). This thesis also finds that during normal times, deposits to total assets has a negative relationship with NPL.

The impact of lagged variable of NPL is negative during crisis but positive for the non-lagged variable. It means that the NPL in earlier period affect the NPL in the current period. Rosenkranz and Lee (2019) finds the positive coefficient for the lagged variable which means that the positive effect of NPL is predicted to have the lasting effects on the banking system. But during crisis, the lagged variable of NPL has negative coefficient. This could be caused by during crisis, people are not that eager to get loan due to the risk which means that there will be less new loan.

In this model, we also see the dampening impact between the lagged variable of bank characteristics and the NPL. For instance, the equity to total asset has positive value during crisis for the non-lagged value but have negative value for the lagged variable. The negative value for the lagged variable is similar to what Rosenkranz and Lee (2019) finds on their research. Rosenkranz and Lee (2019) states that this may be caused by the moral hazard

hypothesis which is the increased risk appetite of the banks to respond the moral hazard for the banks with lower capital, which in turns increasing NPL.

The financial market integration is positive in affecting lending during crisis but have negative effect during regular non-crisis time. This might be explained by the fragility risk as said by Grabel (2003). Fragility risk means that the vulnerability of the borrowers to the shocks in economy can jeopardize the ability of the borrowers to pay their loans. It means that the jeopardy in the payment of the loans can increase NPL.

Interest rate also has negative effect to NPL during crisis, even though it gives a positive relationship with the NPL in normal time. The coefficient of the normal time is similar to what Messai and Jouini (2013) finds. But during crisis, this relationship is reversed. This may be caused by the effect of crisis to loan demand. With getting a loan seems to be riskier during crisis, it means that during crisis there might not be much loan whether it is new loan or not. It will affect the NPL since there will be less demand for loan which indirectly makes people not taking loan anymore.

6. CONCLUSION

This thesis is about the effect of crisis to bank lending in Indonesia. To see what is the effect of the crisis to bank lending, this thesis use regression with the characteristics of the banks and the external condition as the independent variables. This thesis also uses the separation between public banks and private banks to see whether there are any differences in the effect of crisis to the bank lending on those banks. There is also a regression that using NPL as the dependent variable since it is related to the credit crunch and related to the payment of the loans.

This thesis uses the database which consists of 79 banks in Indonesia with the variety of characteristics such as capital, ownership, and other characteristics.

We have some hypothesis that are trying to be tested in this thesis. The first hypothesis is:

H_0: Crisis has no effect to bank lending in Indonesia

This thesis finds that crisis has effect to bank lending in Indonesia. In the general model, this thesis finds that the crisis has negative effect to bank lending in Indonesia. It means that this hypothesis is rejected since we find that 2008 crisis has affect bank lending in Indonesia.

H_0: The variables that represents bank characteristics are not significant

This thesis finds that even though the variables that represents bank characteristics are insignificant in general level, but there are some significant variables in the bank level with the separation between public and private banks. Even when we added lagged value of the variables, we also find that some of them are significant. In the regression with the lending as the dependent variable, the result is that deposit, return on assets, and non-performing loans are significant to affect bank lending during crisis. So it means that we can reject the second hypothesis.

H_0: The variables that represents external conditions are not significant

This thesis uses the variables that represents external condition of a country such as the integration of the market and the interest rate to represent the monetary policy. With the lending model, even though in the general model there is no significant external condition that can affect lending during crisis, this thesis finds that the integration of the market is positive and significantly affected the bank lending of private banks during crisis. And when the dependent variable is changed to the NPL, both variables become significant. So it means that the variables that represents external conditions really affected the value of non-performing

loans. So in other words, the hypothesis of external conditions is not significant is rejected since this thesis finds that external conditions are significant in affecting NPL.

We also see the lagged value has different coefficient with the non-lagged value. It means that there is a dampening impact for each variables that made the non-lagged value affected.

Based on the hypotheses, this thesis concludes that crisis has a negative effect to bank lending in Indonesia. The variables that represent bank characteristics are significant, albeit with different coefficients. And there are some variables that represents external condition that are significant with the lending or NPL as the dependent variable.

From the case of significance of crisis and the bank characteristics, it can be said that the effect of bank characteristics can be seen and detected by the separation between public banks and private banks. This means that the effect of bank characteristics is more specific to certain types of banks since there are some characteristics that can affect more to private banks compared to public banks, judging by its significance with the interaction of crisis and the dummy about type of banks.

Based on the result, it seems that the separation between the type of banks may also play some roles on the lending provision in Indonesia. There are some variables that are not significant in the general model, yet become significant in the model with the separation.

With the different case of Indonesia compared to other researches, it could be possible that there should be a further research regarding this topic of the effect of crisis to developing countries. Because it may be possible that the developing countries may not experience a bigger effect of crisis compared to the developed countries. Other variables such as other bank-related characteristics such as the liabilities could be added to the regression to see whether there are more variables that may affect the severity of the crisis for the developing countries. There should be also another research that use another type of separation between banks to see whether the different types of banks will give the different result of the provision.

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APPENDIX

Banks	Status
PT BANK RAKYAT INDONESIA (PERSERO) Tbk.	State-Owned/Public
PT BANK MANDIRI (PERSERO) Tbk	State-Owned/Public
PT BANK NEGARA INDONESIA (PERSERO),Tbk	State-Owned/Public
PT BANK DANAMON INDONESIA Tbk	Private
PT BANK PERMATA Tbk	Private
PT BANK CENTRAL ASIA Tbk.	Private
PT PAN INDONESIA BANK, Tbk	Private
PT BANK UOB INDONESIA	Private
PT BANK WINDU KENTJANA INTERNATIONAL,TBK	Private
THE BANGKOK BANK COMP. LTD	Private
THE HONGKONG & SHANGHAI B.C.	Private
THE BANK OF TOKYO-MITSUBISHI UFJ LTD.	Private
PT BANK SUMITOMO MITSUI INDONESIA	Private

PT BANK DBS INDONESIA	Private
PT BANK RESONA PERDANIA	Private
PT BANK MIZUHO INDONESIA	Private
PT BANK KEB INDONESIA	Private
PT ANZ PANIN BANK	Private
PT BANK WOORI INDONESIA	Private
PT BANK BUMI ARTA	Private
PT BANK EKONOMI RAHARJA TBK	Private
PT BANK RABOBANK	Private
PT BPD JAWA BARAT DAN BANTEN	State-Owned/Public
PT. BPD DKI	State-Owned/Public
BPD YOGYAKARTA	State-Owned/Public
PT BANK PEMBANGUNAN DAERAH JAWA TENGAH	State-Owned/Public
PT. BPD JAWA TIMUR	State-Owned/Public
PT. BANK PEMBANGUNAN DAERAH JAMBI	State-Owned/Public
PT. BANK BPD ACEH	State-Owned/Public
PT. BPD SUMATERA UTARA	State-Owned/Public
BPD SUMATERA BARAT	State-Owned/Public
PT BPD RIAU KEPRI	State-Owned/Public
PT BPD SUMATERA SELATAN BANGKA BELITUNG	State-Owned/Public
PT. BANK LAMPUNG	State-Owned/Public
PD BPD KALIMANTAN SELATAN	State-Owned/Public
PT. BPD KALIMANTAN BARAT	State-Owned/Public
BPD KALIMANTAN TIMUR	State-Owned/Public
PT BANK PEMBANGUNAN KALTENG	State-Owned/Public
PT.BPD SULAWESI SELATAN DAN BARAT	State-Owned/Public

PT. BPD SULAWESI UTARA	State-Owned/Public
PT. BPD NUSA TENGGARA BARAT	State-Owned/Public
PT. BANK PEMBANGUNAN DAERAH BALI	State-Owned/Public
PT. BPD NUSA TENGGARA TIMUR	State-Owned/Public
PT. BPD MALUKU	State-Owned/Public
PT. BPD PAPUA	State-Owned/Public
PT. BANK PEMBANGUNAN DAERAH BENGKULU	State-Owned/Public
PT. BPD SULAWESI TENGAH	State-Owned/Public
BPD SULAWESI TENGGARA	State-Owned/Public
PT BANK OF INDIA INDONESIA, Tbk	Private
PT BANK METRO EKSPRESS	Private
PT. BANK SINARMAS	Private
PT BANK MASPION INDONESIA	Private
PT. BANK ICBC INDONESIA	Private
PT BANK KESAWAN, Tbk	Private
PT BANK TABUNGAN NEGARA (PERSERO),TBK	State-Owned/Public
PT BANK HIMPUNAN SAUDARA 1906, Tbk	Private
PT BANK TABUNGAN PENSIUNAN NASIONAL	Private
PT BANK MEGA, Tbk	Private
PT BANK BUKOPIN	Private
PT BANK BISNIS INTERNASIONAL	Private
PT BANK JASA JAKARTA	Private
PT BANK YUDHA BHAKTI	Private
PT BANK MITRANIAGA	Private
PT BANK ROYAL INDONESIA	Private
PT PRIMA MASTER BANK	Private

PT SAHABAT SAMPOERNA	Private
PT BANK KESEJAHTERAAN EKONOMI	Private
PT BANK SAHABAT PURBA DANARTA	Private
PT BANK MULTI ARTA SENTOSA (MAS)	Private
PT BANK MAYORA	Private
PT BANK INDEX SELINDO	Private
PT CENTRATAMA NASIONAL BANK	Private
PT BANK FAMA INTERNASIONAL	Private
PT BANK SINAR HARAPAN BALI	Private
PT BANK VICTORIA INTERNATIONAL	Private
PT BANK OCBC NISP, TBK	Private
PT BANK CHINATRUST INDONESIA	Private
PT. BANK CAPITAL INDONESIA, Tbk	Private