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Effects of Financial Inclusion and Openness on Banking Stability: Evidence from Developing and Developed Countries

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Abstract

This study seeks to contribute to the emerging debate regarding the effects of financial inclusion and openness on banking stability. Panel data from 217 developing and developed countries from 2004 to 2017 showed that financial inclusion did not affect banking stability. However, financial openness significantly affected banking stability in all countries worldwide. Furthermore, the interaction of financial inclusion and openness had a significant positive effect on banking stability in developing and all countries worldwide. This finding indicates that the more funds obtained by banks from the implementation of financial inclusion policy and financial openness policy, the greater the potential for banks to maintain their stability. Therefore, to maintain bank stability, each country needs to synchronize its policies on financial inclusion and financial openness. This finding also contributes to the literature on understanding the essential financial inclusion policies and financial openness to improve bank stability.

Keywords: banking stability; financial inclusion; financial openness

JEL classifications: F65; G15; G21

1. Introduction

The impact of the global financial crisis is a valuable lesson for countries to emphasize the importance of banking stability, as banking was under the spotlight because it contributed to the global financial crisis in 2008. Lending by banks without prudential considerations increased credit risk and led to the global crisis.

Banking stability is crucial because banks still dominate the financial system (Moyo et al. 2012). Banking instability is likely to spread across banks because of their interconnectedness. As a result, financial system instability occurs when more banks become unstable. Banking also plays an intermediary role in the global economy by providing financial services to individual households and corporations, and therefore their performance affects the economy (Ahamed & Mallick 2019).

Because of the financial benefits to public service, 55 more countries have committed to implementing financial inclusion since 2011. Furthermore, more than 60 countries have made national strategies to promote financial inclusion. Implementing a financial inclusion program for banking stability is challenging because the two have a tricky relationship. Financial inclusion may promote banking stability through the banking intermediary function. However, increased financial inclusion may also threaten banking stability through asymmetric information, adverse selection, and moral hazard.

Financial openness is another critical factor for banking stability. The global financial crisis that originated in the United States spread quickly to various countries to a large extent due to financial openness. A country's financial openness has both benefits and risks. For instance, it allows foreign

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funding to increase a country's deposit base. However, it also affects the volatility of financial flows and foreign policies affecting them, and therefore possibly causes a negative shock. Therefore, financial openness may reduce a country's resilience (Piersanti 2012).

Previous studies have attempted to examine the relationships between these factors. Ahamed & Mallick (2019), for example, examined the relationship between financial inclusion and banking stability. Moreover, Ashraf (2018) examined the effects of trade and financial openness on financial development. This present research extends these prior studies by building a banking stability model involving the variables of financial inclusion and openness simultaneously. By doing so, this study seeks to examine whether the relationship of the two variables strengthens or weakens bank stability.

The measurements of financial inclusion variables and banking stability used in this study are different from those used by Al-Smadi (2018), Amatus & Alireza (2015), Brei, Gadanecz & Mehrotra (2020), Morgan & Pontines (2018), Neaime & Gaysset (2018), and Siddik & Kabiraj (2018). In addition, while Ahamed & Mallick (2019) used banking-level data, while this study uses country-level data. Furthermore, this study analyzes the differences in the effects of financial inclusion and openness on banking stability in developing and developed countries. The countries were grouped as developing and developed because economic development determines vulnerability to crises (Ali, Intissar & Zeitun 2015).

2. Literature Review

Arrow & Debreu (1954) developed a General Equilibrium Model that could be implemented on market intermediation banks. The model is the foundation of the theoretical linkage between financial inclusion and banking stability. Financial inclusion encourages banking stability, especially when more individuals save at the bank. As a result, the bank has an additional reserve to enable itself to maintain its stability. However, financial inclusion potentially disrupts bank stability when the savings are lent without considering prudential aspects.

The Bank Runs Theory by Diamond & Dybvig (1983) states that banks are vulnerable to instability. Banks can make decisions that make depositors hesitate or lose confidence in the banks' performance. Depositors may then massively withdraw their savings from the banks. In consequence, a bank run happens when banks are unable to replace the withdrawals by the depositors. The Bank Runs Theory is useful as a theoretical basis for the effect of financial inclusion on banking stability. A high financial inclusion increases third-party funds to be obtained by banks. Abundant third-party funds enable banks to take risks, making depositors doubt the return of their funds deposited. This makes depositors withdraw their funds, leading to bank runs and increased risk of instability.

The theory of market failure due to uncertain asymmetric information and adverse selection was pioneered by Akerlof (1970). This theory states that the market is inefficient because of asymmetric information and adverse choices, which can also happen in the credit markets. Banks need to implement financial inclusion program by aggressively channeling credit to the public. This encourages access to financial services in the community. Excessive lending by banks threatens their stability due to asymmetric information, adverse selection, and moral hazards from credit recipients.

The Financial Instability Hypothesis also explains the relationship between financial inclusion and banking stability. According to Minsky (1992), this hypothesis explains the impact of credit on banking stability. It focuses on the bank activities that pursue profit without adequately considering the stability aspects. Banking pursues profit by extending credit to finance various activities or to other banks. This behavior resembles a capitalist economy in which various innovations are made to pursue profit. In this case, banks act as creditors by managing their assets or debts for profit. Furthermore, they actively

extend credit in the context of financial inclusion. Therefore, disbursing credit without considering the health aspect will threaten the bank's stability.

Various empirical studies have contributed to the debate on the effects of financial inclusion on banking stability. Khan (2011) found that financial inclusion maintains banking stability. When more people access financial services, increased third-party funds are obtained and managed by banks as reserves to anticipate business risks. As a result, banking stability is sustainably maintained. Additionally, banks diversify their assets to reduce crisis risk and increase deposits. This reduces reliance on risky funding and promotes the efficiency of monetary policy. Moreover, Ahmed, Juliot, & Abid (2015), Amatus & Alireza (2015), Al-Smadi (2018), Morgan & Pontines (2018), Neaime & Gaysset (2018), Siddik & Kabiraj (2018), Ahamed & Mallick (2019), and Brei, Gadanecz & Mehrotra (2020) found that full access to financial services boosts the resilience of the banking system and deposit base.

However, some findings have shown that financial inclusion threatens banking stability. Public access to financial services can be improved by banks by providing cheap credit, lowering lending standards, and presenting uncredible microfinance institution (Khan 2011). Banking stability is threatened when these efforts are carried out without prudence (Koong, Law & Ibrahim 2017). Batuo, Mlambo & Asongu (2018) also found that financial development has a significant positive effect on banking instability.

Empirical studies have shown inconclusive evidence of the impact of financial openness on banking stability. Financial openness reduces banks' short and long-term risk-taking behavior. Moreover, banks in more open countries are likely to survive future financial crises (Rahman et al. 2020). In line with this, Bui & Bui (2020) showed that financial openness disciplines banks in taking risks to create stability. These results are indirectly related to Cubillas & González's (2014) findings suggesting that financial liberalization harms bank stability. Financial liberalization in developing countries threatens banking stability because of increased risk-taking behavior. In developed countries, liberalization threatens bank stability due to high competition, increasing risk-taking behavior. The high financial openness increases foreign investment in a country. Consequently, the country incessantly channels credit at low-interest rates, which leads to banking behavior threatening stability (Bourgain, Pieretti & Zanaj 2012; Ashraf 2018).

3. Method

This study uses panel data involving time-series data from 2004 to 2017 and cross-section data for 217 countries worldwide. Secondary data were obtained from the World Bank, International Monetary Fund, and other relevant sources. The dependent variable is bank stability, indicated by the Bank Z-Score and Non-Performing Loans. These aspects help determine the continuity of the banking intermediation function reflecting stability. There are three variables of interest in this study, namely (1) financial inclusion, proxied through the index adopted from Sarma (2015), which is arguably the most comprehensive measurement, (2) financial openness, determined by the exportation and importation of banking financial services, and (3) the interaction between financial inclusion and openness measured by multiplying the two. Several control variables were also used, including capital adequacy, liquidity, efficiency, profitability, concentration, interest rates, liquid reserves, GDP, inflation, and exchange rates.

The financial inclusion index by Sarma (2015) is built on three dimensions, namely:

Dimension 1 (d_1) : Penetration (Number of savings and credit accounts at commercial banks);
Dimension 2 (d_2) : Availability (Number of branch offices and commercial bank ATMs);
Dimension 3 (d_3) : Usage (Total savings and credit at commercial banks per GDP).

The calculation method is expressed in the following

equation.

$$d_{ij} = w_{ij}\frac{A_{ij} - m_{ij}}{M_{ij} - m_{ij}} \quad (1)$$

where:

d_{ij} : Dimension i;
w_{ij} : Weighted value for indicator j in dimension i, $0 \leq w_i \leq 1$;
A_{ij} : Value of the latest changes in indicator j in dimension i;
m_{ij} : Minimum value of indicator j in dimension i (lower limit);
M_{ij} : Maximum value of indicator j in dimension i (upper limit).

Each dimension is given the same weight of 1. The lower and upper limits for each indicator are 0 and the 90thth percentile, respectively. The upper limit is determined to avoid outlier values when using the maximum value of each indicator. When the indicator value exceeds the 90thth percentile, it is changed by the 90th percentile value.

The financial inclusion index (IFI) is calculated using the following equations.

$$X_1 = \frac{\sqrt{d_1^2 + d_2^2 + d_3^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2}} \quad (2)$$

$$X_2 = 1 - \frac{\sqrt{(w_1 - d_1)^2 + (w_2 - d_2)^2 + (w_3 - d_3)^2}}{\sqrt{w_1^2 + w_2^2 + w_3^2}} \quad (3)$$

$$IFI = \frac{1}{2}(X_1 + X_2) \quad (4)$$

The IFI value is between 0 and 1. When the IFI value approaches 0, it is more exclusive, and when it is close to 1, this implies more financial inclusion services in a country or region.

The suitable technique used to estimate the dynamic panel data model is the Generalized Method of Moments for Dynamic Panel Data (Baltagi 2005; Ekananda 2019). This method was used because the study variables are macro-level data with significant potential violation of strict exogeneity assumption. Therefore, the Generalized Method of Moments for Dynamic Panel Data was used to resolve the endogeneity problem that can lead to bias in the results. Moreover, the method does not require external instruments to overcome the endogeneity problem (Arellano & Bover 1995; Blundell & Bond 2000).

The estimation specifications of this study are as follows:

$$\begin{aligned} BS_{it} = {} & c_i + \alpha BS_{it-1} + \beta_1 FI_{it} + \beta_2 FO_{it} + \beta_3 CA_{it} \\ & + \beta_4 L_{it} + \beta_5 E_{it} + \beta_6 P_{it} + \beta_7 BC_{it} + \beta_8 IR_{it} \\ & + \beta_9 R_{it} + \beta_{10} GDP_{it} + \beta_{11} I_{it} + \beta_{12} ER_{it} \\ & + \varepsilon_{it} \end{aligned} \quad (5)$$

$$\begin{aligned} BS_{it} = {} & c_i + \alpha BS_{it-1} + \beta_1 FI_{it} \times FO_{it} + \beta_2 CA_{it} \\ & + \beta_3 L_{it} + \beta_4 E_{it} + \beta_5 P_{it} + \beta_6 BC_{it} + \beta_7 IR_{it} \\ & + \beta_8 R_{it} + \beta_9 GDP_{it} + \beta_{10} I_{it} + \beta_{11} ER_{it} \\ & + \varepsilon_{it} \end{aligned} \quad (6)$$

where i represents the country, t is the year, BS is the bank stability, FI is financial inclusion, FO is financial openness, FIFO is interaction between financial inclusion and openness, CA is capital adequacy, L is liquidity, E is bank efficiency, P is profitability, BC is concentration, IR is the interest rate, and R is liquid reserve. GDP is Gross Domestic Product, I is inflation, ER is the exchange rate, c is unobserved heterogeneity, and ε is an idiosyncratic error.

4. Results and Analysis

Table 1 presents the summary of the variable statistics used in this study. The lowest Bank Z-Score at 0.04 in 2005 was recorded in Syria, a developing country. The highest was recorded in Libya, also a developing country, at 63.4 in 2011. The average Bank Z-Score of developed countries during the period was 15.05, which was higher than that of developing countries. However, the Bank Z-Score standard deviation of developed countries was 8.6, or lower than that of developing countries. This indicates that the Bank Z-Score values were more varied in developing than in developed countries.

Table 1. Summary of Variable Statistics

	Min	Max	Mean	Std. Dev.
Bank Z-Score				
Developing countries	.044808	63.4094	13.77893	9.378029
Developed countries	.0167	48.5169	15.05693	8.568608
Non-Performing Loan				
Developing countries	.390536	54.5413	7.446546	6.579664
Developed countries	.092335	54.05	4.966823	7.23131
Financial Inclusion Index				
Developing countries	.002079	.767231	.2610073	.1726589
Developed countries	.103101	1	.5403164	.1843734
Financial Service Trade				
Developing countries	-39.95929	129.6166	11.39201	11.93698
Developed countries	.6630112	144.1975	17.22636	21.18728
Capital				
Developing countries	1.49041	30.5	11.29995	3.851524
Developed countries	2.7	21.0568	8.103989	3.07769
Loan and Deposit Ratio				
Developing countries	18.5734	878.839	96.54798	75.94706
Developed countries	17.7947	367.077	113.8364	50.81317
Operation Cost per Operation Income				
Developing countries	22.298	146.853	57.12722	12.70539
Developed countries	19.8953	112.766	54.79841	14.07914
Net Interest Margin				
Developing countries	.068737	21.186	5.749963	2.613305
Developed countries	.125579	23.1671	2.501409	1.53664
Bank Market Share				
Developing countries	17.164	100	61.99093	17.18807
Developed countries	21.443	99.7801	68.82357	16.53308
Interest Rate				
Developing countries	-22.523	72.4	7.685522	7.342496
Developed countries	-1.112	55.804	4.317133	2.409235
Liquid Reserves and Assets Ratio				
Developing countries	1.137	390.11	25.94599	26.15657
Developed countries	.205	77.207	11.12918	10.31645
GDP Growth				
Developing countries	-62.076	123.14	4.41849	5.798997
Developed countries	-22.857	30.612	2.564592	4.790037
Inflation				
Developing countries	-60.496	513.907	7.027308	14.20827
Developed countries	-30.243	47.776	2.572709	3.484812
Exchange Rate				
Developing countries	.044	6.70e+09	3809931	1.60e+08
Developed countries	.269	1276.93	47.07883	168.0257

The lowest Non-Performing Loans were recorded in 2013 in Macau, amounting to 0.09. The highest non-performing loans were recorded in Ukraine, a developing country, in 2017. Ukraine recorded Non-Performing Loans amounting to 54.5%, meaning that more than half the credits disbursed could not be repaid at maturity. The average value of Non-Performing Loans in developed countries during the period was 5%, or lower than that in developing countries. Also, the standard deviation of Non-Performing Loans in developed countries was 7.2, or higher than that in developing countries. This indicates that Non-Performing Loans were more stable in developed than in developing countries.

Financial Inclusion Index lows were recorded in Vietnam in 2004, in which the numbers reached 0.002. The highest record for the Financial Inclusion Index was 1, recorded in San Marino from 2014 until 2017. This indicates that San Marino was relatively more financially inclusive than any other country worldwide. The average value of Financial Inclusion Index in developed countries was 0.54, or higher than that in developing countries. Also, the standard

deviation of the Financial Inclusion Index values in developed countries was 0.18, or higher than that in developing countries. Therefore, the values of the Financial Inclusion Index were more varied in developed than in developing countries.

The lowest Financial Service Trade in developing countries was recorded in Laos in 2007, at -39.95%. During the period, Financial Services Trade recorded its highest amount at 144.19 in Luxembourg in 2006. The average value of Financial Services Trade in developed countries was 17.2%, or higher than that in developing countries. Also, the standard deviation of the values of the Financial Services Trade in developed countries was 21.18, or higher than that in developing countries. This shows that the values of trade in financial services were more varied in developed than in developing countries.

The correlations between the variables were considered to avoid potential multicollinearity. Table 2 presents the correlation coefficients between variables.

A variable has a strong relationship when its correlation coefficient exceeds 0.8 (Rule of Thumb). Table 2 shows no strong relationships between variables as referred to in the Rule of Thumb. Therefore, all the variables used in this study avoid the potential for multicollinearity. However, the correlation coefficients between the variables of financial inclusion and openness, and their interaction variable were relatively higher (0.6 and 0.7) than the correlations between other variables. Therefore, a separate model was developed between financial inclusion and openness, and their interaction variable.

Using the Bank Z-Score as the dependent variable, the estimation results of the effects of Financial Inclusion and Openness on bank stability are presented in Table 3.

Columns (1) and (2) show the estimation results for developing countries, indicating that financial inclusion had no significant effect on the Bank Z-Score. Conversely, financial openness had a significant positive effect on the Bank Z-Score. The coefficient of the influence of financial openness on the Bank Z-Score was 0.03, which means that every 1% increase in financial openness increased the Bank's Z-Score by 0.03%. The interaction between financial inclusion and openness did not affect the Bank Z-Score.

Columns (3) and (4) show the estimation results for developed countries, indicating that financial inclusion and openness did not affect the Bank Z-Score. Moreover, the interaction of financial inclusion and openness also did not affect the Bank Z-Score.

Columns (5) and (6) show the estimation results for all countries worldwide, indicating that financial inclusion did not affect the Bank Z-Score. However, financial openness had a significant positive effect on the Bank Z-Score. The influence coefficient of financial openness on the Bank Z-Score was 0.04. This means that every 1% increase in financial openness increased the Bank's Z-Score by 0.04%. The interaction between financial inclusion and openness significantly affected the Bank Z-Score, with the influence coefficient of 0.124. This means that every 1% increase in financial inclusion and openness increased the Bank's Z-Score by 0.124%.

Using the Non-Performing Loans as the dependent variable, the estimation results of the effects of financial inclusion and openness on bank stability are presented in Table 4.

Columns (1) and (2) show the estimation results for developing countries, indicating that financial inclusion did not affect Non-Performing Loans. However, financial openness had a significant negative effect on Non-Performing Loans. The influence coefficient of financial openness on Non-Performing Loans was -0.061, which indicates that every 1% increase in financial openness reduced Non-Performing Loans by 0.061%. The interaction between financial inclusion and openness had a significant negative effect on Non-Performing Loans, with a coefficient of -0.206. Therefore, every 1% increase in financial inclusion and openness reduced Non-Performing Loans by 0.206%.

Table 2. Correlations between Independent Variables

	FI	FO	FIFO	CA	L	E	P	BC	IR	R	GDP	I	ER
FI	1.0												
FO	0.1	1.0											
FIFO	0.6	0.7	1.0										
CA	-0.2	-0.1	-0.2	1.0									
L	0.3	0.0	0.1	0.2	1.0								
E	-0.2	-0.1	-0.2	0.2	0.1	1.0							
P	-0.5	0.0	-0.3	0.4	0.0	0.3	1.0						
BC	-0.2	0.0	-0.1	-0.1	0.0	-0.1	0.0	1.0					
IR	-0.3	0.0	-0.1	0.1	0.0	0.1	0.4	0.1	1.0				
R	-0.3	-0.1	-0.3	0.0	-0.2	0.1	0.2	0.1	0.3	1.0			
GDP	-0.3	0.0	-0.1	0.1	-0.1	0.0	0.2	0.1	0.1	0.0	1.0		
I	-0.3	-0.1	-0.2	0.1	0.0	0.1	0.3	-0.1	0.0	0.1	0.0	1.0	
ER	-0.2	0.0	-0.1	0.1	0.0	0.0	0.2	-0.2	0.2	0.1	0.1	0.0	1.0

Note: FI is financial inclusion, FO is financial openness, FIFO is the interaction of financial inclusion and openness, CA is capital adequacy, L is liquidity, E is bank efficiency, P is profitability, BC is concentration, IR is the interest rate, R is liquid reserves, GDP is Gross Domestic Product, I is inflation, and ER is the exchange

Columns (3) and (4) show the estimation results for developed countries, indicating that financial inclusion and openness did not affect Non-Performing Loans. Conversely, the interaction between financial inclusion and openness significantly affected Non-Performing Loans.

Columns (5) and (6) show the estimation results for all countries worldwide, indicating that financial inclusion did not affect Non-Performing Loans. However, financial openness had a significant negative effect on Non-Performing Loans, with an influence coefficient of -0.047. Therefore, every 1% increase in financial openness reduced Non-Performing Loans by 0.047%. The interaction between financial inclusion and openness significantly affected Non-Performing Loans, with a coefficient of -0.119, meaning that every 1% increase in financial inclusion and openness reduced Non-Performing Loans by 0.119%.

Financial inclusion was found to have no significant effect on bank stability for both country groups and all countries worldwide, with Bank Z-Score or Non-Performing Loans as the dependent variables. This finding is robust because it shows a similar result with different measurements of dependent variables. This finding is aligned with those of Ahmed, Juliot, & Abid (2015), Amatus & Alireza (2015), Al-Smadi (2018), Morgan and Pontines (20180, Neaime & Gaysset (2018), Siddik & Kabiraj (2018), Ahamed & Mallick (2019), and Brei, Gadanecz & Mehrotra (2020). Countries mostly focus on inclusion because it eliminates the tariff and non-tariff barriers in accessing financial services. However, efforts to achieve bank stability through financial inclusion are limited.

Financial openness, on the other hand, was found to have a significant positive effect on bank stability in developing countries and all countries worldwide, with Bank Z-Score and Non-Performing Loans as the dependent variables. This finding is robust because it shows a similar result with different measurements of dependent variables. This finding confirms Bui and Bui (2020) and Rahman et al. (2020). Financial openness allows foreign investors to increase their bank deposits in a country. The banks then manage the deposits to mitigate instability risk. However, financial openness was found to have no significant effect on bank stability in developed countries because banks are more independent. This means the banks in developed countries are less dependent on foreign funding for stability than those in developing countries.

The interaction between financial inclusion and openness had a significant positive impact on bank stability in developing countries and all countries worldwide. This finding is robust in all countries worldwide because it shows a similar result with different measurements of dependent variables.

Table 3. Correlations between Independent Variables

VARIABLE	Developing Countries		Developed Countries		All Countries	
	(1)	(2)	(3)	(4)	(5)	(6)
Lag Bank Z-Score	0.910***	0.935***	0.995***	0.937***	0.901***	0.895***
	(0.0548)	(0.0525)	(0.173)	(0.141)	(0.0406)	(0.0431)
Financial Inclusion	0.561		0.812		1.155	
	(0.736)		(15.70)		(0.882)	
Financial Openness	0.0316*		0.0336		0.0466*	
	(0.0165)		(0.127)		(0.0259)	
Capital	-0.0108	-0.0134	0.0399	0.107	-0.0173	-0.0262
	(0.0243)	(0.0279)	(0.170)	(0.0946)	(0.0300)	(0.0317)
Liquidity	-0.00334	-0.00303	-0.000229	0.00688	-0.00393	-0.00359
	(0.00251)	(0.00273)	(0.0115)	(0.0116)	(0.00311)	(0.00294)
Efficiency	-0.00518	-0.00919	0.00804	0.0428	-0.00812	-0.00729
	(0.00888)	(0.00779)	(0.0557)	(0.0325)	(0.00704)	(0.00757)
Profitability	0.0723	0.0913	0.307	0.208	0.133**	0.144**
	(0.0442)	(0.0551)	(0.186)	(0.232)	(0.0662)	(0.0615)
Bank Concentration	-0.00200	-0.00283	0.0171	0.0553	0.00351	0.00229
	(0.00608)	(0.00534)	(0.0769)	(0.0357)	(0.00630)	(0.00617)
Interest Rate	-0.0101	-0.0118	-0.0278	0.00556	-0.0201	-0.0219*
	(0.00740)	(0.00902)	(0.609)	(0.279)	(0.0121)	(0.0130)
Reserve	0.0187**	0.0133*	-0.00557	-0.00840	0.0112*	0.0136**
	(0.00916)	(0.00746)	(0.0296)	(0.0243)	(0.00564)	(0.00615)
GDP	0.0136	0.0145	-0.0561	-0.000866	0.00556	0.00603
	(0.0202)	(0.0231)	(0.176)	(0.0939)	(0.0256)	(0.0229)
Inflation	-0.0178	-0.0178	-0.196*	-0.208**	-0.0307***	-0.0298**
	(0.0140)	(0.0145)	(0.102)	(0.0878)	(0.0115)	(0.0129)
Exchange Rate	-8.05e-05	-5.52e-05	0.000373	0.000888	-6.21e-05**	-6.97e-05**
	(5.67e-05)	(5.01e-05)	(0.00193)	(0.00114)	(2.87e-05)	(3.35e-05)
Financial Inclusion-Financial Openness		0.0530		0.165		0.124**
		(0.0510)		(0.144)		(0.0613)
Constant	0.815	1.118	-2.576	-7.531	0.629	1.089
	(1.156)	(0.970)	(11.26)	(5.330)	(0.889)	(0.676)
Observations	517	517	194	194	711	711
R-squared						
Arellano-Bond Test	p value (AR) 1: 0.001 p value (AR) 2: 0.556	p value (AR) 1: 0.00 p value (AR) 2: 0.528	p value (AR) 1: 0.031 p value (AR) 2: 0.339	p value (AR) 1: 0.021 p value (AR) 2: 0.407	p value (AR) 1: 0.000 p value (AR) 2: 0.613	p value (AR) 1: 0.000 p value (AR) 2: 0.641
Hansen J Statistics	Prob. Chi2: 1.000	Prob. Chi2: 1.000	Prob. Chi2: 1.000	Prob. Chi2: 1.000	Prob. Chi2: 0.970	Prob. Chi2: 0.977

Source: Authors' Processed Results
Note: Standard errors in parentheses
*** p <0.01, ** p <0.05, * p <0.1

Table 4. Correlations between Independent Variables

VARIABLE	Developing Countries		Developed Countries		All Countries	
	(1)	(2)	(3)	(4)	(5)	(6)
Lag NPL	0.795***	0.775***	0.956***	0.994***	0.765***	0.761***
	(0.0940)	(0.0930)	(0.0802)	(0.0735)	(0.100)	(0.101)
Financial Inclusion	-1.689		2.163		-1.402	
	(1.624)		(2.446)		(1.371)	
Financial Openness	-0.0607**		-0.0205		-0.0472*	
	(0.0246)		(0.0234)		(0.0255)	
Capital	0.0287	0.0243	0.0269	-0.0297	0.0585	0.0707
	(0.0569)	(0.0583)	(0.0704)	(0.0720)	(0.0523)	(0.0545)
Liquidity	0.00221	0.000604	0.00526	0.00194	-0.000494	-0.000436
	(0.00755)	(0.00702)	(0.00725)	(0.00862)	(0.00605)	(0.00542)
Efficiency	-0.00267	-0.00119	-0.00717	-0.00979	0.00694	0.00482
	(0.0171)	(0.0159)	(0.0146)	(0.0199)	(0.0126)	(0.0115)
Profitability	-0.0225	-0.0215	0.00903	0.0521	0.00893	-0.000950
	(0.0978)	(0.0771)	(0.0373)	(0.0683)	(0.0626)	(0.0596)
Bank Concentration	-0.0153	-0.0119	-0.00684	-0.0248	-0.0170*	-0.0187**
	(0.0117)	(0.0119)	(0.0180)	(0.0165)	(0.00865)	(0.00881)
Interest Rate	-0.0359*	-0.0334*	0.134	0.0396	-0.0307	-0.0232
	(0.0200)	(0.0195)	(0.0818)	(0.0763)	(0.0222)	(0.0211)
Reserve	-0.0134	-0.0154	-0.00261	-0.00248	-0.0104	-0.0108
	(0.0131)	(0.0138)	(0.0192)	(0.0185)	(0.00990)	(0.0106)
GDP	-0.230***	-0.246***	-0.105	-0.118	-0.207***	-0.199***
	(0.0512)	(0.0490)	(0.0774)	(0.0807)	(0.0464)	(0.0443)
Inflation	0.00593	0.0119	0.118	0.136*	0.0239	0.0274
	(0.0347)	(0.0352)	(0.0731)	(0.0786)	(0.0406)	(0.0394)
Exchange Rate	-8.33e-05**	-6.85e-05	-0.000431	-0.000318	-8.59e-05**	-8.47e-05*
	(3.90e-05)	(5.08e-05)	(0.000476)	(0.000541)	(4.04e-05)	(4.59e-05)
Financial Inclusion-Financial Openness		-0.206**		-0.0180		-0.119*
		(0.0984)		(0.0544)		(0.0660)
Constant	4.652**	4.324**	-1.207	2.066	3.574**	3.077***
	-1.802	-1.692	-3.737	-2.861	-1.486	-1.160
Observations	511	511	192	192	703	
R-squared						
Arellano-Bond Test	p value (AR) 1: 0.157	p value (AR) 1: 0.162	p value (AR) 1: 0.167	p value (AR) 1: 0.153	p value (AR) 1: 0.135	p value (AR) 1: 0.139
	p value (AR) 2: 0.372	p value (AR) 2: 0.380	p value (AR) 2: 0.399	p value (AR) 2: 0.423	p value (AR) 2: 0.331	p value (AR) 2: 0.323
Hansen J Statistics	Prob. Chi2: 1.000	Prob. Chi2: 1.000	Prob. Chi2: 1.000	Prob. Chi2: 1.000	Prob. Chi2: 0.963	Prob. Chi2: 0.974

Source: Authors' Processed Results
Note: Standard errors in parentheses
*** p <0.01, ** p <0.05, * p <0.1

Therefore, financial inclusion and openness policies in developing countries and all countries worldwide should be synchronized to improve bank stability. The stability of banks potentially increases when they receive more funding from the implementation of financial inclusion and openness policies. The interaction between financial inclusion and openness appeared to have no significant effect on bank stability. This is because banks in developed countries are generally sufficiently funded to manage and mitigate risks. Therefore, they are able to maintain stability even without funding through financial inclusion and openness policies.

5. Conclusion

Since banking contributes to the global financial crisis, it is essential to maintain banking stability. In 2011, countries worldwide committed to promoting financial inclusion programs to increase public access to financial services. Maintaining banking stability and promoting financial inclusion can either mutually support or risk one another. Additionally, each country needs to consider its financial openness because it also potentially affects banking stability. The global financial crisis caused by a default on Subprime Mortgage in the United States quickly spread to other countries largely as a consequence of financial market integration.

This study performed an empirical test regarding financial inclusion and openness to contribute to resolving the ambiguity of their influence on bank stability. This study also examined the effect of the interaction between financial inclusion and openness on bank stability and examined the association of those in developing, developed, and all countries worldwide.

The results showed that financial inclusion did not affect bank stability for both groups of countries and all countries worldwide, with Bank Z-Score or Non-Performing Loans as the dependent variables. This finding is robust because it shows a similar result with different measurements of dependent variables. Countries mostly focus on inclusion because it eliminates the tariff and non-tariff barriers in accessing financial services, and all countries still focus on achieving it. However, efforts to achieve bank stability through financial inclusion are limited.

Financial openness had a significant positive effect on bank stability in developing countries and all countries worldwide, with Bank Z-Score and Non-Performing Loans as the dependent variables. This finding is robust because it shows a similar result with different measurements of dependent variables. Financial openness allows the entry of foreign funding to increase the domestic bank deposit base. The banks then manage the deposit to mitigate instability risk.

The interaction between financial inclusion and openness had a significant positive effect on bank stability in developing countries and all countries worldwide. This finding is robust in all countries worldwide because it shows a similar result with different measurements of dependent variables. Banking stability is only sustained when financial inclusion and openness policies are integrated. Therefore, every country needs to synchronize the inseparable financial inclusion and openness policies to enhance banking stability.

We acknowledge that this study has limitations. This study did not analyze how financial inclusion and openness negatively impact bank stability. Certain intervals in financial inclusion and openness have the ability to optimize bank stability. Therefore, further research needs to focus on individual countries because each country has its unique economic characteristics and its policies to mitigate bank instability risks may differ. Nevertheless, the results of this study may narrow the area of inquiry for investigating the relationship between financial inclusion and openness, and banking stability and for using other alternatives to measuring financial inclusion.

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