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# THE IMPACT OF FINANCIAL INCLUSION AND MARKET POWER ON BANK STABILITY: PRACTICE IN SIX ASEAN COUNTRIES

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**ABSTRACT**

***This paper aims to explore how financial inclusion and market power impact bank stability in the ASEAN economy. Financial inclusion index – IFI, which is calculated on two dimensions, availability (bank branches, the number of ATMs per 100,000 adults), and usage (volume of credit and deposit from the private sector as a proportion of the country's GDP). Lerner index is considered as the most accurate measure of bank-specific competition. The system generalized method of moments (SGMM) regression method was used to analyze the effect of financial inclusion and market power on bank stability (non-performing loan and Zscore). Due to positive impacts on bank stability, raising the number of deposit accounts at commercial banks and increasing the total volume of credit and deposits are encouraged. Increasing the number of ATMs or/and bank branches, however, needs careful consideration because of the negative effect on Zscore and being able to lead to instability. In addition, we found that banks with higher market power have not to be riddled with non-performing loans and preserve bank stability.***

***Keyword: financial inclusion, bank competition, bank stability.***

## 1. INTRODUCTION

Since the 2008 world economic crisis, policymakers from all around the world have seen the promotion of financial inclusion as a policy priority (Ahamed and Mallick, 2019), and have gone steps to liberalize financial markets (Ariss, 2010). Therefore, promoting financial inclusion and banking competition have attracted the attention of many researchers and politicians, especially the impact of both factors on banking stability (Ahamed and Mallick, 2019). As regards financial inclusion – in other words, promoting formal access to financial services by all economic sectors and being able to use them effectively, is an essential policy at the national level in developing countries, especially in ASEAN – Association of Southeast Asian Nations (MAS, 2006; ADB, 2015; Rahman and Zaini, 2015; Tambunlertchai, 2015; World Bank, 2015; ASEAN, 2020; CARD MRI and UNCDF, 2020). Financial inclusion plays a positive role in economic growth (Demirgüç-Kunt, Honohan and Beck, 2008; Brune *et al.*, 2011; Cole, Giné and Vickery, 2013; Dupas and Robinson, 2013; Jack and Suri, 2014); in sustainable development in eliminating poverty (Ashraf, Karlan, & Yin, 2010; Banerjee & Newman, 1994; Beck, Demirgüç-Kunt, & Levine, 2007; Burgess & Pande, 2005; Jack & Suri, 2014); reduce hunger and increase food security (Brune *et al.*, 2011; Cole, Giné and Vickery, 2013; Janzen and Carter, 2013; Karlan *et al.*, 2014); etc. As regards bank stability, there are dissimilar views about the effect of inclusive finance on bank soundness (Hannig and Jansen, 2010; Neaime and Gaysset, 2018; Ahamed and Mallick, 2019); and there may be a trade-off between the goals of maintaining banking system stability and promoting financial inclusion (Acharya, Hasan and Saunders, 2006; Hannig and Jansen, 2010).

On the other hand, there are many controversies among the authors about the impact of market power on bank stability. Marcus (1984) argues that the competition weakens bank stability, or to be more precise, if there exists bank competition in the deposit market, the value of the bank's franchise will decrease; thereby, the banks adopt a risk-taking strategy. Keeley (1990) performed the US bank experiment that competition subsequently created banks an incentive to take an excessive risk and therefore reduced the

franchise value. At the opposite extreme, Caminal and Matutes (2002) supports the view that competition is not a factor that hurts banks; but the concentration of the banking market is negatively associated with bank insolvency risk. Higher market power and high concentration of a few banks increase the cost of going loans to businesses, causing borrowers to choose risky projects to pay off loans, thereby increasing the risk of corporate default (Boyd and De Nicolo, 2005). More complicated repayment exacerbates borrowers' moral hazard motives, and banks receive the exposure to a riskier group of customers because of adverse selection considerations (De Nicolo and Loukoianova, 2007; Berger, Klapper and Turk-Ariss, 2009; Uhde and Heimeshoff, 2009).

From the above arguments, the authors find that it is necessary to conduct a review of the impact of inclusive finance and competitiveness on the stability of banks in ASEAN countries. Furthermore, finding answers to whether financial inclusion is being promoted in ASEAN countries today and how controlling competition among banks affects bank stability will bring great significance to policymakers in these countries. Our study obtains empirical evidence about the positive impact of financial inclusion and market power on bank stability and highlights that increasing financial inclusion will reduce the impact of market power on bank stability in ASEAN during 2008 – 2020.

In addition to abstract and introduction, the remains are organized as follows: section 2 reviews the relevant literature, including the impact of inclusive finance and market power on bank stability. The estimation procedure for financial inclusion, market power, and bank stability is introduced in Section 3. Section 4 shows the empirical results of inclusive finance and market power affecting bank stability. Finally, section 5 concludes and carries some policy implications.

## 2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

### *2.1. The influence of financial inclusion over bank stability*

Several governments are devising financial inclusion programs as a vital part of their national plan (Ahamed and Mallick, 2019). Financial inclusion is supported by many researchers in its active role in promoting the stability of banks (Hannig and Jansen, 2010; Khan, 2011; Cull, Demirguc-kunt and Layman, 2012; Ahamed and Mallick, 2019). Specifically, Ahamed and Mallick (2019) found that this effect is expressed through two main channels, including deposits and loans. In addition, the impact of financial inclusion is also shown indirectly by promoting sustainable development and creating an environment for the bank to have stability. The positive impact of financial inclusion mentioned above can be explained through the modern portfolio theory of Harry Markowitz, officially published in 1959 (Markowitz, 1976); more specifically, banks can diversify their deposit and lending portfolio towards reaching many potential and small (retail) customers. In other words, through financial inclusion – geographically or demographically penetrating bank branch networks – banks can provide service for a broad range of prospective customers at lower costs once established requisite infrastructure is available (Berger and DeYoung, 2001; Deng and Elyasiani, 2008; Berger, Hasan and Zhou, 2010; Demirgüç-Kunt and Huizinga, 2010). Some authors argue that retail deposits are slow to respond and even insensitive to risk, thereby providing a cheaper, stable and long-term funding source (Calomiris and Kahn, 1991; Song and Thakor, 2007) compared to wholesale funding, is volatile and often expensive (Demirgüç-Kunt and Huizinga, 2010; Huang and Ratnovski, 2011; Poghosyan and Čihak, 2011).

Financial inclusion is also able to help banks increase access to unbanked and/or underbanked areas by extending microcredit, therefore, banks can have more overall lending opportunities, reduce distances and build relationships strongly with customers (Ahamed and Mallick, 2019). Studies have also shown that banks can reduce the risk of lending based on soft information (relational lending) through customer relationships in the developed financial inclusion sector above (Sharpe, 1990; Petersen and Rajan, 1994; Buch, Koch and Koetter, 2012; Beck *et al.*, 2018). In addition, geographical diversification inflates bank value and lessens risk (Akhigbe and Whyte, 2003; Deng and Elyasiani, 2008).

The positive impacts of inclusive finance are reflected in bank deposits, loans, and socioeconomic issues. Several recent studies show that the more financial inclusion is, the lower level

of income inequality and poverty maintains (Burgess and Pande, 2005; Beck, Demirgüç-Kunt and Levine, 2007; Bruhn and Love, 2014); decreases unemployment (Prasad, 2010); improves mental health (Karlan and Zinman, 2009; Angelucci, Karlan and Zinman, 2013); advocates for education (Flug, Spilimbergo and Wachtenheim, 1998); and increases new company establishment (Karlan *et al.*, 2013). These effects can indirectly affect through sustaining inclusive and stable economic growth, which maintains higher efficiency in bank soundness (Hannig and Jansen, 2010; Khan, 2011; Cull, Demirguc-kunt and Layman, 2012; Ahamed and Mallick, 2019).

Studies have yet to show how financial inclusion directly impacts bank stability in developing countries such as the ASEAN region. However, indirectly, studies have identified the role of financial inclusion for economic development in general (Banerjee & Donato, 2021; CARD MRI & UNCDF, 2020)(CARD MRI and UNCDF, 2020; Banerjee and Donato, 2021), thereby creating favorable conditions for bank stability to be maintained (Hannig and Jansen, 2010; Khan, 2011; Cull, Demirguc-kunt and Layman, 2012; Ahamed and Mallick, 2019). Financial inclusion gives the poor opportunities to boost their income (CARD MRI and UNCDF, 2020), and banks can thus attract more prospective depositors and borrowers (Banerjee, Donato, & Maruta, 2020; Han & Melecky, 2014). From the above arguments, the authors support the view that higher financial inclusion leads to more stable banks.

*Hypothesis 1: Financial inclusion has a positive influence on bank stability.*

### *2.2. The influence of bank competition on bank stability*

The relationship between competition - instability was mentioned quite early. The theory supports ambiguous predictions for market power and bank stability (Caminal and Matutes, 2002; Beck, 2008). The first theoretical model to be mentioned was Marcus (Marcus, 1984), and then the first experimental study was carried out by Keeley (Keeley, 1990). Both argue that competition weakens bank stability, and subsequent empirical studies also supported this view (Saunders and Wilson, 1996; Allen and Gale, 1998; Beck, 2008; Berger, Klapper and Turk-Ariss, 2009; Carletti and Vives, 2009; Ariss, 2010). "A monopoly bank is more likely to monitor than competitive banks because market power allows the bank to appropriate a higher proportion of the rents created by monitoring" (Caminal & Matutes, 2002, page 1356).

However, from another perspective, Boyd & Runkle (1993) contradicted such a counterfactual view through basing on two major arguments: ' too big to fail' and 'too big…(to monitor)'. Boyd & De Nicolo (2005) proposed there is no trade-off between competition and instability, or to make it clearer, the higher market power gains, the lower level of competition brings down. High concentration on a few banks increases borrowing costs for businesses, causing borrowers to choose risky projects to pay off loans, thereby increasing the risk of corporate default. This view is supported by many authors, such as Berger et al. (2009); De Nicolo & Loukoianova (2007); Uhde & Heimeshoff (2009).

Banks can exploit scale economies and decrease marginal costs to gain greater market power (Ahamed and Mallick, 2019). Thus, access to low-cost retail deposits will help banks save on marginal costs (the way to calculate marginal costs will be discussed in more detail). Studies have also shown more credit disbursement for small loans, giving banks greater market power (Petersen and Rajan, 1995; Bonaccorsi di Patti and Dell'ariccia, 2004; Ahamed and Mallick, 2019). In Vietnam, Vo Xuan Vinh & Dang Buu Kiem (2016) find that an increase in market power improves the stability of banks. Banks in ASEAN countries are respectively subjected to central banks' supervision, and most of the dominant banks are state ownership (Ovi, Perera and Colombage, 2014). These banks are 'protected' from direct competition (Ariff and Can, 2009; Ovi, Perera and Colombage, 2014) and possess the ability to get low risk customers (Ovi, Perera and Colombage, 2014), which also means such banks expected to have more market power can reduce credit risk. Therefore, in this study, the authors expect that banks in ASEAN with greater market power can affect bank stability positively.

*Hypothesis 2: Market power has a positive influence on bank stability.*

### *2.3. Variables and Data*

**Financial inclusion**

To measure financial inclusion, we use the financial inclusion index – IFI (according to Sarma

2008, 2012), which is calculated on two dimensions basis: availability and usage. Therefore, in this study, we see data on the number of bank branches and the number of ATMs per 100,000 adults to measure the availability dimension, and volume of credit and deposit from the private sector as a proportion of the country's GDP to measure the usage dimension. Calculating this index we use principal components analysis (PCA). In this paper, not only do we use the comprehensive index, IFI, but also utilize each dimension, including IFI for availability ($IFI_a$) and usage ($IFI_u$).

**Market power**

Lerner index is considered as the most accurate measure of bank-specific competition (Berger, Klapper and Turk-Ariss, 2009; Ahamed and Mallick, 2019). The formula is:

$$Lerner_{it} = \frac{P_{it} - MC_{it}}{P_{it}} \qquad (1)$$

where $P_{it}$ is the price of total assets, the ratio of total interest and non-interest income to total assets for bank *i* at time *t* ; $MC_{it}$ is the marginal cost for bank *i* at time *t*. To determine $MC_{it}$, the authors collect data on total costs, labor costs, operating and management costs, and interest expenses of banks and financial institutions and use Fixed-Effects regression to calculate coefficients. The formula for calculating marginal cost is the logarithmic function of cost conversion, with the formula:

$$\ln C_{it} = \beta_0 + \beta_1 \ln TA_{it} + \frac{1}{2}\beta_2 (\ln TA_i)^2 + \sum_{j=1}^{3} \gamma_{kt} \ln W_{k,it} + \sum_{k=1}^{3} \emptyset_k \ln TA_i \, W_{k,it} + \sum_{k=1}^{3}\sum_{j=1}^{3} \ln W_{k,it} \ln W_{j,it} + \varepsilon_{it} \qquad (2)$$

Where: $C_{it}$: Total cost of the bank (interest expense and non-interest expense)

$TA_{it}$: total assets of bank i at time t

$W_{k,it}$: input price of three costs (labor, funds, and fixed capital). According to De Guevara et al., these prices are calculated (De Guevara *et al.*, 2005) by: *Price of labor:* Cost of personnel/Total assets. The labor cost to total assets ratio can be used where data is unavailable. *Price of capital:* Operating costs (minus personnel costs)/Fixed assets. *Price of funds:* Interest cost on total deposits.

After running FEM regression according to the above equation, the regression coefficients are estimated, and marginal cost ($MC_{it}$) is calculated according to the following formula:

$$MC_{it} = \frac{1}{2}\left[\beta_1 + \beta_2 \ln TA_i + \sum_{k=1}^{3} \emptyset_k W_{k,it}\right] \qquad (3)$$

After obtaining the marginal cost $MC_{it}$, substitute this result into the Lerner calculation formula (Formula 1), and the required Lerner index will be calculated. Such a higher index means the greater market power, which implies less competition (Ahamed and Mallick, 2019).

**Bank stability**

Banking instability can also manifest in the insolvency of banks, often characterized by large amounts of unanticipated bad loans (Guy and Lowe, 2011; Ngalawa, Tchana and Viegi, 2016). Therefore, we first use the traditional measure – non-performing loan (NPL) to total loan ratio (Martinez Peria and Schmukler, 2001; Nier and Baumann, 2006; Guy and Lowe, 2011; S.Kasman and A.Kasman, 2015; Fernández, González and Suárez, 2016). Such a ratio should be as low as possible, or in other words, the less NPL represents for the more stable bank.

In addition, we accept the notion of bank stability as a lack of insolvency (Roy, 1952; Laeven and Levine, 2009; Bai and Elyasiani, 2013; Ngalawa, Tchana and Viegi, 2016), and thus, employ a score widely used – Zscore – which is considered as bank's probability of insolvency (Ahamed and Mallick, 2019) and a performance indicator for bank risk (Laeven and Levine, 2009; Ariss, 2010; Houston *et al.*, 2010; Fang, Hasan and Marton, 2014; Ahamed and Mallick, 2019). Zscore is a composite measure of stability that considers the overall stability of a financial institution without regard to the source of risk (Ashraf et al., 2016) and can reasonably predict the 76% probability of bank failure (Chiaramonte *et al.*, 2016). We calculate the Zscore following Laeven & Levine (2009) as:

$$Zscore_{it} = \frac{ROA_{it} + EQA_{it}}{\sigma(ROA)_{it}} \qquad (4)$$

Where:

$ROA_{it}$: the return on assets ratio of bank i in year t,

$EQA_{it}$: the equity to assets ratio of bank i in year t,

$\sigma(ROA)_{it}$ is the standard deviation of return on assets of bank i in year t.

Assuming the bank's profitability is typically distributed, the inverse Zscore can be used to estimate the probability of a bank's default (Laeven and Levine, 2009; Jiménez, Lopez and Saurina, 2013; Goetz, 2015) i.e., a higher Zscore means more stability. In this study, we use the natural logarithm of Zscore in order to reduce skewness (Laeven and Levine, 2009; Ahamed and Mallick, 2019).

**Other control variables**

Other control variables include an array of bank characteristics and macroeconomic variables. We use the logarithm of total assets as a proxy for the bank size effect, loan loss provision (to total loans) to account for individual bank's loan portfolio risk, the ratio of non-interest income to total operating income representing for income diversification, the equity ratio (to total assets) to account for capitalization, total earning assets to total assets for management quality, GDP growth rate as a proxy for economic growth.

Our models have the form:

$$Bank\ Stability_{ijt} = \beta_0 + \beta_1 IFI_{kjt} + \beta_2 Lerner_{ijt} + \beta_3 ln(TA)_{ijt} + \beta_4 LossProv_{ijt} + \beta_5 NonIncome_{ijt} + \beta_6 EQA_{ijt} + \beta_7 EatoTA_{ijt} + \beta_8 GDPrate_{jt} + \varepsilon_{ijt}$$

$$Bank\ Stability_{ijt} = \beta_0 + \beta_1 IFI_{kjt} * Lerner_{ijt} + \beta_2 Lerner_{ijt} + \beta_3 ln(TA)_{ijt} + \beta_4 LossProv_{ijt} + \beta_5 NonIncome_{ijt} + \beta_6 EQA_{ijt} + \beta_7 EatoTA_{ijt} + \beta_8 GDPrate_{jt} + \varepsilon_{ijt}$$

Where: *i, j* and *t* subscripts indicate bank, country, and year, respectively,

*Bank stability* includes ln(Zscore) and NPL

$IFI_k$ includes IFI, $IFI_a$, $IFI_u$.

**Instrumental variables**

In this study, we also selected two instrumental variables to perform SGMM regression: asset size and phone service subscription index per 100 people (taken from World Development Indicators). In the first instrument variable, according to (Sarma and Pais, 2011), the factor affecting the level of financial inclusion is related to bank size, which is measured through the logarithm of total assets. In the second instrument variable, this metric includes the number of postpaid subscriptions and the number of active prepaid accounts (i.e., used in the last three months). A large number of mobile subscriptions can increase their mobile transactions and thus facilitate many people to enter the formal financial sector through the mobile transaction (money transfer) system m-transfer, which can affect financial inclusion (Ahamed and Mallick, 2019). In this study, we choose the natural logarithm of the telephone service registration index per 100 people to reduce the large gap between countries.

## 3. RESULTS AND DISCUSSIONS

### 3.1. Descriptive statistics

The results of descriptive statistics are shown in Table 1 which provides mean, standard deviation, minimum, maximum values, and observations of variables. The standard deviations of most of variables are less than their means, showing that data are clustered around the mean.

**Table 1. Descriptive statistics**

| Variable | Mean | Std. Dev | Min | Max | Obs. |
|---|---|---|---|---|---|
| ***lnZscore*** | **4.0590** | **1.1226** | **-1.1696** | **7.4862** | **1.155** |
| ***NPL*** | **0.0227** | **0.0197** | **0** | **0.1780** | **1.084** |
| ***IFI*** | **0.3076** | **0.1766** | **0.1495** | **0.8220** | **1.308** |
| ***IFIa*** | **0.1944** | **0.0817** | **0.0601** | **0.3129** | **1.326** |
| ***IFIu*** | **0.1142** | **0.0676** | **0.0424** | **0.4990** | **1.326** |
| ***Lerner*** | **0.2986** | **0.1007** | **-0.1088** | **0.6426** | **1.067** |
| ***lnTA*** | **15.7680** | **1.9010** | **9.597** | **20.0469** | **1.228** |
| ***LossProv*** | **0.0087** | **0.0087** | **-0.0092** | **0.4048** | **1.177** |
| ***NonIncome*** | **0.9566** | **0.9086** | **-3.9479** | **6.6814** | **1.197** |

| | | | | | |
|---|---|---|---|---|---|
| ***EQA*** | **0.1094** | **0.0616** | **-0.0147** | **0.8899** | **1.226** |
| ***EAtoTA*** | **0.8575** | **0.0757** | **0.5503** | **0.9854** | **1.034** |
| ***GDPrate*** | **0.0545** | **0.0157** | **-0.0151** | **0.1453** | **1.326** |
| | | | | | |

*Source: Authors' estimates by using STATA 16 Software.*

For the dependent variables, the mean of lnZscore and NPL are 4.0590 and 0.0227, with the standard deviation of 1.1226 and 0.0197. The moderately high result of standard deviation indicates that the levels of bank stability cross-country are at variance. Regarding the variable of interest, the mean of the IFI is 0.3076, where availability, and usage dimensions are 0.1944 and 0.1142, respectively, with the standard deviation of 0.1766 that point to considerable heterogeneity in financial inclusion across six countries in ASEAN. In addition, Lerner index also gains 0.2986 on average and the standard deviation of 0.1007.

### *3.2. Financial inclusion and bank stability*

Regarding non-performing loans (NPL), such a bank stability measure results show that financial inclusion has a positive effect. For more detail information presented in Table 2, the regression coefficients of the independent variables representing financial inclusion are all positive and statistically significant (except for the coefficient of the variable IFIp).

**Table 2. Impact of financial inclusion on non-performing loans**

| | **NPL** | | |
|---|---|---|---|
| **Variables** | IFI<br>(1) | IFIa<br>(2) | IFIu<br>(3) |
| **l.(NPL)** | 0.5671*** | 0.5506*** | 0.5581*** |
| **$IFI_k$** | -0.0040** | -0.0177*** | -0.0276*** |
| **Lerner** | -0.0015* | -0.0022*** | 0.0005 |
| **lnTA** | -0.0018*** | -0.0020*** | -0.0014*** |
| **LossProv** | 0.5036*** | 0.5042*** | 0.5175*** |
| **NonIncome** | 0.0002*** | 0.0002*** | 0.0002*** |
| **EQA** | -0.0074** | 0.0081*** | -0.0185*** |
| **EAtoTA** | -0.0102*** | -0.0090*** | -0.0093*** |
| **GDPrate** | -0.1071*** | -0.1151*** | -0.1036*** |
| **Constant** | 0.0544*** | 0.0586*** | 0.0500*** |
| **Observations** | 749 | 749 | 749 |
| **AR2** | 0.232 | 0.240 | 0.224 |
| **Hansen** | 0.417 | 0.435 | 0.383 |
| *****, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively** | | | |

Source: *Authors' estimates by using STATA 16 Software.*

Specifically, the IFI, IFIa, and IFIu have regression coefficients of -0.0040; -0.0177; -0.0276. These coefficients show that when the aggregate IFI increases by 0.01, the NPL reduces by 0.0040 units; while the component IFIs (IFIa and IFIu) change 0.01 units, the NPL will change in the same direction and change by 0.0177 and 0.0276 units, respectively. Thus, this result shows that the more comprehensive financial inclusion is, the lower the NPL ratio, thereby keeping the bank safer and more stable. Adasme, Majnoni, & Uribe (2006) have results showing that in Chile, small loans providing a favorable cheaper, and broader supply of credit to the low-income segment of the population can be risk–controlled by relying on "relationship" lending technologies (characterized by asymmetric distributions) and banks, thus, can diminish risk from non-performing loan and become stabilization.

Regarding ln(Zscore), the regression results from the SGMM estimation model show that financial inclusion positively impacts banking stability in ASEAN countries over the 13 years from 2011 – 2023 (after controlling for country and bank-level variables). Most of the regression coefficients in different models - collected by the author in Table 3 - have the expected direction and are statistically significant.

**Table 3. Impact of financial inclusion on Zscore**

| *Variable* | *ln(Zscore)* | | |
|---|---|---|---|
| | IFI<br>(1) | IFIa<br>(2) | IFIu<br>(3) |
| ***l.ln(Zscore)*** | 0.4549*** | 0.4427*** | 0.4136*** |
| ***IFIk*** | 0.3603*** | -1.3399*** | 1.8096*** |
| ***Lerner*** | 1.2139*** | 0.9039*** | 1.2601*** |
| ***lnTA*** | 0.1005*** | 0.1589*** | 0.1085*** |
| ***LossProv*** | -8.4355*** | -11.7649*** | -8.0504*** |
| ***NonIncome*** | -0.0008** | -0.0011*** | -0.0007 |
| ***EQA*** | 6.5718*** | 10.3806*** | 6.6150*** |
| ***EAtoTA*** | 1.1926*** | 1.6175*** | 1.2603*** |
| ***GDPrate*** | 4.9297*** | 4.2427*** | 4.7593*** |
| ***Constant*** | -1.4524*** | -2.6115*** | -1.5553*** |
| ***Observations*** | 927 | 927 | 927 |
| ***AR2*** | 0.210 | 0.170 | 0.159 |
| ***Hansen*** | 0.681 | 0.600 | 0.732 |
| ******, **, and *: statistical significance at the 1%, 5% and 10% levels respectively*** | | | |

Source: *Authors' estimates by using STATA 16 Software.*

Table 3 shows that index of financial inclusion - IFI, has a beneficial influence on bank stability through the representative variable Zscore – in this paper, we use ln(Zscore) – with 99% confidence. The estimate of the IFI coefficient is 0.3603, indicating that if the IFI rises 0.01, and the Zscore increases by 0.3603%.

In term of each financial inclusion dimension, usage – IFIu, have positive results for bank stability. However, the IFIa index has a different result, with a regression coefficient of -1.3399; it is seen that in terms of availability, an increase in ATMs or bank branches harms Zscore, or in other words, has a negative effect on profitability and increase the probability of bank failure. This result is consistent with the research results of Neaime and Gaysset when the number of bank branches is increased, which hurts financial stability (Neaime and Gaysset, 2018). Garcia also showed that there are high transaction costs in developing or rural countries, making it unprofitable to open a bank branch or financial service point, thereby negatively affecting bank stability (Garcia, 2016). Le and Ngo also support this view and encourage the reduction of bank branches (Le and Ngo, 2020).

### *3.3. Bank competition and bank stability*

In this study, the authors use the Lerner index to measure the level of competition among banks. Regression results show that this index has a positive regression coefficient for variables of bank stability. Table 3 shows that the regression coefficient of the Lerner index on non-performing loans (statistically significant 95 – 99%) in models (1), (2), and (3), respectively, is 0.0015, 0.0020, and 0.0022. The regression coefficients on lnZscore in the models of Table 3 are all significantly positive. Both tables show that the results point out a significant and beneficial influence of banks' market power on stability. Our finding suggests that banks with a higher level of market power also enjoy higher stability - the non-performing loan ratio will decrease, and the Zscore will increase. Our findings for ASEAN

countries are in line with many authors (Saunders and Wilson, 1996; Allen and Gale, 2004; Beck, 2008; Berger, Klapper and Turk-Ariss, 2009; Carletti and Vives, 2009; Ariss, 2010; Ahamed and Mallick, 2019). These studies all agree that a rising level of pricing power or an increasing degree of bank competitiveness can enhance banking safety and contribute to economic stability in developing countries.

Although the research results show that increasing financial inclusion and market power both increase the stability of banks, the combination of financial inclusion and market power shows interesting results. Specifically, Table 4 shows that the interaction variables between financial inclusion and market power (IFIk * Lerner) have coefficients in the models that have negative signs and are statistically significant at 1%. Thus, increasing financial inclusion will reduce the impact of market power on bank stability. This result can be explained by the fact that in an inclusive finance sector, each bank can access and provide low-cost financial services to more retail customers (including ones from disadvantaged segments of society) due mainly to the advancement of innovative technology (Harper and Arora, 2005; Ahamed and Mallick, 2019), thereby promoting bank competition. As a result, increased financial inclusion will reduce the influence of market power on bank stability.

**Table 4. Competition, financial inclusion, and bank stability**

| *Variable* | IFI<br>(1) | IFIa<br>(2) | IFIu<br>(3) |
|---|---|---|---|
| *NPL* | | | |
| $IFI_k$ * Lerner | 0.0774*** | 0.0681*** | -0.2667*** |
| Lerner | -0.03143*** | -0.0178*** | 0.0207*** |
| *ln(Zscore)* | | | |
| $IFI_k$ * Lerner | -6.3622*** | 34.6815*** | -50.2492*** |
| Lerner | 3.9341*** | -7.1648*** | 6.7636*** |

***, **, and * indicate statistical significance at the 1%, 5% and 10% levels respectively.

Source: *Authors' estimates using STATA 16 Software*

## 4. CONCLUSION

Both financial inclusion and bank competition, as mentioned earlier, do have a positive impact on bank stability in the ASEAN economy. This paper uses a sample of 102 banks in six countries of ASEAN within a 13-year period from 2008 to 2020, and we find the result showing a higher level of financial inclusion contributes to greater bank stability. Those banks with higher market power have not to be riddled with non-performing loans and preserve bank stability. In the inclusive financial sector, however, market power affecting stability is diminished. Or to make it clearer, accessing more customers at lower costs can reduce the level of bank competition, and increased financial inclusion will reduce the effect of market power on bank stability. Our results have important policy implications suggesting that bank stability is strongly ensured by the level of financial inclusion; therefore, rising the total volume of credit and deposits are encouraged. The growing number of ATMs or/and bank branches, however, requires careful consideration because the results show that this de can negatively affect profitability and lead to instability.

## 5. ABBREVIATIONS

ASEAN: The Association of Southeast Asian Nations; ADB: Asian Development Bank; CARD: the Center for Agriculture and Rural Development; MRI: Mutually Reinforcing Institutions; UNCDF: United Nation Capital Development Fund; MAS: Monetary Authority of Singapore; US: United State; GDP: Gross domestic product.

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