

The Effect of Liquidity Creation on Bank Capital: A Case Study in Indonesia

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Abstract

This paper aims to examine the moderating role of bank competition on the effect of liquidity creation on bank capital. We measure bank competition using the Lerner index approach, liquidity creation using the Catfat approach, and bank capital using the capital to total asset ratio approach. This test also considers control variables from bank-specific factors such as Return on Assets, Loan to Deposit Ratio, and Non-Performance Loans as well as macroeconomic factors such as Gross Domestic Product, inflation, and Bank Indonesia interest rates. The sampling technique used was purposive sampling. The data sample obtained was 96 banks from a population of 114 banks in Indonesia which consistently operated during the period 2008–2018. Hypothesis testing uses panel data regression analysis techniques through the first model of the Hayes method. The results show that the negative effect of liquidity creation on bank capital depends on competition. We found that bank competition at any level (low, medium, high) negatively moderates (weakens) the effect of liquidity creation on bank capital in all banks. This finding is consistent with the view that banks may strengthen their capital in response to bank competition which may decrease the level of bank liquidity creation.

Keywords: Moderation, Bank Competition, Liquidity Creation, Bank Capital

JEL Classification Code: C31, G01, G21, G28

1. Introduction

In modern financial theory, namely financial intermediation, banks collect savings funds then channel them back in the form of investment/loans or financing to debtors. This process is called qualitative asset transformation. With this qualitative asset transformation, banks create liquidity by financing long-term illiquid assets with

short-term liquid liabilities (Diamond & Dybvig, 1983). Banks also create liquidity through off-balance sheet activities such as providing contingent loans and guarantees (Coval & Thakor, 2005). On the one hand, these activities give banks an important role in the economy through investment and loans. However, these activities expose the bank to liquidity risk due to the risk of maturity mismatch.

Higher liquidity creation can make banks less liquid because banks that hold more illiquid assets are funded by liquid liabilities such as savings and deposits. Besides, it also increases risk exposure due to forcing banks to release illiquid assets to meet the liquidity needs of customers. Therefore, the function of liquidity creation attracted attention because the global economic crisis of 2008–2009 indicated that bank illiquidity may affect macroeconomic stability (Fu et al., 2016). As a result, one of the regulator's responses was to produce the BASEL III agreement which introduced a higher standard of liquidity and capital with the aim of making the banking sector more resilient. However, strengthening capital through BASEL III provisions may reduce liquidity creation (Horváth et al., 2014).

In various previous literature, the relationship between liquidity creation and bank capital leads to two “opposing”

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theoretical hypotheses. First, the higher the creation of bank liquidity, the less liquid the bank is. As a result, this encourages banks to maintain higher capital to strengthen their solvency and increase the ability to collect deposits from external sources (Matz & Neu, 2007). This argument is also called the capital cushion hypothesis. Second, the creation of higher liquidity indicates that the bank's liquid liabilities such as deposits from external sources (current accounts, savings) are used to finance illiquid assets. When a bank faces liquidity risk, the bank substitutes this liquid liability with bank capital. Therefore, it is expected that there will be a negative effect of liquidity creation on bank capital (Distinguin et al., 2012).

Gorton and Winton, (2017) argued that an increase in liquidity creation has an impact on a decrease in the ratio of capital to total assets because there is an increase in the amount of deposits from external parties so that the composition of illiquid equity to total bank assets decreases or is deluded. This argument is also called the liquidity substitutions hypothesis. From other literature, the relationship between bank capital and liquidity creation is a two-way relationship. Horváth et al. (2014) examined the relation between capital and liquidity creation. This issue is interesting because of the potential impact on liquidity creation from tighter capital requirements such as those in Basel III. They observed a strong expansion in liquidity creation until the financial crisis that was mainly driven by large banks. These findings supported the view that Basel III can reduce liquidity creation, but also that greater liquidity creation can reduce banks' solvency. Thus, they showed that this reverse causality generates a trade-off between the benefits of financial stability induced by stronger capital.

Bank competition is important because it also has implications for both the creation of liquidity and bank capital. The first hypothesis is that competition causes a decrease in liquidity creation (Jiang et al., 2016). The second hypothesis is that competition can increase liquidity creation (Love & Peria, 2012). And the relationship between competition and bank capital has been discussed in various studies. A capital requirement (also known as regulatory capital or capital adequacy) is the amount of capital a bank or another financial institution has to have as required by its financial regulator. This is usually expressed as a capital adequacy ratio of equity as a percentage of risk-weighted assets. Empirical evidence shows that banks in many countries hold capital above the regulatory minimum. Banks tend to maintain capital at a level above the regulatory minimum to anticipate an increase in the cost of reserves for non-performing loans which can erode profits and capital (Allen et al., 2011). A similar result from Schaeck and Cihák, (2012) stated that competition increases capital holdings by motivating banks to maintain capital levels above regulatory requirements.

In this study, we examine the interaction effect of liquidity creation and competition on bank capital. We focus on whether competition plays a role in moderating the effect of liquidity creation on bank capital. Our paper contributes to the literature by providing evidence that the effect of liquidity creation on bank capital depends on bank competition. To our knowledge, no previous study has empirically investigated the role of bank competition in moderating the effect of liquidity creation on bank capital. Our findings represent our first contribution and also have important policy implications that are very relevant today.

This paper is structured as follows: Section 2 discusses the literature review that relates to this discussion and develops hypotheses. Section 3 describes data and samples and provides summary statistics. It also presents the basic regression model. Section 4 results and discusses. Part 5 conclusion.

2. Literature Review

2.1. Competition and Liquidity Creation

The increasing globalization of banking business activity has stimulated academic debate about the role of competition in the banking industry. Competition affects bank credit (Beck et al., 2004), bank failure (Beck et al., 2013), and economic growth (Claessens & Laeven, 2004). This paper uses a competition measure approach, namely the Lerner index. Compared to the concentration level measure, the advantage of this Lerner index is that it measures the market power of each bank in setting the selling price and marginal cost (Fu et al., 2014; Rahman et al., 2021).

Liquidity creation is a very vital bank service because banks create liquidity by using relatively liquid liabilities such as current accounts and savings to fund relatively illiquid assets such as business loans (Berger & Bouwman, 2009). Our paper uses the liquidity creation measure approach from Berger and Bouwman (2016), an approach that measures by considering transactions in the on and off-balance sheet financial statements using a method called Catfat. The catfat method is also used by other researchers such as Horváth et al. (2014) and Zheng et al. (2019).

Two hypotheses related to the impact of competition on liquidity creation. The first hypothesis is that higher competition can reduce profits, resulting in a decrease in the contribution to capital so that it can increase bank vulnerability through a capital scheme as a buffer against adverse shocks. As a consequence, banks reduce liquidity creation by limiting loans and deposits received to reduce the risk of bank runs. Although liquidity creation is a key banking function, little is known about its determinants. Jiang et al. (2016) used a new identification strategy to assess whether intensification of competition among banks increases or decreases liquidity

creation. Consistent with the predictions of some theoretical models, they found that regulatory-induced competition has a negative effect on bank liquidity creation and these liquidity-reducing effects are smaller among more profitable banks and larger among smaller banks. So according to the viewpoint of this hypothesis, increased competition leads to a decrease in liquidity creation.

The second hypothesis is that higher competition can influence pricing policy at banks, namely lowering loan interest rates and increasing deposit rates. As a result, the demand for loans and deposits has increased. Empirical support from the study of Love and Peria, (2012) showed the relationship between competition and low-interest rates on savings. Meanwhile, the findings of Beck et al. (2004) provided empirical support that tighter competition encourages loan demand by reducing financing barriers. With higher competition, loan interest rates fall and interest on deposits increases. This increase in credit and savings certainly encourages an increase in bank liquidity creations. Thus, according to this hypothetical view, increased competition leads to increased liquidity creation.

2.2. Competition and Bank Capital

The level of capital has an important role in indicating banking performance (Margono et al., 2020). According to reports from various papers that the ratio of bank capital in many countries is on average 75% above the minimum regulatory requirements (Barth et al., 2004) as well as the same found in US banks (Flannery & Rangan, 2008). Although there are still few studies that explain the relationship between capital regulations and banks that hold capital far above the minimum capital requirements. Ashcraft, (2001) in his paper tried to explain that there is no strong evidence that this accumulation of capital ratios is the impact of the regulation of the minimum bank capital requirements.

Furthermore, Allen et al. (2011) offered an alternative explanation that many banks have maintained a capital ratio that is far above the minimum capital requirement due to market discipline arising from the asset side of the bank. According to their model, competition has motivated banks to maintain a higher level of capital. Higher capital indicates the bank's commitment to monitoring loans and attracts loan-worthy borrowers. Empirical evidence using data from more than 2,600 banks from 10 countries in Europe showed that tighter competition makes banks hold higher capital ratios (Schaeck & Cihák, 2012). A large capital buffer tends to boost bank lending expansion faster (Nguyen & Dang, 2020).

2.3. Liquidity Creation and Bank Capital

Previously, the relationship between liquidity creation and bank capital was discussed from the point of view of

bank capital which influenced liquidity creation. First, the financial fragility-crowding out" hypothesis states that high capital has a negative effect on liquidity creation (Berger & Bouwman, 2009). Second, the risk absorption hypothesis states that the level of capital has a positive effect on liquidity creation (Repullo, 2004). In the development of further research, liquidity and capital creation have a two-way relationship. The study of Horváth et al. (2014) and Fu et al. (2016) found that bank capital and liquidity creation had a negative effect on each other in a sample of developed and developing countries in Europe and the Asia Pacific. In contrast, the results of the study Tran et al. (2016) showed a positive two-way relationship between regulatory capital and liquidity provision in a sample of US banks for the period 1996–2016.

2.4. Hypotheses

Referring to the research results above, there are four possible predictions/hypotheses regarding the role of competition in determining the effect of liquidity creation on bank capital. If liquidity creation has a positive effect on bank capital and competition has a positive effect on bank liquidity and capital creation, then the first prediction/hypothesis is that competition is expected to strengthen the positive effect of liquidity creation on bank capital. Likewise, if liquidity creation has a negative effect on bank capital and competition has a negative effect on bank liquidity and capital creation, then the second prediction/hypothesis is that competition is expected to strengthen the negative effect of liquidity creation on bank capital. If liquidity creation has a positive effect on bank capital and competition has a positive effect on liquidity creation but has a negative effect on bank capital, then the third prediction/hypothesis is that competition is expected to weaken the positive effect of liquidity creation on bank capital. If liquidity creation has a negative effect on bank capital and competition has a negative effect on liquidity creation and has a positive effect on capital, then the fourth prediction/hypothesis is that competition is expected to weaken the negative effect of liquidity creation on bank capital.

Table 1: Sample Selection

| Criteria | Size | % |
|--|------|------|
| National conventional commercial bank population | 114 | 100 |
| Bank closes, mergers, acquisitions, and incomplete financial report data | 18 | 0.1 |
| Total Samples | 96 | 99.9 |

3. Research Method

The authors choose the explanatory survey research method to find and develop a theory. The results or output of the research can explain why a certain symptom or reality occurs. Besides, the authors use competition as a moderator on the influence of the independent variable on the dependent variable through the interaction effect of two independent variables (Hayes, 2013), namely liquidity creation and competition on bank capital.

3.1. Population and Sample

The sample selection is based on the purposive random sampling method with a judgmental sampling type by determining the criteria or features in accordance with the research objectives (Hadi, 2007). Based on the six criteria set by the authors for the data period 2008–2018, the following sample data was obtained:

3.2. Data Analysis

The analysis used is a panel data regression model over the period 2008–2018. The authors use the first model in Hayes (2013) to identify the moderating role of competition. The authors add control variables so that other factors outside the study do not affect the independent and dependent variables under study. Control variables from bank-specific factors include Return on Assets (ROA), Nonperforming Loans (NPL), Loan to Deposits Ratio (LDR). While the control variables are macroeconomic factors of Gross National Product (GDP), inflation, and the Bank Indonesia Interest Rate. This moderating effect or conditional effect is to identify the effect of competition that strengthens or

weakens the effect of liquidity creation on bank capital which is mathematically written as follows (Hayes, 2013):

$$Y = b_1 + b_3M$$

Where M is the moderating variable.

4. Results and Discussion

4.1. Results

Based on the descriptive statistics in Table 2, all banks have a capital ratio above the regulatory minimum. Large banks have the lowest bank capital ratio value compared to small banks and all banks. This can indicate that large banks tend to use more customer deposits to fund loans or investments. This can be seen from the liquidity creations of large banks that are higher than small banks. This result is in line with Horváth et al. (2014) and Fu et al. (2016), that the higher level of liquidity creation is because banks finance illiquid assets (loans) with liquid liabilities (deposits) so that the composition of the ratio of capital to assets is smaller (Berger & Bouwman, 2016). Although large banks mostly use external funds to finance loans or investments, the LDR level of large banks is still maintained and is even lower than that of small banks. Therefore, small banks need more effort to lower the LDR by increasing the volume of their deposits.

The results of statistical analysis (Table 3), we found that there is a moderating effect of competition on the effect of liquidity creation on bank capital for all banks. However, with different results for large banks, we did not find a moderating effect of competition. Partially, it was also found that liquidity creation had an inverse effect on bank capital, for all banks and small banks. Likewise,

Table 2: Descriptive Statistics

| Variables | All Banks | | | Large Banks | | | Small Banks | | |
|-----------------------|-----------|--------|-----------|-------------|--------|-----------|-------------|--------|-----------|
| | N | Mean | Std. Dev. | N | Mean | Std. Dev. | N | Mean | Std. Dev. |
| Bank Capital | 1056 | 15.172 | 10.136 | 206 | 13.296 | 4.052 | 850 | 15.627 | 11.074 |
| Liquidity Creation | 1056 | 0.165 | 0.264 | 206 | 0.272 | 0.142 | 850 | 0.139 | 0.280 |
| Bank Competition | 1056 | 0.327 | 0.239 | 206 | 0.409 | 0.161 | 850 | 0.307 | 0.250 |
| Return on Asset | 1056 | 1.863 | 4.640 | 206 | 2.300 | 1.285 | 850 | 1.757 | 5.128 |
| Nonperforming Loan | 1056 | 2.111 | 3.184 | 206 | 1.753 | 1.340 | 850 | 2.198 | 3.482 |
| Loan to Deposit ratio | 1056 | 94.731 | 54.443 | 206 | 91.573 | 26.441 | 850 | 95.496 | 59.257 |
| Rate | 1056 | 6.367 | 1.794 | 206 | 5.933 | 1.515 | 850 | 6.473 | 1.841 |
| Inflations | 1056 | 5.340 | 2.714 | 206 | 4.849 | 2.376 | 850 | 5.459 | 2.778 |
| GDP | 1056 | 5.434 | 0.555 | 206 | 5.334 | 0.487 | 850 | 5.458 | 0.567 |
| Valid N (listwise) | 1056 | | | 206 | | | 850 | | |

Table 3: Baseline OLS Regression (Hayes Model 1)

| Independent Variable: Bank Capital | | | | | | | | | |
|------------------------------------|-----------|---------|-------|-------------|--------|-------|-------------|---------|-------|
| | All Banks | | | Large Banks | | | Small Banks | | |
| | Coeff. | t | p | Coeff. | t | p | Coeff. | t | p |
| Variables | | | | | | | | | |
| Liq. Creation (LC) | -25.852 | -21.903 | 0.000 | -1.162 | -0.585 | 0.559 | -29.321 | -21.353 | 0.000 |
| Banking Comp. (BC) | 2.917 | 2.481 | 0.013 | -8.271 | -3.098 | 0.002 | 3.574 | 2.689 | 0.007 |
| Int_1 (LC x BC) | 20.322 | 14.346 | 0.000 | 20.741 | 1.618 | 0.107 | 22.377 | 14.415 | 0.000 |
| Control Variables | | | | | | | | | |
| ROA | 0.040 | 0.613 | 0.540 | -0.021 | -0.064 | 0.949 | 0.034 | 0.489 | 0.625 |
| NPL | -0.020 | -0.215 | 0.830 | -0.300 | -1.493 | 0.137 | -0.012 | -0.125 | 0.901 |
| LDR | 0.045 | 9.613 | 0.000 | 0.020 | 1.659 | 0.099 | 0.045 | 8.871 | 0.000 |
| Rate | -0.245 | -0.836 | 0.403 | -0.483 | -1.479 | 0.141 | -0.165 | -0.482 | 0.630 |
| Inflation | 0.132 | 0.669 | 0.504 | 0.026 | 0.127 | 0.899 | 0.141 | 0.605 | 0.545 |
| GDP | -0.504 | -0.997 | 0.319 | -0.698 | -1.189 | 0.236 | -0.405 | -0.689 | 0.491 |
| F Test | 65.5513 | | 0.000 | 6.9515 | | 0.000 | 60.686 | | 0.000 |
| R | 0.6005 | | | 0.492 | | | 0.628 | | |
| Adjusted R ² | 0.3606 | | | 0.242 | | | 0.394 | | |
| R ² (change) | 0.1258 | | | 0.010 | | | 0.150 | | |
| Observation | 1056 | | | 206 | | | 850 | | |

Note: The Bank's Capital Ratio is measured by capital divided by total assets, Liquidity Creation (LC) is measured using the Catfat approach from Berger and Bouwman (2009), Bank Competition (BC) is measured by Lerner index, Int_1 is the interaction of LC and BC variables on the dependent variable, and data analysis using multiple linear regression with a confidence level of 95%.

Table 4: Conditional Effects of the Focal Predictor at Values of The Moderator

| | BC | Effect | S.E. | t | p | LLCI | ULCI |
|-------------|--------|---------|-------|---------|-------|---------|---------|
| All Banks | -0.239 | -30.710 | 1.401 | -21.916 | 0.000 | -33.459 | -27.960 |
| | 0.000 | -25.852 | 1.180 | -21.903 | 0.000 | -28.168 | -23.536 |
| | 0.239 | -20.994 | 1.026 | -20.470 | 0.000 | -23.006 | -18.981 |
| Small Banks | -0.250 | -34.924 | 1.641 | -21.281 | 0.000 | -38.146 | -31.703 |
| | 0.000 | -29.321 | 1.373 | -21.353 | 0.000 | -32.016 | -26.626 |
| | 0.250 | -23.718 | 1.175 | -20.189 | 0.000 | -26.023 | -21.412 |

Note: The conditional effect for large banks does not exist because the interaction (int_1) is statistically insignificant, Low-Level Confidence Interval (LLCI), Upper-Level Confidence Interval (ULCI).

partially bank competition has an effect on bank capital for both large and small banks. However, the direction of the influence of competition on capital in large banks is different for small banks and all banks. The model of moderation mathematically can be written as follows: Bank Capital = -25.852 + 20,322M in a sample of all

banks and Bank Capital = -29.353 + 22,377M in a sample of small banks.

To investigate further how the effect of moderation or interaction of liquidity creation and competition on bank capital, it can be seen from the conditional effects in Table 4 below:

In all banks, at low levels of competition ($SD = -1$; $BC = -0.239$), the negative moderation effect is significant ($b = -30.710$; $p = 0.000$) and zeros are not included in the confidence interval between the LLCI and the ULCI. At the medium level of competition ($SD = 0$; $BC = 0.000$), the negative moderation effect is significant ($b = -25.852$; $p = 0.000$) and zeros are not included in the confidence interval between the LLCI and the ULCI. At a high level of competition ($SD = 1$; $BC = 0.239$), the negative moderation effect is significant ($b = -20.994$; $p = 0.000$) and zeros are not included in the confidence interval between the LLCI and the ULCI. This means that in the whole sample of banks, competition at any level negatively moderates the negative effect of liquidity creation on bank capital. The results were relatively the same for small banks.

4.2. Discussion

Based on the results of statistical data analysis, in a sample of all banks and small banks, bank competition negatively moderates (weakens) the effect of liquidity creation on bank capital. These results indicate that the effect of liquidity creation on bank capital depends on bank competition. Furthermore, the interesting thing is how competition moderates the effect of liquidity creation on bank capital. The results of previous research related to the relationship of these 3 variables, first, liquidity creation has a negative effect on bank capital (Horváth et al., 2014; Fu et al., 2016). Second, competition increases bank capital ratios (Allen et al., 2011; Schaeck & Cihák, 2012). Third, competition has a negative effect on liquidity creation (Jiang et al., 2016). First, the theoretical argument that can be offered is that when liquidity creation increases through increased bank activity, which is reflected by an increase in illiquid assets (loans) funded by liquid liabilities (deposits), it can reduce the bank's capital ratio. This is because banks use more deposits than capital in financing loans.

As a consequence, the ratio of bank capital to total assets becomes deluded or decreases. However, when competition exists, this competition inhibits the increase in the volume of loans and deposits so that banks have to reduce credit interest and increase deposit interest (Beck et al., 2004). Increased competition has an impact on reducing liquidity creation because banks respond to competition by limiting both the volume of credit and deposits to reduce bank runs (Horvath & Seidler, 2013). With this competition, the deposit rate is also hampered (Jiang et al., 2016) so that it does not have an impact on the bank's capital ratio decline (Gorton & Pennacchi, 1990). Thus, in this condition, competition plays a role in weakening the inverse effect of liquidity creation on bank capital.

In small banks, the role of competition in moderating negatively is clearer and more consistent. Competition

greatly impacts determining the pricing of loans and deposits at small banks. Small banks do not have the high market power to provide a more attractive pricing for customers because they are locked in by a minimal margin spread between deposit and loan interest. Therefore, when competition exists and is even tighter, the liquidity creation of small banks will decrease as the volume of loans and deposits decreases. When the volume of loans decreases, the bank will also be motivated to adjust the level of the capital ratio. This result is in line with the argumentation Horvath and Seidler (2013) according to empirical data on banks in Czech. Thus, competition negatively moderates (weakens) the effect of liquidity creation on capital in small banks. Different results were seen in large banks where competition does not have any moderating effect on the effect of liquidity creation on bank capital. In large banks, the market power is large so that they are able to offer prices far below their marginal costs so that competition in large banks does not have a significant impact on the creation of bank liquidity and capital.

Second, the argument is based on the direction of the influence of the variables. Mathematically, the direction of the influence of liquidity creation on bank capital is negative, while the effect of competition on bank capital is positive so that there is an indication of a trade-off between the two. For example, in the initial conditions before there was competition, a 3% increase in liquidity creation could reduce the bank's capital ratio by 4%. Then came competition which was able to increase capital by 2%. After the competition, the effect of a 3% increase in liquidity creation can only reduce bank capital by 2% (4%–2%). Therefore, competition weakens the effect of liquidity creation on bank capital.

The implications of this research are at least two things, first the impact of costs and liquidity, and the second is the sensitivity of regulators. The first implication is that bank competition needs to exist, be maintained, and enhanced so that the bank becomes more liquid (reduces the effect of liquidity creation on capital) and as a result, the capital ratio is higher. But on the other hand, the competition encourages an increase in the cost of savings funds because banks have to increase deposit rates to win the competition for funds. Therefore, banks need to increase the efficiency of other costs arising from competition, such as lowering non-performing loan reserve costs. Wang (2018) reported that competition increases the volume of credit but the increase in volume is accompanied by an increase in NPL because banks tend to reduce their risk level taking to win the competition. So, on the one hand, competition can make banks more liquid because it weakens the effect of liquidity creation on bank capital, but on the other hand, competition may increase bank costs so that banks are required to be more efficient.

The second implication is that regulators need to consider that an endogenous level of bank competition may be important in determining the effectiveness of implementing bank capital regulations according to the bank group.

5. Conclusion

We argue that the role of risk-sharing between liquidity and competition in moderating the effect of liquidity creation on bank capital has yet to be explored. In this paper, we attempt to fill the gaps in the literature by testing empirically how the interaction of liquidity creation and competition affects the capital of each bank. To test this, we analyzed data on 96 conventional commercial banks in Indonesia over the period 2008–2018. The main findings of this paper are; first, competition moderates negatively (weakens) the inverse effect of liquidity creation on bank capital in a sample of small banks and all banks. Second, we find that liquidity creation has a significant negative effect on bank capital in a sample of small banks and all banks.

The results of this study have important policy implications for government and authorities as they provide new insights for regulatory design. Policymakers need to consider bank competition in determining different capital policies for each bank group. In contrast to large banks, the moderating role of competition has no effect because their market power has incentivized them to set more competitive prices so that they can increase their market share and economies of scale.

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