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THE IMPACT OF COUNTERCYCLICAL CAPITAL BUFFER POLICY ON CREDIT GROWTH IN INDONESIA

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Abstract

CCB is aimed at reducing the rate of credit procyclicality. This research analyzed the impact of CCB implementation in Indonesia to the growth of bank lending. Using the data of all banks, all BUKU categories, and DSIB, this research analyzed the impact of CCB by using dynamic panel data analysis with the GMM (generalization method of moments) system approach. The research result shows the change of capital regulation, such as CCB has negative and significant impacts in influencing credit growth. Therefore, this research recommends CCB to be implemented in Indonesia because CCB can effectively hold credit growth rate in Indonesia.

Key word **:** *CCB, GMM System, Procyclicality*

JEL Classification : G21

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I. PREFACE

1.1 Background

Learning from the 2008 global financial crisis, the Basel Committee on Banking Supervision (BCBS) issued the BASEL III policy framework which emphasized on the resilience of financial institutions through the strengthening of capital and liquidity. One of the instruments proposed in BASEL III is countercyclical capital buffer (CCB). The aim of CCB implementation according to BCBS is to prevent the emergence and/or increase of systemic risk due to excessive credit growth and the ability to absorb incurred lossed (BIS, 2010). Excessive credit growth can stem from procyclicality behavior between credit growth and economic growth in which credit growth tends to increase along with economic expansion and vice versa. CCB policy is expected to reduce credit growth in economic expansion period through the transmission of the increase in credit cost as banks need to increase their capital reserves. Therefore, when CCB policy is able to reach its goals in reducing excessive credit growth, CCB policy is said to be able to reduce procyclicality behavior of banks.

CCB policy needs to be implemented in Indonesia because of high procyclicality behavior between credit growth and economic growth (Utari et al., 2012). Deriantino (2011) also proved there were high procyclicality behaviors in capital formation to economic growth in several ASEAN countries, including Indonesia. Aside from the fact of procylicality, Indonesia as a G-20 member is also required to implement CCB policy. Figure 1 shows the procyclicality of credit growth and capital formation.

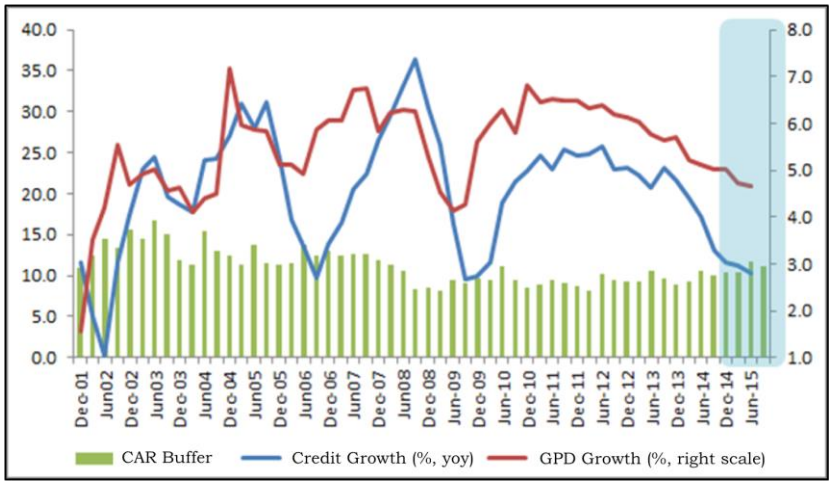

Figure 1. Credit yoy, PDB yoy, and Buffer *CAR*

One of the things that must be observed in the CCB policy implementation is whether the policy is effective in reducing excessive credit growth as one of the sources of systemic risk. Several economic literatures state that regulation of bank capital can affect credit growth through 2 (two) channels: lending channel and capital channel. Lending channel is focused on the reduction of credit disbursement due to increase in cost, while capital channel is focused on the reduction of credit growth due to increase in capital requirements. However, both transmissions may not happen or in other word, capital regulation does not affect credit growth if several assumptions are not met. Credit reduction through lending channel may not materialize if banks have strong capital sources and wider access of funds (not only limited to TPF). Likewise in capital channel, banks can adjust their capital level without impacting credit portfolio when they have high excess capital or they are able to increase capital due to wide access to source of funds.

Several empirical studies have been made to see the relations between capital regulation and credit growth. The results were dominated by negative relations among them, such as Tabak et al. (2011) who tested the relations between bank capital and bank credit growth in Brazil. Mora dan Lora (2010) examined the impact of capital buffer on economic growth by using the data of England banking industry. Bridges et al. (2014) tested the impact of capital provision change on bank credit behavior in England. Gambacorta dan Mistrulli (2003) examined Italian banking data, Coffinet et al. (2012) used French banking data, Deriantino (2011) used Indonesian banking data sample, while Xiong (2013) used Chinese banking data sample. In addition, a study by Drehmann dan Gambacorta (2011) showed that the addition of CCB buffer can reduce credit growth, especially in Spain. On the other hand, positive relations between bank capital and credit growth were found in the study of Berrospide and Edge (2010) which used banking data in the United States albeit with a relatively small magnitude.

1.2 Research Purposes

Based on the aforementioned background, the aim of this research is to conduct analysis on the impact of CCB policy implementation on credit growth in Indonesia. Estimating equation will be used on banking data industry and based on categories per BUKU and DSIB/non-DSIB.

1.3 Research Limitations

When this research was conducted, Indonesia had not implemented CCB therefore the data used in relation to the CCB buffer level was obtained from study on the main indicator of CCB conducted by Bank Indonesia along with this research.

1.4 Method of Writing

The method of writing of this research is as follows. Chapter 1 is the background of the relevance in knowing the impact of CCB implementation on bank credit growth. Furthermore, research purposes and limitations were also explained. Chapter 2 is the literature study which explains the motive of banks in maintaining capital buffer level, capital relations, and bank credit as well as several studies that have been conducted. Chapter 3 is the explanation of data and equations used to estimate the impact of capital regulations on credit in the case of Indonesian banking. Chapter 4 is the elaboration of analysis results using equations defined in banking data industry and based on categories. Chapter 5 will present conclusion and recommendation related to this research.

II. LITERATURE REVIEW

2.1 The Banks Motive in Maintaining Capital Buffer Level

Based on previous studies there are several reasons why banks commonly have capital buffer[2]. Tabak et al. (2011) states that banks have capital buffer aimed at (i) market discipline[3], (ii) fulfilling supervisory regulations, and (iii) anticipating shocks in the economy. Meanwhile, Lidquist (2004) states that banks maintain capital buffer to avoid cost related to market discipline. When not all of bank liabilities are guaranteed, depositors will ask for higher returns (in form of saving rates) as compensations for higher bank risks. Therefore, banks will try to reduce risks and cost of funds by increasing capital level which indicates the level of banking soundness.

Nier and Baumann (2006) view that banks maintain capital buffer to reduce insolvency risk. It can be achieved by increasing capital level from the minimum capital limit. Moreover, banks maintain capital buffer as signal to market or rating agencies to be competitive in securing a more efficient funding. Jokipii and Milne (2006) state that capital buffer can be used to anticipate all unexpected shocks, especially when there are pressures in the financial system.

In addition to the aforementioned reasons, banks maintain capital buffer level due to technical reason: as a buffer to prevent violating minimum capital regulations (Jokipii and Milne, 2006; Nier and Baumann, 2006). Tabak et al. (2011) states that when minimum capital regulations change, banks cannot adjust their capital level immediately. This is due to adjustment cost in relation to the increase of fresh external capital.

2.2 Relations Between Bank Capital and Credit

In economic literatures there are two transmissions how changes in bank capital can affect credit: lending channel and capital channel. The two transmissions are based on the irrelevance of capital structure of a company/bank using the perfect

[2] Capital buffer is defined as the difference between actual capital and minimum capital that must be built up by banks.
[3] Market discipline in the banking sector can be interpreted as situation where private sector agent is faced against several cost components as an outcome of banks making risky actions and taking cost-based actions (Berger, 1991).

market assumptions in Modigliani-Miller theorem. In a perfect market banks will always be able to increase the level of funding (debt or equity) to finance lending which removes the need of regulations related to bank capital. However, in reality the market is imperfect and there is assymetric information on the level of debt, equity, and assets of banks. Lending channel depends on market imperfection on bank lending, while capital channel depends on market imperfection on bank equity (Gambacorta and Mistrulli, 2003).

Bank lending channel can be explained when there is monetary policy tightening which can increase the cost of fund of banks, especially for TPF, and reduce interest margin which will cause banks' profitability to decrease. If in this condition banks should increase capital, banks will react by increasing credit requirements. In the end credit disbursement will decrease due to an increase in cost for customers. For banks with strong capital and wider access of funds (not only TPF), such conditions will not be a problem (Gambacorta and Mistrulli, 2003).

Meanwhile, capital buffer of banks will reduce when there is an increase in minimum capital requirements. There are two conditions which could allow capital regulations to affect credit disbursement through capital channel transmission. The first condition is banks choose to meet capital requirements because they realize violations to minimum capital requirements are very risky (Van den Heuvel, 2002 quoted from Gambacorta and Ibanes, 2011). Banks without high capital buffer and do not have wide access to other sources of funding will make adjustments to the amount of credit channeled. On the contrary, banks with bigger capital buffer or wider access on capital sources can adjust the amount of capital that should be fulfilled without affecting its credit portfolio. The second condition is if the market for bank equity is not perfect because bank cannot easily issue new equity, particularly in crisis period because of tax disadvantage as well as problems of adverse selection and agency cost (Gambacorta and Mistrulli, 2003).

2.3 Previous Studies

Several preceding studies which tried to analyze the relations between bank capital and credit growth are as follows.

a. The Impact of Capital Requirements on Bank Lending (Bridges et al., 2014)

This study is aimed to estimate the impact of change in minimum compulsory CAR or capital requirement to the ratio of CAR and bank credit. The

methodology used is dynamic panel regression with fixed effect approach on the data of 53 banking groups in the UK with assets > £ 5 billion in the 1990Q1–2011Q3 period (balanced panel data). The research result shows that the increase in minimum capital requirement will increase CAR because banks tend to increase their capital buffer. In addition, the study proves that banks will respond to increase in CAR by reducing credit.

b. Bank Capital Buffers, Lending Growth, and Economic Cycle: Empirical Evidence for Brazil (B.M. Tabak, A.C. Noronha, and D. Cajueiro, 2011)

This study aims to analyze the relations between capital buffer and economic cycle as well as effect from capital regulations to bank lending. The methodology used is dynamic panel data regression FGLS (feasible generalized least square) on 134 banks in the 2000–2010 period in Brazil. The preliminary stage of study estimates the effect of output gap and several control variables to capital buffer to know whether capital buffer is procyclical or countercyclical. An estimation of capital buffer behavior effect to credit growth is then made. The study result finds that capital buffer is countercyclical and has negative effect to credit growth significantly.

c. The Effects of Bank Capital on Lending: What do we know and what does it mean? (J.M. Berrospide and R.M. Edge, 2010)

This study aims to analyze how bank capital regulations impact bank lending in the US. Besides using the dynamic panel data regression method with a sample size of 165 Bank Holding Companies (BHC) in the 1992Q1–2009Q3 period in the US, this study also estimated aggregate data of commercial banks using vector auto regression (VAR). The preliminary stage of study estimated panel data regression using BHC samples in the US with two approaches. First using capital index to see the difference in capital impact if banks experience a surplus or deficit as in Hancox and Wilcox (1994). Second using actual CAR as in Bernanke and Lown (1991). The study results found that using both capital index or CAR, capital has positive relations to credit growth, but the study shows that the magnitude of capital impact is not too great to credit growth.

d. The Effects of Countercyclical Capital Buffers on Bank Lending (Drehmann and Gambacorta, 2011)

This study aims to analyze the impact of CCB implementation on bank lending in Spain. The method used is dynamic panel regression with GMM

(generalized methods of moments) on the data of 772 banks in the EU and UK in the 1999Q1–2009Q4 period (balanced). Capital data used in the simulation is actual capital added by CCB buffer. The study results show that CCB is able to reduce credit growth during credit booms and reduce credit contraction when CCB buffer is released.

e. Bank Capital Buffer Decision Under Macroeconomics Fluctuation: Evidence for the Banking Industry of China (Huan-Xian and Xiong-Qiyue, 2014)

This study aims to analyze banking behavior in making decision on capital buffer level in business cycle fluctuations and transmissions which allow CCB to affect Chinese macroeconomics. The methodology used is dynamic panel regression using GMM on the data of 45 commercial banks in China in the 2000–2010 period. The study results found that bank capital buffers in China have countercyclical behaviors to business cycle. In relation to CCB, researchers state that capital strengthening regulations such as CCB will further strengthen the countercyclical behavior of Chinese banking.

III. DATA AND METHODOLOGY

3.1 Data

This research uses Indonesian individual banking and macroeconomics data in the 2005Q1 to 2015Q2 period in a quarterly format. The numbers of banks included in this research are 96 commercial banks, excluding foreign bank branches and sharia commercial banks. Thereafter data is constructed in form of panel data because the research uses panel regression method. Panel data usage is aimed at collecting more varied data in explaining more informative and complex equations (Gujarati and Porter, 2009). There are two data periods used when there were pressures in the economy and also banking industry: the mini crisis period in 2005 and global financial crisis in 2008. Both events are expected to illustrate the relations between capital and credit in terms of procyclicality. Banking data used in this research are CCB buffer rate (%), bank credit (Ln, yoy), assets (Ln), ROA (%), and CAR (%), while macroeconomics data used are GDP (yoy) and BI Rate (%). Complete data explanations can be seen on Table 1.

Tabel 1. Data Used

Data	Unit	Source
Bank Credit	Rp	Bank Indonesia
Total Assets	Rp	Bank Indonesia
CAR	(%)	Bank Indonesia
ROA	(%)	Bank Indonesia
GDP	(%)	Bank Indonesia
BI RATE	(%)	Bank Indonesia

CCB buffer rate is calculation results using main indicators as found in CCB main study (Pramono et al., 2015) with CCB rate at 0%–2.5% range. The main indicator used is credit-to-GDP gap (calculated with one sided HP filter with smoothing parameter of 25,000) within lower range (L) of 3 and higher range (H) of 6. Figure 2 shows the CCB buffer rate based on the main indicator.

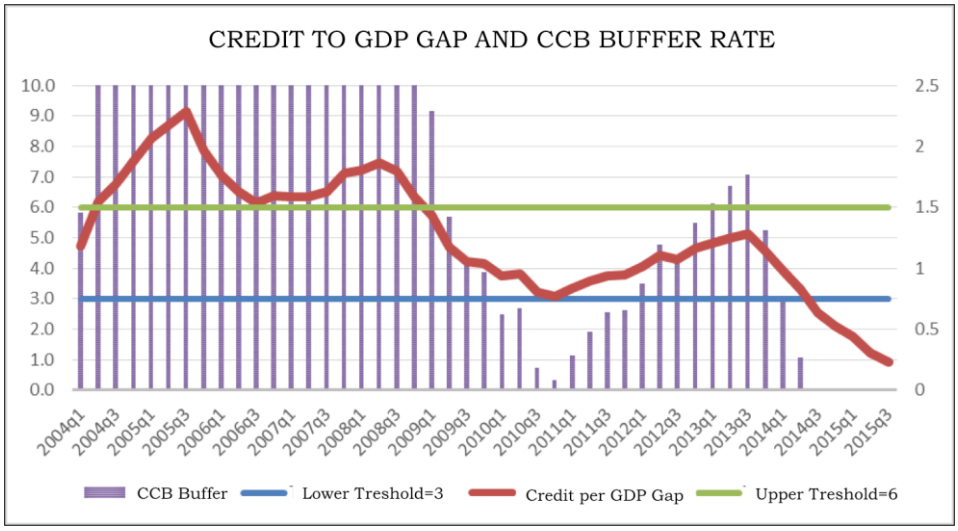

Figure 2. Credit to GDP Gap and CCB Buffer Rate

ROA and total assets are the variables expected to be able to explain the growth of bank credit disbursement. ROA is the proxy of bank profitability, while total assets are the proxy of bank sizes. This research also discusses bank behavior when there are changes of capital regulations such as CCB based on bank sizes/ categories. Aside from being impacted by the banking factor itself, credit growth is also influenced by macroeconomics factor, such as GDP and interest rate. Economic growth can trigger credit procyclicality behavior, by increasing credit growth. Meanwhile, high interest rate can push credit growth.

3.2 Equation and Assumption

The method used to analyze the impact of CCB policy on credit growth is dynamic panel, in which credit growth is affected by previous credit growth. If dynamic panel equation is estimated using fixed effects or random effects approach then endogeneity problem could occur. As a result, the resulting estimator can be bias and inconsistent (Verbeek, 2008). Arrelano Bond (1991) suggests the generalized methods of moments (GMM) approach which is an improvement of instrumental variable (IV) method for dynamic panel equations estimation. GMM method will generate an unbias, consistent, and efficient parameter estimate.

There are two estimation procedures commonly used in GMM framework: first difference GMM (FD–GMM) and system GMM. The principle of FD-GMM method is to combine the instrumental variable matrix of first difference equation and instrumental variable matrix of real series equation. Meanwhile, the basic idea of

GMM system method application is using lagged level from *i, t, y* as modifier of equation instruments in first differences and using lagged differences from *i, t, y* as instrumental variable equation in level (Blundell and Bond, 1998). However, estimator from GMM could generate a bias estimation in the case of weak instrumental variable. That can be detected by comparing AR estimator from pooled least squares, fixed effect, and GMM. Estimator of pooled least squares is biased upwards and estimator of fixed-effects is biased downwards. Unbiased estimator is in between.

This study will analyze the impact of CCB policy implementation on credit growth in the banking industry and also CCB policy implementation based on bank sizes/categories, in this case according to BUKU and DSIB/Non-DSIB. In the industry data level, the equations used are as follows.

1. Equation (1): seeing the relations between credit and capital

$$\boldsymbol{Ln(credit)_{it} = \beta_0 + \beta_1 Ln(credit)_{i,t-1} + \beta_2 CAR_{it} + \beta_3 \theta_{it} \epsilon_{it}} \quad (1)$$

Equation (1) is used to see the relations between credit and capital without using control variable because capital is using actual CAR variable.

2. Equation (2): as in equation 1, but involving banking and macroeconomics variables.

$$\boldsymbol{Ln(credit)_{it} = \beta_0 + \beta_1 Ln(credit)_{i,t-1} + \beta_2 CAR_{it} + \beta_3 \delta_{it} + \beta_4 \theta_{it} + \epsilon_{it}} \quad (2)$$

To test the robustness of equation 1, some control variables which represent banking and macroeconomics variables are added. The banking variables used are ln(Asset) as the proxy of bank size, ROA as the proxy of profitability, and credit interest rate. Meanwhile, macroeconomics variables used are GDP (yoy) and BI rate (%).

3. Equation (3): as in equation (2), but with time dummy to see the relations between credit and capital when CCB is activated.

$$\boldsymbol{Ln(credit)_{it} = \beta_0 + \beta_1 Ln(credit)_{i,t-1} + \beta_2 CAR_{it} + \beta_2 CAR * D\_CCB_{it} + \beta_3 \delta_{it} + \beta_4 \theta_{it} + \epsilon_{it}} \quad (3)$$

Equation (3) is aimed at seeing the relations between credit and capital when CCB rate is set more than 0%, the time used based on main indicator to calculate the level of CCB buffer rate. D_CCB is the dummy when CCB rate is >0%.

4. Equation (4): seeing the relations between credit and capital, capital is added to CCB buffer.

$$Ln(credit)_{it} = \beta_0 + \beta_1 Ln(credit)_{i,t-1} + \beta_2 CAR\_CCB_{it} + \beta_3 \delta_{it} + \beta_4 \theta_{it} + \epsilon_{it} \quad (4)$$

Equation (4) assumes when additional capital buffer must be formed, banks tend to increase their capital. Capital variable used is actual CAR added by CCB rate buffer. While the control variable used is the same as in equation (2).

To see the impact of CCB policy implementation on credit based on bank size, estimation is conducted on equation (2), equation (3), and equation (4) with modification adding dummy for BUKU categories or DSIB (domestic systemically important bank). Example of BUKU dummy usage is on equation (5) and DSIB dummy on equation (6).

$$Ln(credit)_{it} = \beta_0 + \beta_1 Ln(credit)_{i,t-1} + \beta_2 CAR * D1_{it} + \beta_3 CAR * D2_{it} + \beta_4 CAR * D3_{it} + \beta_5 CAR * D4_{it} + \beta_6 \theta_{it} + \epsilon_{it} \quad (5)$$

$$Ln(credit)_{it} = \beta_0 + \beta_1 Ln(credit)_{i,t-1} + \beta_2 CAR * D\_DSIB_{it} + \beta_3 CAR * D\_NonDSIB_{it} + \beta_4 \theta_{it} + \epsilon_{it} \quad (6)$$

3.3 Hypothesis

Additional CCB buffer is expected to prevent systemic risk stemming from excessive credit growth so that CAR is expected to have negative relations on credit. It is based on transmissions according to lending channel and capital channel as follows.

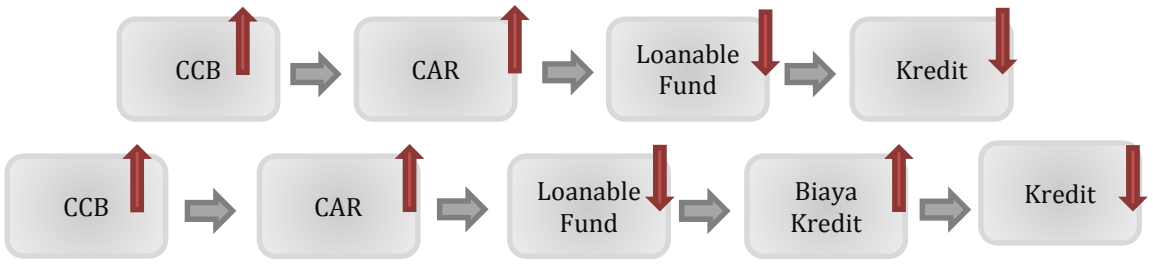

Figure 3. Transmission of CCB to Credit (Capital and Lending Channel)

Total assets, ROA, and GDP are expected to have positive relations to credit. When banks are in healthy conditions—signified by the number of assets and profit owned—credit tends to increase. Likewise when the economy is in expansion phase, credit tends to increase. Meanwhile, BI rate is expected to have negative relations on credit. When interest rate increases, credit will decrease. Summary on expected sign between variables used with credit is in Table 2.

Furthermore, CCB policy implementation is expected to reduce credit growth on bank categories which will be differentiated according to BUKU and DSIB/Non-DSIB.

Table 2. Variable and Expected Sign on Credit

Variable	**Expected Sign**
CAR	(-)
Total Asset	(+)
ROA	(+)
PDB_YOY	(+)
Monetary Policy Rate (BI_Rate)	(-)

IV. ANALYSIS RESULTS

Based on equations which have been defined in the previous chapter, there will be an analysis of CCB policy implementation to bank lending growth in general (using banking industry data) and banks based on size/category.

4.1 Impact of CCB Policy Implementation on Bank Credit

Table 3 explains the estimation results in detail for every equation which uses banking industry data. Bank capital is proven to have negative relations with credit growth despite without large magnitude. It can be seen from the consistency of equation (1) and (2) results in which several control variables have been added to equation (2) as robustness test. The estimating equation (2) result also shows that all control variables have compatible expected sign/relation, including GDP and credit procyclicality attributes.

On equation (3) a CCB dummy variable with value of 1 is added when CCB is active (rate CCB above 0%) and value of 0 when CCB is inactive (rate CCB 0%) as control variable in form of dummy interaction between capital and CCB activation time. Estimating equation (3) result still produces CAR estimator value which is consistently negative and significant.

Furthermore in equation (4), banks are assumed to add capital when there is an increase in CCB buffer rate so that total bank capital is actual capital added by CCB buffer rate. Estimating equation (4) result shows negative relations between credit growth and bank capital as with the previous three equations. In addition, the magnitude obtained is more negative compared to equations (1) and (2). It shows that CCB implementation can reduce credit growth deeper when banks tend to increase their capital.

Estimation results of the aforementioned four equations are compatible with several empirical studies conducted previously, that capital will have negative relations with credit, both through lending channel or capital channel.

Table 3. Estimation Results of Banking Industry

Variable	Equation (1)	Equation (2)	Equation (3)	Equation (4)
Ln_Credit (-1)	0.9880***	0.8786***	0.8768***	0.8762***
	(0.0055)	(0.0387)	(0.0295)	(0.0372)
CAR	**-0.0044****	**-0.0064****	**-0.0001**	
	(0.0024)	**(0.0034)**	**(0.0006)**	
Ln_Total Asset		0.1210***	0.1215***	0.1204***
		(0.0438)	(0.0316)	(0.0408)
ROA		0.0151***	0.0161***	0.0148***
		(0.0066)	(0.0049)	(0.0058)
GDP yoy		0.0089***	0.0127***	0.0103***
		(0.0044)	(0.0056)	(0.0018)
BI rate (-1)		-0.0073***	-0.0055***	-0.0062***
		(0.0020)	(0.0025)	(0.0018)
CAR_CCB				**-0.0052***
				(0.0030)
CAR * D.CCB			**-0.0007*****	
			(0.0003)	
Cons	0.3188***	0.0997	0.0432	0.1107
	(0.1085)	(0.1721)	(0.0025)	(0.1796)
Quarterly Dummies	Yes	Yes	Yes	Yes
Obs.	3936	3936	3936	3936
Number of Groups	96	96	96	96
Number of Instrument	120	82	123	82
AR(1) in First Differences (p-value)	0.018	0.016	0.013	0.017
AR(2) in First Differences (p-value)	0.774	0.806	0.759	0.787
Hansen Test (p-value)	0.899	0.168	0.906	0.128

Table 3. (continued)

Variable	Equation (1)	Equation (2)	Equation (3)	Equation (4)
Differences Hansen Test (p-value)				
All System GMM instrument	1	0.569	1	0.512
Based on Lagged Dependent Variable	0.961	0.588	0.999	0.659

4.2 Impact of CCB Implementation on Bank Credit Based on Size/ Category

Then an analysis on the impact of CCB implementation is made according to bank sizes/categories, per BUKU and DSIB/non-DSIB. BUKU category is based on the amount of a bank's capital. The amount of bank capital can affect its ability in channeling credit because banks with large capital tend to channel bigger credit. Estimates based on BUKU category is aimed at knowing if there are differences of CCB policy impact to credit between banks with large capital and banks with small capital. Furthermore, there is an analysis based on DSIB/non-DSIB category.

Table 4 presents estimation results based on BUKU and DSIB/non-DSIB[4]. Estimating equation results based on BUKU do not show conclusive results because generally CCB has negative impact to credit growth albeit insignificant. Moreover, it cannot be concluded that big-sized banks suffer more impact than small-sized banks. The discrepancy may be caused by the distribution number of banks which are less balanced between-BUKU because BUKU 4 only consists of 4 banks, BUKU 3 consists of 17 banks, BUKU 2 consists of 49 banks, and BUKU 1 consists of 48 banks.

More compatible results are obtained when equations are estimated according to DSIB/non-DSIB category. The estimation results show that CCB policy can reduce credit growth with bigger impact to non-DSIB banks. That is in line since non-DSIB banks tend to have relatively smaller capital compared to DSIB banks so that the

[4]complete results are in the attachment

changes in minimum capital regulations can affect the ability of non-DSIB category in channeling credit.

Table 4. Estimation Results Based on BUKU and DSIB Categories

Variable	BUKU 1	BUKU 2	BUKU 3	BUKU 4	NON-DSIB	DSIB
CAR_{it}	-0.0154***	-0.0133***	-0.3140*	-0.01554	-0.0145***	-0.0139***
Equation (2)	(0.0054)	(0.0048)	(0.0179)	(0.0140)	(0.0056)	(0.0037)
$CAR\_CCB * D\_CCB_{it}$	-0.0008*	-0.0008***	-0.0004	-0.0013	-0.0089**	-0.0060*
Equation (3)	(0.0004)	(0.0003)	(0.0005)	(0.0016)	(0.0037)	(0.0035)
CAR_CCB_{it}	-0.0127***	-0.0104***	-0.0249	-0.0090	-0.0067*	-0.0048*
Equation (4)	(0.0042)	(0.0042)	(0.0172)	(0.0112)	(0.0036)	(0.0030)

IV. CONCLUSION

5.1 Conclusion

CCB policy is aimed at overcoming credit growth procyclicality as well as increasing banking resilience through capital increase which is expected to reduce excessive credit growth as one of the sources of systemic risk. The condition is supported by several studies previously done. Based on this study, capital increase through CCB implementation can push credit growth, both in industry level or based on bank categories, especially DSIB/non-DSIB.

5.2 Policy Recommendation

Based on the study result, CCB policy implementation is proven can push credit growth rate. Therefore, CCB can be recommended as one of macroprudential policy instruments to help overcome potential systemic risk stemming from excessive credit growth during economic expansion phase.

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APPENDIX

Data Descriptive Statistic

Table 1. Banking Descriptive Statistic

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Capital (CAR)	4,032	21.65	10.79	0.11	69.43
Ln_Credit	4,032	14.92	1.87	9.03	20.04
Size (Ln_Aset)	4,032	15.37	1.82	9.85	20.47
Profitability (ROA)	4,032	2.58	3.34	-56.91	42.21
BI Rate	4,032	7.81	1.83	5.75	12.75
Buffer_CCB	4,032	1.46	0.95	0.00	2.50
GDP_yoy	4,032	5.75	0.69	4.14	6.81

Banking capital has quite varied diversity as seen from the standard deviation of 20.79. It is confirmed by the minimum and maximum value with rather wide deviation. Credit, size, and profitability have wide diversity. Meanwhile, economic growth and BI rate can be said of not having high variation. It is seen from the standard deviation value of 0.69 and 1.84. Furthermore, there will be descriptive analysis based on BUKU category. Table 2 explains that.

Table 2. Descriptive Statistic Based on BUKU Category

BUKU 1 CATEGORY					
Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Capital (CAR)	1,806	23.25	11.32	2.87	69.43
Profitability (ROA)	1,806	2.13	3.83	-56.91	42.21
Size (Ln_Aset)	1,806	14.01	1.08	9.85	16.51
Ln_Credit	1,806	13.55	1.18	9.03	16.36
BUKU 2 CATEGORY					
Capital (CAR)	1,428	20.83	10.99	6.26	69.26
Profitability (ROA)	1,428	3.05	3.28	-47.09	30.73
Ln_Aset	1,428	15.70	1.05	11.99	17.63
Ln_Credit	1,428	15.21	1.11	9.88	17.23

Table 2. (continued)

BUKU 3 CATEGORY

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Capital (CAR)	630	20.10	9.26	0.11	69.34
Profitability (ROA)	630	2.57	1.72	-1.49	14.80
Size (Ln_Aset)	630	17.48	0.89	15.00	19.28
Ln_Credit	630	17.14	0.87	14.82	18.97

BUKU 4 CATEGORY

Capital (CAR)	168	17.27	3.18	11.80	26.60
Profitability (ROA)	168	3.52	1.85	-1.04	15.47
Size (Ln_Aset)	168	19.42	0.53	17.81	20.47
Ln_Credit	168	18.88	0.63	17.54	20.04

Based on BUKU categories it can be explained that the higher the capital, diversity of four variables above is becoming lower. The standard deviation value of bank capital is becoming lower in BUKU 1 to BUKU 4 categories. This also happens on bank size, profitability, and credit in which the standard deviation value is getting lower in BUKU 1 to BUKU 4 categories. Therefore, categorization based on BUKU categories is able to represent every banking indicator properly.