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Financial Inclusion and Macroeconomic Stability in Eight Southeast Asian Economies

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Abstract

More than six in ten people in developing countries in Southeast Asia are unbanked. It may be for this reason that ASEAN prioritizes financial inclusion and financial stability. Financial inclusion aims to enlarge the proportion of the population to access and use financial services. The objectives of this study are to construct financial inclusion index and to investigate the relationship between the constructed index and the macroeconomic stability variables—financial stability, inflation volatility, and output volatility-- in eight Southeast Asian countries for the 2008-2020 period. The three-dimension—access and availability, usage, and technology/infrastructure-- financial inclusion index is constructed using a double principal component method. The result shows that Indonesia (0.55) and Lao (0.53) are the two countries with the highest average index for the period. Employing the panel seemingly unrelated regression, the study finds that financial inclusion has a positive effect on financial stability; and a negative effect on inflation and output volatility. The finding supports the ASEAN authority to continuously expand financial inclusion as it contributes to increasing financial stability, reducing inflation and output volatility, hence, the macroeconomic stability.

Key words : Financial Inclusion, Financial Stability, Inflation Volatility, Output Volatility, Macroeconomic Stability, ASEAN

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INTRODUCTION

Macroeconomic stability is important for economic growth for its capability to reduce exposure to external shocks minimizes (Ames et al., 2001) (Kammoun, Ben Romdhane & Fakhfakh, 2020). Macroeconomic stability arises when key economic linkages are in balance (Ames et al., 2001); nevertheless, there is no unique set of thresholds between stability and instability for any macroeconomic variable.

Macroeconomic stability, following the 19 92 Maastricht Treaty, is measured by inflation rate, the real output growth (gross domestic product-GDP), changes in employment/ unemployment, current account volatility, the health of government finances, interest rate volatility, and

exchange rate stability (https://stats.unctad.org/Dgff2016/partnership/goal17/target_17_13.html., accessed Oct. 19, 2022). As a fundamental element for economic growth, maintaining and conducting macroeconomic stability is affected by how the organization of key markets-and-sectors and the macroeconomic management of an economy is carried out (Ames et al., 2001). Among the existing economic sectors, the financial sector is often considered the root of most macroeconomic instability as experienced in several economic crisis episodes, therefore, a stable financial system is a precondition for macroeconomic stability (Agung et al., 2016).

In addition to discussing distinctive features of finance and the financial system, financial stability underscores the ability to withstand shocks, including occurrences related to financial crises, and to resume functioning the intermediation of saving and investment (Schinasi, 2004; Garcia, 2016; Cihak, Mare & Melecky, 2016).

Financial inclusion has long been researched since the mid-1980s, but only four articles discussed the topic between 1986-1990 (Gálvez-Sánchez et al., 2021). The interest in the topic increased substantially after 2010, following the 2008 financial crisis. Speaking of developing Southeast Asian economies, over six in ten Southeast Asians are having low or no access to bank. The Association of Southeast Asian Nations (ASEAN) places a high priority on financial inclusion and financial stability.

There are quite a few definitions of financial inclusion, and the term is a multiple-faceted conception (Tram, Lai & Nguyen, 2021; Sahay et al., 2015). One widely used definition of financial inclusion is the proportion of economic agents utilizing financial services both provided by bank and non-bank institutions (World Bank Global Financial Development Report, 2014). Financial inclusion is also seen as the process of ensuring that everyone in an economy can easily access, have access to, and use the formal financial system (Sarma, 2008 ; Sarma & Pais, 2011; Park & Mercado, 2015; Park & Mercado, 2018). As time goes on, digital technology advances and the coverage in financial services expands and provides larger opportunities to increase financial inclusion (Khera et al., 2021; Park & Mercado, 2021).

The development of research on financial inclusion can be classified into three key strands-measures, determinants, and effects of the financial inclusion (Cavoli & Shrestha, 2020). Studies on financial inclusion measures are found, among others, in (Sarma, 2008; Sarma, 2012) who pioneers a multi-dimensional financial inclusion index (Arora, 2018; Camara & Tuesta, 2018; Tram, Lai & Nguyen, 2021).

Studies on determinants of financial inclusion are contributed by (Abel, Mutandwa & Roux, 2018; Le et al., 2019; Ngo, 2019) to mention some. Studies on the effect of financial inclusion cover a wide range of aspects--for example, the effects on poverty and income inequality (Park & Mercado, 2018, 2021; Omar & Inaba, 2020), economic development (Banerjee, Donato & Maruta, 2020; Huang et al., 2021), economic growth (Thathsarani, Wei & Samaraweera, 2021; Abdul Karim et al., 2022; Nandi, Hasan & Kabir, 2022), and economic performance (Marcelin et al., 2022).

Further studies investigate the effects of financial inclusion on the inflation rate (Bourainy, Salah & Sherif, 2021); financial stability (Cihak, Mare & Melecky, 2016; Ahamed & Mallick, 2019; Pham & Doan, 2020; Barik & Pradhan, 2021); output volatility (Cavoli, Gopalan & Rajan, 2020) macroeconomic stability (Vo et al., 2019; Matsebula and Sheefeni, 2022); and monetary policy (Mehrotra & Yetman, 2014; Jungo, Madaleno & Botelho, 2022).

Research on the nexus of financial inclusion and financial stability results no unique conclusion. (Morgan & Pontines, 2014) find that an increase in share of loans to small and medium-sized enterprises (SMEs) supports financial sta-

bility, where the number of non-performing loans (NPLs) is reduced and the likelihood of financial institution's default is depressed. (Nguyen & Du, 2022) find that the financial inclusion index and financial stability is positively related. (Cihak, Mare & Melecky, 2016), on the other hand, conclude that the nexus between financial inclusion and financial stability is ambiguous depending on the country's characteristics. (Saha & Dutta, 2020) find a u-shape relationship between financial inclusion and financial stability. (Pham & Doan, 2020) find a weak positive effect of financial inclusion on financial stability in 42 Asian countries.

Mehrotra and Yetman (2014) examine the implications of different degrees of financial inclusion for optimum monetary policy. Inflation and output are used as proxies for monetary policy. Their empirical evidence reveals that economies with higher levels of financial inclusion have a stronger negative effect on inflation and interest rates, but positive effect on output.

Jungo, Madaleno and Botelho (2022) conduct a comparative analysis of the causal relationship between financial inclusion and monetary policy in Sub-Saharan Africa (SSA) and Latin America and the Caribbean (LAC). The findings show a robust positive relationship between financial inclusion and monetary policy in both Sub-Saharan Africa (SSA) and Latin America and the Caribbean (LAC). Financial inclusion improves the effectiveness of monetary policy in SSA, while it improves the efficiency of monetary policy in LAC. As a result, greater access to and usage of financial services improves the effectiveness of monetary policy in managing inflation.

Financial inclusion positively impacts macroeconomic stability (Aziz & McConaghy, 2014). Matsebula and Sheefeni (2022) find a positive relationship between financial inclusion and output in South Africa. Financial inclusion has also been shown to have a long-term positive impact on inflation. Finding a balance between financial inclusion and inflation control is crucial for policymakers.

Vo et al. (2019) examine the connection between financial inclusion and macroeconomic stability in 22 emerging economies. They use bank z-score, the ratio of non-performing loan (NPL) to gross loan, NPL provision, inflation volatility, and output growth volatility for macroeconomic stability; and the average amount of change in the number of bank branches per 100,000 account holders for the financial inclusion. They find, using a threshold estimation, that financial inclusion improves financial stability up to a certain point, after which the relationship reverses.

Combining the ideas of pioneer researchers who explore measuring financial inclusion indices and those who relate financial inclusion with macroeconomic stability, the objectives of this paper are twofold. Firstly is to measure financial inclusion to measure the financial inclusion index for eight selected Southeast Asian (SEA) countries, namely Brunei Darussalam, Cambodia, Indonesia, Lao, Malaysia, Philippines, Thailand, and Vietnam; and the second is to further investigate the effect of the estimated financial inclusion index on macroeconomic stability indicators. In this paper, the macroeconomic stability variables include bank z-score, inflation volatility, and output growth volatility.

To construct the financial inclusion index, this paper includes the number of depositors and the number of debit cards indicator to the dimension of usage. This inclusion is to consider the wide use of the products in Indonesia and as well as to fill the existing research gap.

This paper contributes to the empirical literature, particularly for the selected SEA countries, by constructing a composite financial inclusion index that includes financial products in the usage dimension and considers the technological infrastructure dimension. The paper also analyses how the constructed index affects the macroeconomic stability indicators. To avoid arbitrary and subjective weights in the index const-

ruction, a double principal component analysis (PCA) method is employed to produce the financial inclusion index. This research is expected to inspire scholars to explore more financial inclusion as it affects the aggregate economy, particularly on macroeconomic stability variables.

The finding of this paper shows that the financial inclusion index for the selected SEA countries improves over time, positively affects financial stability, and reduces inflation volatility and output volatility. The index, therefore, supports macroeconomic stability.

The following is how the paper will be organized. The data employed are presented in Section 2. The research method is discussed in Section 3. The empirical findings and discussion are found in Section 4. As the final part, the conclusion closes the paper in Section 5.

METHOD

The data employed in this study is secondary data sourced mainly from the IMF Financial Access Survey (IMF FAS), the Findex of the World Bank, and the World Bank Indicator. The data covers periods of 2008-2020 for 8 ASEAN developing countries—Brunei Darussalam, Cambodia, Indonesia, Lao, Malaysia, Philippines, Thailand, and Vietnam. Two steps are taken in addressing the research objectives—the first is to construct financial inclusion index and the second is to estimate how the calculated index affects the macroeconomic stability indicators.

The financial inclusion index is calculated using the principal component analysis (PCA) technique. The method employed in this paper is based on (OECD, 2008) for composite index construction. The main idea of the technique is to reduce a larger set of predictor variables to a smaller set with minimal loss of information and keep a maximum variance (Sainani, 2014; Jolliffe & Cadima, 2016).

The PCA estimation requires that data for each indicator of every dimension must be complete. Missing data can be imputed by interpolation and/or backcast/forecast techniques. The composite index construction must be based on theoretical or firm conceptual grounds as it relates to choosing the correct variables for the dimensions used. However, the dimensions and the respective indicators may vary among authors in constructing the financial inclusion index. This makes it uneasy for authors, including myself, to make an apples-to-apples comparison.

As in earlier studies by (Sarma & Pais, 2011; Camara & Tuesta, 2018; Park & Mercado, 2018, 2021; Hanivan & Nasrudin, 2019; Omar & Inaba, 2020; Banerjee, Donato & Maruta, 2020; Tram, Lai & Nguyen, 2021; Arshad et al., 2021), access to and usage of financial services are used as the dimensions of the financial inclusion index. In this article, the author combines access and availability in one single dimension called the access and availability dimension. This dimension represents the supply side of the financial service and indicates the availability and convenient access to financial institutions, including branches, and ATMs. It also penetrates people through the number of accounts, both deposit and loan, provided. However, the number of deposit accounts per one thousand adults is normally higher than that of loans.

The other dimension is usage which represents the demand side of financial inclusion. The indicators utilized for usage dimension are the proportion of outstanding deposits to gross domestic product (GDP) and the proportion of outstanding loans to GDP as in (Tram, Lai & Nguyen, 2021; Nguyen, 2021). The author adds an indicator of the number of financial products users per one thousand adults in the dimension. The financial products here include deposits and debit cards, as those are the products commonly used. The different scale used in the indicators reveals no issues as the data is normalized prior to the calculation process.

The last dimension is technology/ infrastructure. It describes the technological progress and advancement modes that facilitate people in reaching financial services. The modes include internet use and mobile cellular subscription as in (Khera et al., 2021; Park & Mercado, 2021). The dimension formation and the data source are presented in Table 1.

Table 1. Financial Inclusion Index: Dimension, Indicator, Data Source, and Reference

Dimension and Reference	Indicator and Data Source
1. Access and availability (Supply side) Reference: (Mialou & Amidzic, 2017), (Nguyen, 2021), (Tram, Lai & Nguyen, 2021)(Abdul Karim et al., 2022), (Bourainy, Salah & Sherif, 2021)	- Number of financial institutions and branches per one hundred thousand adults. Data source: IMF FAS*. - Number of ATMs per one hundred thousand adults. Data source: IMF FAS*. - Number of financial institutions per one thousand km2 Data source: IMF FAS*. - Number of ATMs per one thousand km2 Data source: IMF FAS*. - Number of deposit accounts with commercial banks per one thousand adults Data source: IMF FAS*. - Number of loan accounts with commercial banks per one thousand adults Data source: IMF FAS*.
2. Usage (Demand side) Reference: (Nguyen, 2021), (Tram, Lai & Nguyen, 2021)	- Outstanding deposits (% of GDP) Data source: IMF FAS*. - Outstanding loans (% of GDP) Data Source: IMF FAS*. - Number users of financial products per one thousand adults (= the total number of depositors per one thousand adults plus debit card holders per one thousand adults) Data Source: IMF FAS*.
3. Technology/ Infrastructure Reference: (Park & Mercado, 2021), (Khera et al., 2021)	- Mobile cellular subscriptions per one hundred people Data Source: ITU WB** - Individuals using the internet (% of population) Data Source: ITU WB**

Source: * https://data.imf.org/regular.aspx?key=61063966
** https://data.worldbank.org/indicator/IT.CEL.SETS.P2
*** https://data.worldbank.org/indicator/IT.NET.USER.ZS

Prior to developing the index, all data are normalized using min-max normalization (OECD, 2008) to keep the index ranges between 0 and 1, where 0 represents complete financial exclusion and 1 indicates full financial inclusion. The composite index is then built using two-stage PCA as in (Camara & Tuesta, 2018); Hanivan & Nasrudin, 2019; Banerjee, Donato & Maruta, 2020; Tram, Lai & Nguyen, 2021; Nguyen, 2021; Park & Mercado, 2021; and Bourainy, Salah & Sherif, 2021).

After the index construction is completed, the next step is to regress the estimated index on macroeconomic stability variables. Referring to (Vo et al., 2019), macroeconomic stability includees (i) the financial stability measured by bank z-score and (ii) macro risks measured by inflation and output volatility. Bank z-score is measured as

$bank\ z\ score = \frac{ROA+(equity/assets)}{\sigma_{ROA}}$ where ROA is return on assets, σ_{ROA} is standard deviation of ROA. The higher the value of the bank z-score is, the greater the financial stability is. Inflation volatility is calculated by a three-year rolling standard deviation, and the same is applied to calculate output volatility. Lower volatility in inflation and output lead to lower macro risks, hence, a higher value of macroeconomic stability.

Considering the limited total sample (t = 13 years, n = 8) and the heterogeneity of the independent variables, the model is estimated by the Zellner panel seemingly unrelated regression (SUR) see (Hsiao, 2022; Baltagi, 2021; and Ekananda, 2016). The model, in a compact form, is shown in equation (1); and the properties are described in equations (2)-(7).

$$y = X\beta + \varepsilon \quad (1)$$

Where y and ε are $\sum_i T_i\, x1$ matrices; X is $\sum_i T_i\, xk$ matrix; β is a $kx1$ matrix.

$$E[\varepsilon_i|X] = 0 \quad (2)$$
$$Var\ E[\varepsilon_i|X] = \sigma_i^2 I_T = \sigma_{ii} I_T \quad (3)$$
$$E[\varepsilon_{it}\varepsilon_{jt}|X] = \sigma_{ij} \quad (4)$$
$$E[\varepsilon_{it}\varepsilon_{js}|X] = 0\ (t \neq s) \quad (5)$$
$$E[\varepsilon_{it}\varepsilon_{js}|X] = 0\ (t \neq s) \quad (6)$$
Rank (X) = full rank Nk (7)

Equations (3) – (6) describe the groupwise heteroscedasticity, contemporaneous correlation, no autocorrelation, and no time-varying cross-correlation, respectively. In the SUR model, individual *i* appears to be independent of individual *j*, but they are not. They are linked through the covariance matrix. The SUR model parameters are estimated utilizing the generalized least square (GLS) method and given as $\hat{\beta}_{GLS} = (X'V^{-1}X)^{-1}X'V^{-1}y$, where $V = \Sigma \otimes I_T$ and $\otimes$ is a Kronecker product, in this case as given by equations (3) and (4).

The empirical model in this paper consists of three single equations as shown in equations (8)-(10) to predict macroeconomic stability. The equations are presented by bank z-score, inflation volatility, and output volatility. Below are the equations.

$$bzscore = \alpha_0 + \alpha_1 IFI + \alpha_2 control\ variable + \varepsilon_1 \quad (8)$$

$$inflvol = \beta_0 + \beta_1\ IFI + \beta_2\ control\ variable + \varepsilon_2 \quad (9)$$

$$outvol = \gamma_0 + \gamma_1\ IFI + \gamma_2\ control\ variable + \varepsilon_3 \quad (10)$$

Where *IFI* = the estimated index of financial inclusion; *bzscore* = bank z-score; *inflvol* = inflation volatility; and *outvol* = output volatility. The parameters α_0, β_0, and γ_0 are constant for the cross-section identifiers, in this case, are the eight selected SEA countries. The control variable is average exchange rate volatility (*avgervol*). It is hypothesized that there is a significantly positive relationship between the index of financial inclusion and financial stability which is represented by the bank z-score ($\alpha_1, \beta_1, \gamma_1 > 0$). On the contrary, it is expected that a higher financial inclusion index will reduce the volatility of inflation and the volatility of output in the economies ($\alpha_2, \beta_2, \gamma_2, \alpha_3, \beta_3, \gamma_3 < 0$). All data for the estimation are accessed from https://data.worldbank.org/indicator.

RESULT AND DISCUSSION

This section presents the results and discussions of the financial inclusion index construction and the SUR estimation. For the index construction, the first-stage principal component is shown in Table 2 and the second-stage is in Table 3. The tables below contain the PCA estimates for Indonesia as a sample case, while those of the other seven SEA countries are found in the appendices of this paper (see Tables A1 and A2 in the Appendix). Table 2 shows the computed weights for each indicator of each dimension, the eigenvalue of each component, and the variance explained and its cumulative, all are of the first-stage principal component estimates. The first principal component (PC1), in general, has the largest

eigenvalue, showing the maximum possible variance there is in the data. The second principal component (PC2) picks up information that is not captured by the first component and the information is also uncorrelated to the first component.

Table 2 also shows that the largest weight (0.22) for the access and availability dimension is given by the indicator of the number of deposit accounts with commercial banks per one thousand adults. This indicator assigns parts of its information to the second PC by contributing its high loading to that component (Hanivan & Nasrudin, 2019). The first PC covers 86% of the total variation which substantiates that PC1 is to explain the access and availability dimension.

For the usage dimension, the largest weight (0.37) is found in outstanding deposits as a percent of GDP, followed by 0.33 and 0.30 for outstanding loans as a percent of GDP and the number of financial product users per one thousand adults, respectively. The first component (PC1) has the largest eigenvalue (2.69) and covers 90% of the total variation.

The last dimension of the first-stage principal component estimate is the technology and infrastructure. The mobile cellular subscription indicator has the largest weight (0.63). The first component (PC1) has the largest eigenvalue of 1.59. The PC1 also is able to explain nearly 80% of the total variation in the data. After completing the first stage estimation, the following step is to estimate the second-stage principal component to calculate the composite index of financial inclusion.

The second-stage principal component estimate the weights for the composite financial inclusion index as presented in Table 3. For the case of Indonesia, the largest weight of the financial inclusion index is the technology and infrastructure dimension (0.38). The same condition is also found in the other five SEA countries—Lao, Malaysia, Philippines, Thailand, and Vietnam. The second largest weight is usage (0.33), which is not too much different from the technology and infrastructure dimension. The access and availability dimension has the smallest weight (0.29). The PCA method prevents the author from determining the weights arbitrarily in constructing the composite index. Aside from the weights, Table 3 also shows that PC1 has the largest eigenvalue of 2.93 and covers 98% of the total variation.

Table 2. First Stage Principal Component Estimate*

Country*: Indonesia						
D1	**Access and Availability (trace=6; number of component=5)**					
I	**PC1**	**PC2**	**PC3**	**PC4**	**PC5**	**W**
1.1	0.39	-0.56	0.12	0.38	0.46	0.17
1.2	0.42	-0.00	-0.48	-0.32	0.45	0.20
1.3	0.42	-0.33	0.08	0.27	-0.65	0.20
1.4	0.43	0.10	-0.44	-0.31	-0.38	0.21
1.5	0.37	0.73	0.04	0.56	0.10	0.22
1.6	0.40	0.14	0.74	-0.5	0.06	
EV	5.18	0.54	0.25	0.03	0.00	
V	0.86	0.09	0.04	0.01	0.00	
CV	0.86	0.95	0.99	0.99	1.00	
D2	**Usage**					
I	**PC1**	**PC2**	**PC3**	**PC4**	**PC5**	**W**
2.1	0.57	0.81	0.11			0.37
2.2	0.58	-0.49	0.65			0.33
2.3	0.58	-0.31	-0.75			0.30
EV	2.69	0.19	0.12			
V	0.90	0.06	0.04			
CV	0.90	0.96	1.00			
D3	**Technology and Infrastructure**					
I	**PC1**	**PC2**	**PC3**	**PC4**	**PC5**	**W**
3.1	0.71	0.71				0.63
3.2	0.71	-0.71				0.37
EV	1.59	0.41				
V	0.79	0.21				
CV	0.79	1.00				

Note:
D = Dimension; I = Indicator; PC = Principal Component; W = Weight; EV = Eigenvalue; V = Variance explained; CV = Cumulative variance
*Figures are rounded to two-digit decimals.
**See Appendix Table A1 for the other seven SEA countries' first-stage PC estimates.

Table 3. Second Stage Principal Component Estimates*

Country**: Indonesia				
D	**Index of Financial Inclusion (IFI)**			**W**
	PC1	**PC2**	**PC3**	
1	0.58	-0.54	0.61	0.29
2	0.58	0.80	0.17	0.33
3	0.58	-0.26	-0.77	0.38
EV	2.93	0.04	0.03	
V	0.98	0.01	0.01	
CV	0.98	0.99	1.00	

Note:
D = Dimension; I = Indicator; PC = Principal Component; W = Weight; EV = Eigenvalue; V = Variance explained; CV = Cumulative variance
*Figures are rounded to two-digit decimals.
**See Appendix Table A2 for the other seven SEA countries' second-stage PC estimates.
Source: Author's own estimate

Figure 1 compiles the eight selected SEA estimated financial inclusion indices for the 2008-2020 period. The graph shows that the index of each country generally increases over time, indicating that more people are financially included in terms of access and availability, use, and technological infrastructure employed. Indonesia and Lao have the highest average index, 0.55 and 0.53, respectively, and are followed by Malaysia (0.51), Vietnam (0.50), the Philippines (0.46), Thailand (0.41). and Cambodia (0.40). Brunei has the lowest financial inclusion index (0.15). This may be related to the lower financial depth and intermediation that Brunei has (Bhattacharyay & Bhattacharyay, 2022), compared to that of the other SEA countries.

Following the calculation of the financial inclusion index, the calculated index is regressed on three variables of macroeconomic stability separately, but simultaneously for the countries studied for each variable. Table 4 displays the statistical description of the financial inclusion index as the dependent variable along with other independent variables representing macroeconomic stability and the control variables.

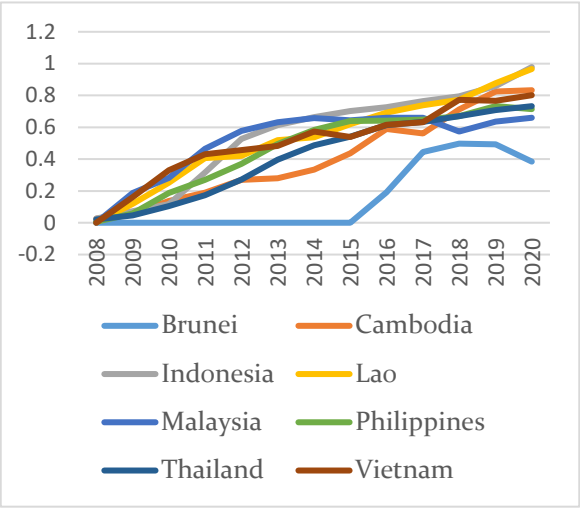

Figure 1. IFI: Selected Eight Southeast Asian Countries
Source: Author's own estimate

The panel SUR method accommodates initial endowments and characteristics of the individual countries studied besides the fixed effects. Table 5 presents the regression result summary while the detail result is in Table A3 in the Appendix. Table 5 shows that the financial inclusion index, in general, has a positive effect on the bank z-score, implying that it contributes to financial stability. This finding is in line with the result of (Vo et al., 2019; Ahamed & Mallick, 2019), and (Nguyen & Du, 2022). However, adverse effect is found in Cambodia and Lao. The adverse effect may be caused by some factors, among others, a fast-growing credit expansion to the private sector, a decline in the bank's credit standards, complications in credit evaluation, inadequate banking sector oversight, supervision of the banking sector, or a rise in non-performing assets (Barik & Pradhan, 2021). An insignificant effect of the financial inclusion index on bank z-score is found in Vietnam. The result is still consistent with including a control variable, the average of exchange rate volatility, in the regression, implying that the financial inclusion index is giving a robust result.

Table 4. Summary of Descriptive Statistics

Var*	Obs.	Mean	Max.	Min.	Std. Dev.
B z-s	104	12.07	31.18	3.39	6.01
Infl. vol.	104	1.78	13.38	0.02	2.25
Out vol.	104	1.75	9.10	0.03	1.92
IFI	104	0.40	0.98	0.00	0.36
Avg. ER vol.	104	180.37	1725.28	0.00	337.81

Note:
*Var = Variable; B z-s = Bank z-score; Infl. vol. = Inflation volatility; Out. vol = output volatility; IFI = Index of financial inclusion; Avg. ER vol. = Average exchange rate volatility.
Source: Author's own estimate

Table 5. Panel SUR Estimates

	Bank Z-Score	Inflation Volatility	Output Volatility
Constant	10.456***	3.302***	1.619***
	(0.306)	(0.220)	(0.281)
_BRN--IFI	3.903***	0.644***	-0.459***
	(0.662)	(0.254)	(0.332)
_KHM--IFI	-2.930***	-7.966***	2.705***
	(0.330)	(2.250)	(1.586)
_IDN--IFI	0.919	-1.338	1.027
	(0.218)	(0.591)	(0.582)
_LAO--IFI	-1.865***	-3.013***	1.957***
	(0.790)	(0.595)	(0.384)
_MYS--IFI	15.498***	-1.441***	-3.666***
	(3.036)	(0.381)	(1.444)
_PHI--IFI	7.410***	-0.743***	1.736***
	(1.391)	(0.619)	(1.686)
_THA--IFI	9.085***	-2.059***	-3.168***
	(1.328)	(0.670)	(0.956)
_VNM--IFI	1.460205	-12.21286	0.793562
	(2.471)	(1.270)	(0.370)
Control Variable	Yes	Yes	Yes
Fixed Effect	Yes	Yes	Yes
Adjusted R-squared	0.994	0.835	0.824
Prob(F-statistic)	0.000	0.000	0.000

Source: Author's own estimate

Still referring to Table 5, the second variable of macroeconomic stability is inflation volatility. The relationship between the financial inclusion index and inflation volatility is found negatively significant in Cambodia, Indonesia, Lao, Malaysia, the Philippines, Thailand, and Vietnam. The result is in accordance with (Vo et al., 2019). However, the reverse is found for Brunei as found in (Matsebula & Sheefeni, 2022) for South Africa. After adding the control variable in the regression, the results remain the same, confirming a robust result.

The financial inclusion index-output volatility nexus is found significantly negative, as expected, for Brunei, Cambodia, Malaysia, and Thailand. Financial inclusion increases access to and the use of financial services (Jungo, Madaleno & Botelho, 2022), hence, efficiency in the financial sector and the economy. However, a reverse result is significantly found in Indonesia, Lao, the Philippines, and Vietnam. Central banks in countries with higher degrees of financial inclusion would place the monetary policy to balance the trade-off between output volatility and inflation volatility (Mehrotra & Yetman, 2014). Indonesia, Lao, and Vietnam have a higher average of financial inclusion indices—respectively, 0.55, 0.53, 0.50-- and tend to keep inflation under control. However, it does not mean that they would sacrifice economic growth. Low and controllable inflation supports economic growth. Again, including the average exchange rate volatility in the regression still keep the result unchanged. Therefore, the result is robust. Considering the regression result, in general, is as expected, therefore, the financial inclusion index positively affects macroeconomic stability.

CONCLUSION

This paper investigates the effect of the financial inclusion index on the macroeconomic stability in eight selected SEA countries from 2008-2022. The financial inclusion index is calculated using a double PCA method to avoid arbitrary weights for its dimensions. The dimensions of the index include access and availability, usage, and technology and infrastructure. Each dimen-

sion has its own indicator. The paper provides a step-by-step explanation of calculating the com-posite index. The index ranges between 0 and 1-0 indicates financial exclusion and 1 is full fin-ancial inclusion. The calculation shows that during the observed periods Indonesia and Lao have the highest average index, 0.55 and 0.53, respectively; and Brunei has the lowest (0.15). However, the index trends appear to in-crease over time for all country samples, with an exception for Brunei. The study statistica-lly finds evidence of a positive relationship between the financial inclusion index and fin-ancial stability in six SEA countries; a negative nexus with inflation and output volatility in seven and four SEA countries, respectively. It, therefore, implies that the financial inclusion index affects macroeconomic stability. The mixed results, however, encourage interested scholars to use threshold regression for future research to investigate the financial inclusion index-macroeconomic stability nexus; and experiment with different indicators and dimensions to compute the index.

The finding of this study will highly support the ASEAN priority on financial inclusion and financial stability as there still are people who remain underbanked and unbanked in the region. Financial inclusion opens wider access to and provides financial services for more people. Improved technology and infrastructure will make the interaction between financial providers and demanders even less costly and easier. Higher financial inclusion is expected to promote financial stability and lower inflation and output volatility, hence, supporting macroeconomic stability.

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APPENDIX

Table A1. First Stage Principal Component Estimate

Country	Indicator	PC1	PC2	PC3	PC4	PC5	PC6	Weight
	(1) Access and Availability Dimension (trace=6; number of component=6)							
Brunei Darussalam	Financial institution per one hundred thousand adults	0.4345	-0.3123	0.5633	0.3147	-0.5453	0.0059	0.1093
	ATM per one hundred thousand adults	0.5071	0.2114	-0.3840	0.0713	-0.0806	-0.7343	0.2095
	Financial institution per one thousand km2	0.5168	-0.0828	0.0419	-0.8193	0.0321	0.2281	0.1545
	ATM per one thousand km2	0.2184	0.6233	-0.2981	0.1970	-0.3714	0.5461	0.1994
	Deposit accounts per one thousand adults	0.1153	0.6169	0.6447	0.0255	0.4179	-0.1233	0.2107
	Loan accounts per one thousand adults	0.4755	-0.2860	-0.1702	0.4303	0.6186	0.3089	0.1166
	Eigenvalue	3.2814	2.0075	0.4058	0.1618	0.1342		
	Variance explained	0.5469	0.3346	0.0676	0.0270	0.0224		
	Cumulative variance	0.5469	0.8815	0.9491	0.9761	0.9985		
	(2) Usage Dimension							
	Outstanding deposit as % of GDP	0.6753	-0.1689	-0.7180				0.2591
	Outstanding loan as % of GDP	0.6545	-0.3115	0.6889				0.3155
	Financial product users per one thousand adults	0.3400	0.9351	0.0998				0.4254
	Eigenvalue	1.8444	0.8968	0.2587				
	Variance explained	0.6148	0.2989	0.0862				
	Cumulative variance	0.6148	0.9138	1.0000				
	(3) Technology and Infrastructure Dimension							
	Mobile cell subscription per one hundred people	0.7071	0.7071					0.5236
	Internet users as % of population	0.7071	-0.7071					0.4764
	Eigenvalue	1.9100	0.0900					

Country	Indicator	PC1	PC2	PC3	PC4	PC5	PC6	Weight
	Variance explained	0.9550	0.0450					
	Cumulative variance	0.9550	1.0000					
	(1) Access and Availability Dimension (trace=6; number of component=6)							
Cambodia	Financial institution per one hundred thousand adults	0.2649	0.6404	0.4240	0.5644	0.1462	0.0005	0.2050
	ATM per one hundred thousand adults	0.4504	-0.2864	0.1840	0.0947	-0.4583	-0.6799	0.1325
	Financial institution per one thousand km2	0.3300	0.5642	-0.0178	-0.7320	-0.1912	0.0030	0.2139
	ATM per one thousand km2	0.4464	-0.3013	0.2186	0.0595	-0.3554	0.7296	0.1289
	Deposit accounts per one thousand adults	0.4455	-0.3013	0.2287	-0.2390	0.7723	-0.0699	0.1288
	Loan accounts per one thousand adults	0.4694	0.0893	-0.8282	0.2755	0.0966	0.0224	0.1909
	Eigenvalue	4.2367	1.6699	0.0760	0.0130	0.0044	0.0000	
	Cumulative variance	0.7061	0.9844	0.9971	0.9993	1.0000	1.0000	
	(2) Usage Dimension							
	Outstanding deposit as % of GDP	0.5842	-0.3538	-0.7305				0.3275
	Outstanding loan as % of GDP	0.5818	-0.4450	0.6808				0.3264
	Financial product users per one thousand adults	0.5659	0.8227	0.0541				0.3461
	Eigenvalue	2.8735	0.1180	0.0085				
	Variance explained	0.9578	0.0393	0.9972				
	Cumulative variance	0.9578	0.0028	1.0000				
	(3) Technology and Infrastructure Dimension							
	Mobile cell subscription per one hundred people	0.7071	0.7071					0.5566
	Internet users as % of population	0.7071	-0.7071					0.4434
	Eigenvalue	1.7966	0.203398					

Country	Indicator	PC1	PC2	PC3	PC4	PC5	PC6	Weight
	Variance explained	0.8983	0.1017					
	Cumulative variance	0.8983	1.0000					
	(1) Access and Availability Dimension (trace=6; number of component=6)							
Lao	Financial institution per one hundred thousand adults	0.4232	0.0976	0.8017	0.4059	0.0056	0.0628	0.2195
	ATM per one hundred thousand adults	0.4285	0.0786	-0.4760	0.5542	-0.1628	-0.5000	0.2144
	Financial institution per one thousand km2	0.4275	0.1852	0.0330	-0.5441	-0.6969	-0.0121	0.2210
	ATM per one thousand km2	0.4295	0.1182	-0.3599	0.1095	0.1786	0.7925	0.2172
	Deposit accounts per one thousand adults	0.4282	0.1755	0.0078	-0.4605	0.6752	-0.3433	0.2210
	Loan accounts per one thousand adults	-0.2944	0.9514	-0.0061	0.0898	0.0018	0.0021	0.0931
	Eigenvalue	5.3313	0.5942	0.0577	0.0142	0.0021	.0005	
	Variance explained	0.8885	0.0990	0.0096	0.0024	0.0003	0.0001	
	Cumulative variance	0.8885	0.9876	0.9972	0.9996	0.9996	1.0000	
	(2) Usage Dimension							
	Outstanding deposit as % of GDP	0.5762	-0.6941	0.4316				0.3279
	Outstanding loan as % of GDP	0.5759	0.7195	0.3882				0.3407
	Financial product users per one thousand adults	0.5800	-0.0249	-0.8142				0.3313
	Eigenvalue	2.9324	0.0473	0.0203				
	Variance explained	0.9775	0.0158	0.0068				
	Cumulative variance	0.9775	0.9932	1.0000				
	(3) Technology and Infrastructure Dimension							

	Mobile cell subscription per one hundred people	0.7071	0.7071					0.9298
	Internet users as % of population	0.7071	-0.7071					0.0702
	Eigenvalue	1.0755	0.9245					
	Variance explained	0.5377	0.4623					
	Cumulative variance	0.5377	1.0000					
	(1) Access and Availability Dimension (trace=6; number of component=6)							
Malaysia	Financial institution per one hundred thousand adults	-0.0059	0.8324	-0.3748	0.1351	-0.1238	0.3646	0.1367
	ATM per one hundred thousand adults	0.4585	0.0715	-0.1082	0.7184	0.1200	-0.4924	0.1367
	Financial institution per one thousand km2	0.4483	0.1441	-0.3576	-0.6403	0.3637	-0.3287	0.2193
	ATM per one thousand km2	0.4711	-0.3035	-0.0599	0.1467	0.3856	0.7156	0.2006
	Deposit accounts per one thousand adults	0.3595	0.3929	0.8359	-0.1306	0.0118	0.0204	0.3067
	Loan accounts per one thousand adults	-0.4875	0.1862	0.1324	0.1306	0.8301	-0.0631	0.0000
	Eigenvalue	3.8903	1.3516	0.4049	0.3299	0.0230	0.0004	
	Variance explained	0.6484	0.2253	0.0675	0.0550	0.0038	0.0001	
	Cumulative variance	0.6484	0.8736	0.9411	0.9961	0.9999	1.0000	
	(2) Usage Dimension							
	Outstanding deposit as % of GDP	-0.1713	0.9658	0.1947				0.1828
	Outstanding loan as % of GDP	0.6844	0.2588	-0.6816				0.4086
	Financial product users per one thousand adults	0.7087	-0.0165	0.7053				0.4086
	Eigenvalue	1.8957	1.0086	0.09575				
	Variance explained	0.6319	0.3362	0.0319				
	Cumulative variance	0.6319	0.9681	1.0000				
	(3) Technology and Infrastructure Dimension							

	Mobile cell subscription per one hundred people	0.7071	0.7071					0.5864
	Internet users as % of population	0.7071	-0.7071					0.4136
	Eigenvalue	1.70527	0.2947					
	Variance explained	0.8526	0.1474					
	Cumulative variance	0.8526	1.0000					
	(1) Access and Availability Dimension (trace=5; number of component=5)							
Philippines	Financial institution per one hundred thousand adults	0.4489	-0.0647	-0.7700	0.4458	-0.0522		0.1960
	ATM per one hundred thousand adults	0.4467	-0.4614	0.4586	0.3356	0.5144		0.1958
	Financial institution per one thousand km2	0.4556	0.0165	-0.2190	-0.7956	0.3335		0.2027
	ATM per one thousand km2	0.4527	-0.2931	0.2565	-0.1478	-0.7883		0.1997
	Deposit accounts per one thousand adults	0.4317	0.8347	0.2882	0.1839	-0.0031		0.2057
	Eigenvalue	4.8007	0.1444	0.0536	0.0011	0.0011		
	Variance explained	0.9601	0.0289	0.0107	0.0002	0.0000		
	Cumulative variance	0.9601	0.9890	0.9998	1.0000	1.0000		
	(2) Usage Dimension							
	Outstanding deposit as % of GDP	0.5782	-0.5617	0.5917				0.3156
	Outstanding loan as % of GDP	0.5915	-0.2109	-0.7782				0.3214
	Financial product users per one thousand adults	0.5619	0.8000	0.2103				0.3630
	Eigenvalue	2.7245	0.2141	0.0614				
	Variance explained	0.9082	0.0714	0.0205				
	Cumulative variance	0.9082	0.9795	1.0000				
	(3) Technology and Infrastructure Dimension							

	Mobile cell subscription per one hundred people	0.7071	0.7071					0.5288
	Internet users as % of population	0.7071	-0.7071					0.4712
	Eigenvalue	1.8910	0.1090					
	Variance explained	0.9455	0.0545					
	Cumulative variance	0.9455	1.0000					
	(1) Access and Availability Dimension (trace=6; number of component=6)							
Thailand	Financial institution per one hundred thousand adults	0.3830	-0.5831	0.4516	0.0402	0.5217	0.1886	0.1304
	ATM per one hundred thousand adults	0.4299	-0.0491	-0.5627	0.1634	0.3227	-0.6044	0.1710
	Financial institution per one thousand km2	0.4200	-0.3108	0.2293	0.1212	-0.7673	-0.2664	0.1576
	ATM per one thousand km2	0.4310	0.0298	-0.4814	0.1846	-0.1430	0.7260	0.1756
	Deposit accounts per one thousand adults	0.3587	0.7008	0.4382	0.4155	0.1206	-0.0331	0.1819
	Loan accounts per one thousand adults	0.4215	0.2626	0.0545	-0.8662	0.0051	-0.0037	0.1834
	Eigenvalue	5.3113	0.6181	0.0519	0.01783	0.0008	0.0000	
	Variance explained	0.8852	0.1030	0.0086	0.0030	0.0001	0.0000	
	Cumulative variance	0.8852	0.9882	0.9969	0.9999	1.0000	1.0000	
	(2) Usage Dimension							
	Outstanding deposit as % of GDP	0.5842	-0.4267	0.6904				0.3268
	Outstanding loan as % of GDP	0.5864	-0.3662	-0.7226				0.3163
	Financial product users per one thousand adults	0.5611	0.8269	0.0363				0.3569
	Eigenvalue	2.7611	0.1910	0.0479				
	Variance explained	0.9204	0.0637	0.0160				
	Cumulative variance	0.9204	0.9840	1.0000				
	(3) Technology and Infrastructure Dimension							

	Mobile cell subscription per one hundred people	0.7071	0.7071					0.5292
	Internet users as % of population	0.7071	-0.7071					0.4708
	Eigenvalue	1.8897	0.1103					
	Variance explained	0.9449	0.0551					
	Cumulative variance	0.9449	1.0000					
	(1) Access and Availability Dimension (trace=6; number of component=5)							
Vietnam	Financial institution per one hundred thousand adults	0.3924	-0.5875	0.2676	0.2325	0.5019		0.1426
	ATM per one hundred thousand adults	0.4238	-0.0515	-0.2671	-0.5825	0.3795		0.1688
	Financial institution per one thousand km2	0.4125	-0.3862	0.0985	0.2606	-0.6394		0.1568
	ATM per one thousand km2	0.4250	0.0376	-0.3201	-0.3748	-0.3963		0.1725
	Deposit accounts per one thousand adults	0.4024	0.4517	-0.4563	0.6216	0.1951		0.1788
	Loan accounts per one thousand adults	0.3921	0.5455	0.7326	-0.1090	-0.0106		0.1803
	Eigenvalue	5.4777	0.4373	0.0511	0.0336	0.0003		
	Variance explained	0.9129	0.0729	0.0085	0.0056	0.0000		
	Cumulative variance	0.9129	0.9858	0.9943	1.0000	1.0000		
	(2) Usage Dimension							
	Outstanding deposit as % of GDP	0.6015	-0.2220	-0.7674				0.3314
	Outstanding loan as % of GDP	0.5812	-0.5375	0.6110				0.3040
	Financial product users per one thousand adults	0.5482	0.8135	0.1943				0.3646
	Eigenvalue	2.7088	0.2806	0.0106				
	Variance explained	0.9029	0.0935	0.0035				
	Cumulative variance	0.9029	0.9965	1.0000				
	(3) Technology and Infrastructure Dimension							

	Mobile cell subscription per one hundred people	0.7071	0.7071				0.6500
	Internet users as % of population	0.7071	-0.7071				0.3500
	Eigenvalue	1.5384	0.4616				
	Variance explained	0.7692	0.2308				
	Cumulative variance	0.7692	1.0000				

Source: Author's own estimate

Table A2. Second Stage Principal Component Estimates

Country	Dimension	Index of Financial Inclusion			Weight
		PC1	PC2	PC3	
Brunei Darussalam	Access and availability	-0.6336	0.0649	0.7709	0,0454
	Usage	0.5316	0.7605	0.3729	0,6092
	Technology and Infrastructure	0.5621	-0.6461	0.5163	0,3454
	Eigenvalue	2.25565	0.5897	0.1547	
	Variance explained	0.7519	0.1966	0.0516	
	Cumulative variance	0.7519	0.9484	1.0000	
Cambodia	Access and availability	0.5686	0.7637	0.3057	0.3602
	Usage	0.5883	-0.1178	-0.8000	0.3240
	Technology and Infrastructure	0.5749	-0.6347	0.5163	0.3158
	Eigenvalue	2.7591	0.1744	0.0666	
	Variance explained	0.9197	0.0581	0.0222	
	Cumulative variance	0.9197	0.9778	1.0000	
Lao	Access and availability	0.5956	-0.3723	-0.7118	0.3167
	Usage	0.5943	-0.3919	0.7023	0.3176
	Technology and Infrastructure	0.5404	0.8413	0.0122	0.3657
	Eigenvalue	2.68534	0.3048	0.0099	
	Variance explained	0.8951	0.1016	0.0033	
	Cumulative variance	0.8951	0.9967	1.0000	
Malaysia	Access and availability	0.5631	-0.7024	0.4354	0.2820
	Usage	0.6060	-0.0072	-0.7954	0.3421
	Technology and Infrastructure	0.5619	0.7117	0.4216	0.3759
	Eigenvalue	2.6503	0.3076	0.0421	
	Variance explained	0.8834	0.1025	0.0140	
	Cumulative variance	0.8834	0.9860	1.0000	
Philippines	Access and availability	0.6185	-0.2964	-0.7278	0.3135
	Usage	0.6052	-0.4111	0.6817	0.2993
	Technology and Infrastructure	0.5013	0.8620	0.0749	0.3872
	Eigenvalue	2.4682	0.5109	0.0209	
	Variance explained	0.8227	0.1703	0.0070	
	Cumulative variance	0.8227	0.9930	1.0000	
Thailand	Access and availability	0.5764	-0.6469	0.4993	0.3261

	Usage	0.5808	-0.1054	-0.8072	0.3214
	Technology and Infrastructure	0.5748	0.7553	0.3149	0.3524
	Eigenvalue	2.8253	0.1044	0.0703	
	Variance explained	0.9418	0.0348	0.0234	
	Cumulative variance	0.9418	0.9766	1.0000	
Vietnam	Access and availability	0.5871	-0.0283	-0.8090	0.3313
	Usage	0.5731	-0.6913	0.4401	0,3153
	Technology and Infrastructure	0.5718	0.7220	0.3897	0.3534
	Eigenvalue	2.8230	0.1360	0.0409	
	Variance explained	0.9410	0.0453	0.0137	
	Cumulative variance	0.9410	0.9863	1.0000	

Source: Author's own estimate

Table A3. Panel SUR Estimates

	Bank Z-Score		**Inflation Volatility**		**Output Volatility**	
	Model1	**Model2**	**Model1**	**Model2**	**Model1**	**Model2**
Constant	10.55283***	10.45558***	3.694781***	3.302197***	1.754859***	1.619051***
	(0.305126)	*(0.306218)*	*(0.187392)*	*(0.220382)*	*(0.162020)*	*(0.280721)*
_BRN—IFI	4.004098***	3.902778***	0.477773***	0.644418***	-0.171883***	-0.458801***
	(0.601371)	*(0.662210)*	*(0.178108)*	*(0.254451)*	*(0.283170)*	*(0.331840)*
_KHM--IFI	-3.327719***	-2.930242***	-10.18604***	-7.965796***	-0.686958***	2.705197***
	(0.268181)	*(0.329873)*	*(2.057372)*	*(2.249983)*	*(0.859603)*	*(1.586196)*
_IDN—IFI	0.881662***	0.919438	-1.360781***	-1.338376	1.358608***	1.027127
	(0.205918)	*(0.217980)*	*(0.560862)*	*(0.591404)*	*(0.244583)*	*(0.582256)*
_LAO—IFI	-2.463239***	-1.865310***	-2.991965***	-3.013444***	1.721658***	1.957447***
	(0.767227)	*(0.790479)*	*(0.491218)*	*(0.595419)*	*(0.216887)*	*(0.383884)*
_MYS—IFI	14.81430***	15.49760***	-1.550917***	-1.441569***	-3.464476***	-3.666401***
	(3.552729)	*(3.036099)*	*(0.387435)*	*(0.381318)*	*(0.900770)*	*(1.444335)*
_PHI—IFI	7.147909***	7.410069***	-0.777858***	-0.743238***	1.877005***	1.735943***
	(1.463148)	*(1.391521)*	*(0.553276)*	*(0.618988)*	*(0.875702)*	*(1.686327)*
_THA—IFI	8.436305***	9.084594***	-2.094756***	-2.059036***	-2.541954***	-3.168206***
	(1.415968)	*(1.327770)*	*(0.570708)*	*(0.669725)*	*(0.781061)*	*(0.955593)*
_VNM—IFI	0.979363	1.460205	-13.44874***	-12.21286	1.050623***	0.793562
	(2.354045)	*(2.470566)*	*(1.123900)*	*(1.270023)*	*(0.234573)*	*(0.369849)*
_BRN--AVGERVOL		-1.374516		2.880876		-5.514044
		(7.363499)		*(3.333761)*		*(4.465643)*
_KHM--AVGERVOL		0.004219		0.029419		0.050928
		(0.003425)		*(0.015288)*		*(0.013130)*
_IDN--AVGERVOL		2.13E-05		-0.000161		-0.000518
		(0.000130)		*(0.000368)*		*(0.000173)*
_LAO--AVGERVOL		0.003139**		0.001480**		0.003335**
		(0.001239)		*(0.000931)*		*(0.000565)*

_MYS--AVGERVOL		-22.04674***		-1.121412***		1.040760***
		(4.266888)		*(0.525033)*		*(1.785173)*
_PHI--AVGERVOL		0.352550		-0.014864		-0.399355
		(0.402266)		*(0.226349)*		*(0.254729)*
_THA--AVGERVOL		1.504022***		0.253042***		-0.772572***
		(0.339573)		*(0.156369)*		*(0.227600)*
_VNM--AVGERVOL		0.000165		0.000609		-0.000138
		(0.000909)		*(0.000584)*		*(9.57E-05)*
Fixed Effects (Cross)						
_BRN—C	-1.128369	-0.995640	-2.987407	-2.675269	0.202777	0.496823
_KHM—C	4.182848	3.995709	3.388169	2.020349	0.475400	-2.254059
_IDN—C	-6.802018	-6.739409	-1.795898	-1.311521	-1.562172	-0.907714
_LAO--C	-3.141773	-4.004826	-0.161418	-0.061233	-1.947159	-2.620491
_MYS--C	0.820035	4.235107	-1.625137	-1.101614	2.350389	2.415606
_PHI--C	5.078421	4.477636	-1.989790	-1.588917	-0.143962	0.710384
_THA--C	-5.492740	-7.214969	-1.486872	-1.369929	2.118652	3.310904
_VNM--C	6.483596	6.246393	6.658352	6.088134	-1.493925	-1.151454
Weighted Statistics						
R-squared	0.992714	0.995440	0.895098	0.871800	0.946904	0.863490
Adjusted R-squared	0.991472	0.994129	0.877217	0.834943	0.937853	0.824243
F-statistic	799.3242	759.3423	50.05846	23.65333	104.6244	22.00159
Prob(F-statistic)	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

Source: Author's own estimate