BANK COMPETITION AND LIQUIDITY RISK: THE CASE OF BRICS COUNTRIES

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This paper investigates the effect of bank competition on liquidity risk using evidence from Brazil, Russia, India, China and South Africa. The paper employs bank fixed effects to mitigate the concern of endogeneity and the results show that an increase in competition would result in a reduction in liquidity risk. From the perspective of policy makers in BRICS countries, this evidence implies that it is necessary to improve competition in banking sector for a more stable and safer financial markets.

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Bank competition and financial stability both hold critical roles in the banking sector. Bank competition is believed to be the key contributor for an efficient allocation of resources, production process and nourishing innovation (The Organization for Economic Co-operation and Development (OECD) 2010; Vives 2011). Meanwhile, financial stability is also important for the efficiency of resources allocation and the key driver for financial risk management, ensuring transactions can be operated smoothly, stabilizing macroeconomic indicators such as unemployment rate, price level; and therefore, is certainly a vital source for economic growth (World Bank 2015). The relationship between bank competition and financial stability is, however, more complicated than one's expectation. The first point of view on this relationship advocates a dilemma that policy makers in

attempts to foster efficiency by approving competition policy in banking sector might unintentionally hurt financial stability, implying a trade-off between competition and stability (Vives 2011). Greater competition can reduce financial stability and this can occur through two channels: (1) the asset side and (2) the liability side of banks' balance sheet (OECD 2010; Vives 2011). The idea supporting the asset side channel can be found in the well-known paper written by Keely (1990). Intuitively, banks' decision to take risk on the asset side will depend on the benefits of the risk taking actions and the costs of declining charter value in the case those risk taking actions are failed (Keely 1990; Akins et al. 2016). In a less competitive environment, banks can utilize market power to elicit monopoly rents, increase profits and enjoy valuable charters (Keely 1990; OECD 2010; Akins et al. 2016). That situation makes banks become reluctant to risk taking behaviors because the gains of increasing risk might not be enough to offset the losses of deteriorating charter value (Keely 1990). The contrast happens when competition increases. Greater competition results in a decrease in profits and charter value, which in turn encourages risk taking action of banks on the asset side (Keely 1990; Allen and Gale 2004; OECD 2010; Akins et al. 2016). In regard to the liability side channel, the argument supporting this channel is that tougher competition can magnify the issue of coordination among depositors and this, in turn, would result in panic runs (OECD 2010; Vives 2011). Therefore, increased competition can lead to an increase in instability either through the asset side or the liability side (OECD 2010; Vives 2011).

However, the debate on the relationship between bank competition and financial stability does not stop there. There are another arguments pointing out that greater competition is not necessarily associated with increased instability and there can be another mechanisms through which more competition might indeed result in a more stable financial environment. Allen and Gale (2004) summarise the analyses by Allen and Gale (2000), chapter 8 to show that in a dynamic condition, an increase

in competition can either increase or decrease risk taking behaviors. In another work, Boy and De Nicoló (2005) argue that the traditional view on the relationship between banking competition and financial stability (e.g. more competition increases instability) only considers the competition in deposit markets while fails to take into account the competition in the loan markets. According to their analyses, when accounting for the competition in loan markets, the opposite result would happen. Basically, if the competitive condition is not severe, then banks can take advantages of market power to achieve their desired monopoly rents, resulting in higher interest rates charged to borrowers in loan markets. In that situation, when facing with higher costs, borrowers have incentive to take more risks on their investment, which, in turn, translating into a higher probability that they will go to bankrupt. Therefore, the model analyzed by Boy and De Nicoló (2005) with the dominant effect in loan markets shows a clear opposite result that less competition is associated with an increase in instability while more competition will improve stability.

Although the analyses by Boy and De Nicoló (2005) are persuasive, that is still not shortcoming-free, however. Martinez-Miera and Repullo (2010) argue that when coming up with the conclusion, Boy and De Nicoló (2005) assume a perfect correlation of loan defaults, which may not hold in reality. Martinez-Miera and Repullo (2010) then introduce a more realistic assumption that loan defaults are imperfectly correlated. With this assumption, they believe that the relationship between bank competition and bank stability should be a U-shaped curve. This means that when only few banks exist, introducing more competition would increase stability. But this turn out to be reverse if bank market has been already very competitive, then additional entry would lead to an increase in instability.

The empirical findings in this field are mixed, supporting both the theoretical perspectives (e.g negative and positive relationship between bank competition and financial stability). Results found by Keely (1990) and Berk et al. (2003) suggest a

negative relationship between bank competition and bank failures while findings conducted by Jayaratne and Strahan (1998), De Nicoló (2000) and De Nicoló et al. (2004) defend a positive one[1]. Hence, the debate has still not been ended yet. Interestingly, by our knowledge, while most of literature on this topic focus on the link between bank competition and popular indicators of instability such as systemic risk, default risk or credit risk; scholars seem to do not pay so much attention on liquidity risk and the literature on the relationship between bank competition and liquidity risk is quite new. Moreover, from 1 January 2018, the Net Stable Funding Ratio (NSFR) under Basel III effectively becomes a standard in liquidity regulation (Basel Committee on Banking Supervision 2014). In confront with the situation that banks must prepare to meet higher liquidity requirements, examining how competition would affect liquidity risk of banks becomes a very attractive topic for a wide range of stakeholders, including bank managers, policy makers and academic researchers. This paper is, therefore, contributing to the literature by entering through this entrance. Particularly, in this research, we are examinining the relationship between bank competition and liquidity risk using evidence from Brazil, Russia, India, China and South Africa (BRICS).

The remaining of the research is organized as follows. Section I is reviewing the literature more comprehensively. Section II is then discussing about methodology. Data and descriptive statistics will be mentioned in section III while section IV is presenting the findings. Section V concludes the paper.

I. Literature Review

The classical paper conducted by Keely (1990) examines the hypothesis that an increase in bank competition might be responsible for an increase in default risks

[1] For a comprehensive empirical review, see Boyd and De Nicoló (2005).

through affecting charter values[2]. More specifically, greater competition can lead to a decrease in bank charter values and the decline in the charter values, in turn, creates incentive for banks to take additional risks on assets and therefore, increases banks' default risk. The author firstly presents a theoretical framework to show that in a concentrated market with only few banks existing, banks can enjoy monopoly profits and valuable charter values. In such situation, there is no incentive for banks to engage in risk behaviors because the expected losses might exceed the expected gains. The result would be different, however, if bank market becomes more competitive. More competition means that banks are no longer able to elicit monopoly rents, which in turn certainly causes a decrease in profits and there would be a decrease in charter values as well. In addition, deposit insurance is often criticized for causing "a moral hazard for excessive risk taking" (Keely 1990, p. 1183) and a decrease in charter values would trigger banks' readiness on shifting their risks to insurance fund by taking additional risks on assets (Keely 1990; Allen and Gale 2004). This in turn increases the likelihood of bank failures. Keely (1990) then uses data of 150 largest U.S banks from 1970 to 1986 to provide empirical evidence. In that paper, to measure bank default risk, the author employs: (1) "the market-value capital-to-asset ratio" and (2) "the interest cost on large CD's" (Keely 1990, p. 1191). The findings confirm the hypothesis developed, meaning that there is a negative relationship between bank competition and financial stability.

In align with the results by Keely (1990), empirical evidence from Beck et al. (2003) supports an idea that bank crises are less likely to occur in a more concentrated market. To come up with the results, Beck et al. (2003) use data of 79 countries from 1980 to 1997 to explore how concentration would affect bank crises. In this paper, the crisis variable represents a systemic risk and is assigned the value one when the country in concern is facing with a crisis, and zero otherwise. A crisis

[2] See Allen and Gale (2004) for an excellent theoretical review on the literature.

can be understood as an event in which banking sector has problem of insolvency or illiquidity and can not work functionally without government intervention. The authors then measure concentration by "the share of assets of the three largest banks" (Beck et al. 2003, p. 6). Logit model is employed while various national characterisics enter as control variables.

The empirical evidence found by Keely (1990) and Beck et al. (2003) are in favor of the idea that an increase in competition would cause financial instability and this point of view is often known as the classical view on the relationship between bank competition and financial stability (Boyd and De Nicoló 2005; Vives 2011). Nevertheless, the link is not as simple as appeared at the first glance (Allen and Gale, 2004). Boyd and De Nicoló (2005) review the literature and find that the empirical results are mixed and the classical perspective is not truly solid. The authors then revisit the theoretical background and point out that the traditional theory or "the portfolio model" only considers the effects of competition in deposit markets and ignores the effects in loan markets (Boyd and De Nicoló 2005, p. 1331). According to their arguments, "in the contracting model", the effects of competition would be fully taken into account, including the ones in the loan markets (Boyd and De Nicoló 2005, p. 1331). The authors explain their idea that in a concentrated market, banks earn monopoly rents in the deposit markets and enjoy valuable charter and banks refrain them from taking extra risks on the assets since the expected gains can not be large enough to offset the expected losses. This logic is the same as in the traditional theory. There is, however, simultaneous effects in loan markets. Less competitive market would induce banks to charge higher interest rates for their customers in loan markets. In turn, when borrowers are in confront with higher costs, they are likely more willing to engage in risk taking behaviors, increasing the likelihood of bankruptcy. According to Boyd and De Nicoló (2005), in that situation, the effects in loan markets are superior to the effects in deposit markets and as a consequence, a decrease in competition would unambiguously

cause an increase in instability and vice versa. This result is obviously opposite to the one in the traditional view.

There are some empirical evidence supporting a positive relationship between bank competition and financial stability. De Nicoló (2000) investigates how bank size affects the probabilities of failures in the U.S, Japan and some European countries. The result shows that when bank size increases, insolvency risk also increases. Although bank size is certainly a weak measure of bank competition, one can argue that, however, it is somewhat "correlated with market power" and therefore, the result should has at least some meaningful implications (Boyd and De Nicoló 2005, p. 1333). In another paper, De Nicoló, et al. (2004) study how bank consolidation, conglomeration affect financial risk worldwide and uncover that in a more concentrated market, systemic risk level was higher than that in a less concentrated market from 1993 to 2000 and this phenomenon has enhanced from 1997 to 2000. These empirical results imply that a reduction in bank competition does not necessarily create a more stable financial environment but rather, cause instability (De Nicoló et al. 2004). Recently, there are more findings from Anginer et al. (2014); Schaeck and Cihák (2014) and Akins et al. (2016) asserting this point of view.

In another work, Martinez-Miera and Repullo (2010) do not agree with the result presented by Boyd and De Nicoló (2005) and point out that in the model analyzed by Boyd and De Nicoló (2005), there is an assumption about a perfect correlation of loan defaults. This assumption might not hold in reality and therefore, Martinez-Miera and Repullo (2010) modify the assumption and allow loan defaults to be imperfectly correlated. According to their analysis, there are two simultaneous effects existing: (1) "the risk-shifting effect" and (2) "the margin effect" (Martinez-Miera and Repullo 2010, p. 3639) and the direction that how bank competition affects stability would depend on which effect becomes dominant. They analyze further that, in a concentrated market, "the risk-shifting effect" holds a superior role

and resultantly, more competition would be associated with higher stability and the contrast happens in a competitive market with a dominant role belonged to "the margin effect", meaning that more competition would cause an increase in instability (Martinez-Miera and Repullo 2010, p. 3639). In summary, Martinez-Miera and Repullo (2010) predict the relationship between bank competition and financial stability follows an U-shaped curve. However, Schaeck and Cihák (2014) do not find evidence to support this theoretical prediction.

Reviewing the literature on this topic reveals a massive interest of scholars on the relationship between bank competition and various measures of financial stability such as default risk, systemic risk, insolvent risk and credit risk. It is interesting, however, that the role of liquidity risk seems to not attract much attention from researchers and therefore, the literature on how does bank competition affect liquidity risk is quite underdeveloped. In this paper, we are going to contribute to the literature by examining the link between bank competition and liquidity risk using data from BRICS countries.

II. Research Methodology

A. Model Specification

To investigate the relationship between bank competition and liquidity risk, we run the regression for the following equation:

$$\begin{aligned}(1)\quad \text{Liquidity risk}_{it} &= \beta_0 + \beta_1 * \text{Lerner Index}_{it-1} + \beta_2 * \text{Liquidity risk}_{it-1} + \alpha \\ &* \text{Bank characteristics}_{it-1} + \gamma * \text{Country chacracteristics}_{it-1} \\ &+ \theta_{it} + \varepsilon_{it}\end{aligned}$$

Equation (1) desires more explanation. The subscript i denotes bank i while t denotes year t and t-1 is lagged variable, representing the previous year. In equation

(1), to measure liquidity risk which appears as dependent variable, we use the Net Stable Funding Ratio (NSFR) proposed in Basel III agreement. This ratio will be discussed in detail shortly.

In the right side of equation (1), the concerned variable is the Lerner Index which represents the level of bank competition and β_1 is the parameter of interest, telling us how bank competition does affect liquidity risk. We are going to mention about the Lerner Index comprehensively later.

In addition, in equation (1), liquidity $risk_{it-1}$, bank characteristics and country characteristics enter as control variables. We add the lagged term of liquidity risk as a control variable because we expect that liquidity risk in the previous year should have impact on liquidity risk in the current year. Bank characteristics in equation (1) include: (1) *Equity* is calculated as total equity divided by total assets, (2) *Size* is calculated by taking the log of total assets, and (3) *Loans* is calculated as loans divided by total earning assets. Country characteristics include: (1) *inflation rate* and (2) *GDP growth.* The rationale for including these bank characteristics and country characteristics as control variables is based on previous studies, particularly in refer to Anginer et al. (2014); Schaeck and Cihák (2014) and Akins et al. (2016).

In equation (1), θ_{it} denotes bank fixed effects. The justification for using bank fixed effects is because the approach help eliminate time-invariant characteristics and therefore, mitigate the problem of endogeneity (Anginer et al. 2014)

In addition to equation (1), we are eager to examine whether the relationship between bank competition and liquidity risk follows an U-shaped curve predicted by Martinez-Miera and Repullo (2010). To implement this strategy, the squared term of the Lerner Index shall be added and hence, the equation (2) below is used to examine the hypothesis of an U-shaped relationship:

$$(2)\quad \text{Liquidity risk}_{it} = \beta_0 + \beta_1 * \text{Lerner Index}_{it-1} + \beta_2 * \text{Liquidity risk}_{it-1} + \beta_3 * \text{Lerner Index}_{it-1}{}^2 + \alpha * \text{Bank characteristics}_{it-1} + \gamma * \text{Country chacracteristics}_{it-1} + \theta_{it} + \varepsilon_{it}$$

B. Measure of Liquidity Risk – NSFR

The Basel III agreement introduces two liquidity standards, those are: (1) the Liquidity Coverage Ratio (LCR) and (2) the Net Stable Funding Ratio (NSFR). While these two standards are both important for ensuring bank stability, Dietrich, et al. (2014) argue that NSFR is expected to have sustainable and greater impact on banks' activities and business models. In line with this argument, we utilize the advantages of the NSFR and use this ratio as the measure of liquidity risk in this paper.

According to Basel III, the definition of the NSFR is: "The NSFR is defined as the amount of available stable funding relative to the amount of required stable funding. This ratio should be equal to at least 100% on an ongoing basis." (Basel Committee on Banking Supervision 2014, p. 2). The formula used to calculate the NSFR is as follows (Basel Committee on Banking Supervision 2014, p. 2):

$$(3)\quad \frac{\text{Available amount of stable funding}}{\text{Required amount of stable funding}} \geq 100\%$$

C. Measure of Competition - Lerner index

Previous studies measure competition in different ways. Popular measures of competition are Tobin's q, the numbers of banks, concentration ratios, the Herfindahl index, bank mergers, the H-statistic (Akins et al. 2016). Recently, scholars have drawn attention on the Lerner index (Berger et al. 2008; Demirguc-

Kunt and Martínez Pería 2010; Anginer et al. 2014 and Nguyen et al. 2016). In this paper, we also employ the Lerner index as a measure of competition because the index does allow for capturing the competition at the individual bank level, which is appropriate with the context of this paper.

To calculate the Lerner index, we adapt the same approach used in Berger et al. (2008); Demirguc-Kunt and Martínez Pería (2010); Anginer et al. (2014) and Nguyen et al. (2016). Particularly, we firstly estimate the following regression:

$$
\begin{aligned}
(4)\quad \ln\left(C/W_2\right) &= \beta_0 + \beta_1 \ln Y_1 + \beta_2 \ln Y_2 + \beta_3 \ln\left(W_1/W_2\right) + \beta_4 \ln\left(W_3/W_2\right) \\
&+ \beta_5 t + \frac{1}{2}\beta_6 (\ln Y_1)^2 + \beta_7 \ln Y_1 \ln Y_2 + \beta_8 \ln Y_1 \ln\left(W_1/W_2\right) \\
&+ \beta_9 \ln Y_1 \ln\left(W_3/W_2\right) + \beta_{10} t \ln Y_1 + \frac{1}{2}\beta_{11} (\ln Y_2)^2 \\
&+ \beta_{12} \ln Y_2 \ln\left(W_1/W_2\right) + \beta_{13} \ln Y_2 \ln\left(W_3/W_2\right) + \beta_{14} t \ln Y_2 \\
&+ \frac{1}{2}\beta_{15} (\ln W_1/W_2)^2 + \frac{1}{2}\beta_{16} \left(\ln\left(W_3/W_2\right)\right)^2 + \beta_{17} t \ln\left(W_1/W_2\right) \\
&+ \beta_{18} t \ln\left(W_3/W_2\right) + \frac{1}{2}\beta_{19} t^2 + \varepsilon
\end{aligned}
$$

In equation (4), C is total costs, Y_1 is loans, Y_2 is investment (total securities), W_1 is interest expenses, W_2 is personnel expenses and W_3 is other operating costs. After the regression (4) is derived, to achieve the marginal cost, we employ the same technique used in Nguyen et al. (2016) to take the derivative of the cost function in equation (4) with respect to each output and then weighted by the output share. In particular, the following formula is used to derive the marginal cost (Nguyen et al. 2016, p. 1247):

$$
(5)\quad MC = \frac{\partial C}{\partial Y_1} \times \frac{\partial Y_1}{\partial Y} + \frac{\partial C}{\partial Y_2} \times \frac{\partial Y_2}{\partial Y}
$$

After that, we use the following formula to calculate the Learner index:

$$(6) \quad L = \frac{P - MC}{P}$$

In the formula (6), P is price of outputs and MC is marginal cost. It is worth to note that, the Lerner index in fact represents the market power of a bank. In this situation, the higher the index is, the more market power banks have, which, in turn, represents a less competition.

III. Data and Descriptive Statistics

A. Data

We employ a panel bank data set from BankScope for Brazil, Russia, India, China and South Africa (BRICS) from 2001 to 2016. The sample consists of 10,145 bank-year observations for 1,629 banks. Of the 10,145 observations, 9,833 are for commercial banks, 160 for bank holding companies, and 152 for cooperative banks. Exploiting the time-series, we can track competitive dynamics over time. BRICS provide interesting landscape for analyzing the impact of competition since these banking systems experienced rapid expansion.

In addition, data for macroeconomic indicators is largely collected from the World Bank - World Development Indicators.

B. Descriptive Statistics

Table 1 below summarizes the descriptive statistics for data sample. In the sample, a typical bank has NSFR of 0.976, almost meet the requirement under Basel III. Nevertheless, the NSFR is quite spreaded out among bank since the minimum value of this ratio is -0.313 while the maximum value is 14.129 and the standard deviation is 0.336. In regard to the level of competition, the average Lerner index

is 0.458, meaning that a typical bank in BRICS countries has market power to charge a price of about 1.5 times higher than its marginal cost. But this market power varies widely among banks since the standard deviation is 0.261. On average, loans account for 51.7 percent of banks' total assets, indicating a significant role of loans in banks' portfolio. In addition, a typical bank finances 15.9 percent of its total assets by using its equity. Regarding macroeconomic performance, from 2001 to 2016, a typical country in BRICS experiences an annual GDP growth rate of 4 percent and an annual inflation rate of 8.3 percent.

TABLE 1 – DESCRIPTIVE STATISTICS

Variable	Obs	Mean	Std. Dev.	Min	Max
NSFR	10,145	0.976	0.336	-0.313	14.129
Lerner	10,145	0.458	0.261	-1.261	1.084
Bank characteristics					
Equity	10,145	0.159	0.120	-1.269	0.914
Size	10,145	9.255	2.357	3.434	25.619
Loans	10,145	0.517	0.177	0.000	0.972
Country characteristics					
Inflation	8,756	0.083	0.036	-0.074	0.213
GDP growth	9,676	0.040	0.044	-0.078	0.142

Source: Author calculations.

V. Results

A. Main Findings

Table 2 below presents our main findings. In table 2, the column (1) exhibits the results when we do not control for the lagged term of NSFR, bank characteristics and country characteristics. The column (2) shows the results after controlling for those variables. Finally, the column (3) reports the results when adding the squared term of Lerner index.

TABLE 2 - THE EFFECT OF COMPETITION ON LIQUIDITY RISK

	Dependent variable: NSFR		
	(1)	(2)	(3)
Variables	Without control variables	With control variables	With the squared term of Lerner Index
Lerner index$_{t-1}$	-0.0732**	-0.0559**	-0.0587*
	(0.0298)	(0.0250)	(0.0345)
Lerner index$^2_{t-1}$			0.00452
			(0.0477)
NSFR$_{t-1}$		0.440***	0.440***
		(0.0310)	(0.0309)
Equity$_{t-1}$		-0.140**	-0.140**
		(0.0591)	(0.0590)
Size$_{t-1}$		0.00437	0.00433
		(0.00465)	(0.00468)
Loans$_{t-1}$		-0.0630*	-0.0622*
		(0.0336)	(0.0340)
Inflation$_{t-1}$		-0.293***	-0.293***
		(0.0846)	(0.0846)
GDP Growth$_{t-1}$		-0.834***	-0.835***
		(0.0731)	(0.0735)
Constant	1.015***	0.651***	0.651***
	(0.0139)	(0.0619)	(0.0619)
Observations	8,061	7,564	7,564
R-squared	0.003	0.274	0.274
Number of index	1,417	1,377	1,377

Notes: Robust standard errors in parentheses.

Source: Author calculations.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

As we can see in table 2, when we do not control for other variables, the coefficient estimate of the Lerner index is -0.0732 and this coefficient estimate is statistically significant at the 0.05 significant level (column (1)). After controlling for other covariates, the coefficient estimate of the Lerner index slightly changes

from -0.0732 to -0.0559 and the estimate is still significant at the 0.05 significant level (column (2)).

The coefficient estimate of the Lerner index is -0.0559, meaning that when the Lerner index increases (e.g. more market power and less competition), the NSFR on average decreases 0.0559 (e.g. an increase in liquidity risk), holding the other variables constant. This result translates into words is that a reduction in competition in banking systems at BRICS countries is associated with an increase in liquidity risk or in another words, banks at BRICS countries become more fragile if banking systems become more concentrated. This result is consistent with the prediction of Boyd and De Nicoló (2005).

To test the prediction of Martinez-Miera and Repullo (2010) about an U-shaped link between bank competition and stability, we add the squared term of the Lerner index in our model and the column (3) in table 2 report the results. The coefficient estimate of the squared term is not statistically significant. Therefore in our sample data, we do not find a statistically significant evidence to support the prediction of an U-shaped curve, linking bank competition and financial stability.

B. Robustness Checks

Although we use bank fixed effects to mitigate the issue of endogeneity, however, we suspect that the concern is still exist. Hence, we implement robustness check by using two stages least squares with Lerner $index_{t-2}$, $NSFR_{t-1}$, $equity_{t-1}$, $size_{t-1}$, $loans_{t-1}$ enter as instruments. Table 3 reports the comparison between bank fixed effects and two stages least squares.

TABLE 3 – COMPARISON BETWEEN BANK FIXED EFFECTS AND TWO STAGES LEAST SQUARES

	Dependent variable: NSFR	
	(1)	(2)
Variables	Bank Fixed Effects	Two Stages Least Squares
Lerner index$_{t-1}$	-0.0559**	-0.277***
	(0.0250)	(0.0543)
NSFR$_{t-1}$	0.440***	0.414***
	(0.0310)	(0.0162)
Equity$_{t-1}$	-0.140**	-0.0520
	(0.0591)	(0.0466)
Size$_{t-1}$	0.00437	0.0153***
	(0.00465)	(0.00450)
Loans$_{t-1}$	-0.0630*	-0.210***
	(0.0336)	(0.0404)
Inflation$_{t-1}$	-0.293***	-0.235***
	(0.0846)	(0.0821)
GDP Growth$_{t-1}$	-0.834***	-0.526***
	(0.0731)	(0.0706)
Constant	0.651***	0.724***
	(0.0619)	(0.0588)
Observations	7,564	6,009
R-squared	0.274	
Number of index	1,377	1,161

Notes: Robust standard errors in parentheses.

Source: Author calculations.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

In table 3, the coefficient estimate of the Lerner index using bank fixed effects is -0.0559 while the estimate using two stages least squares is -0.277. In regard to the absolute value, the coefficient estimate does change significantly. However, the sign of the coefficient estimate is still a minus sign. This means that when the Learner index increases (e.g. a decrease in competition), the NSFR decreases (e.g.

an increase in liquidity risk) or in another words, a decrease in bank competition in BRICS countries would lead to an increase in liquidity risk. Therefore, the direction in which bank competition affect financial stability is confirmed by using two stages least squares although the absolute value of the coefficient estimate does changes.

V. Conclusion

The evidence in this paper supports the idea that an increase in bank competition would result in an increase in financial stability. From the perspective of policy makers in BRICS countries, the findings in this research suggest that to keep financial markets stable and safe, it is necessary to improve competition in banking sectors.

We are aware that there are still some shortcomings in this paper. Firstly, although we try to mitigate the endogeneity concern by employing bank fixed effects, the problem of endogeneity still exists and therefore, it is desired to have a more appropriate method to deal with. Secondly, generalizability of the results in this paper is limited since BRICS countries can not precisely represent for developing countries. Therefore, a more well-designed method for this paper is necessary in the future.

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