



Determinants of International Financial Integration in ASEAN-5 Countries: Recent Findings Based on Panel GMM Approach

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Abstract

Globalization in the financial and trade sectors has increased capital flows for numerous countries. This study aims to analyze the determinants of international financial integration in ASEAN-5 (Indonesia, Malaysia, Philippines, Singapore and Thailand) from 2008 to 2017. The value for International Financial Integration in this study was calculated using equity-based measurements. This study uses the Generalized Method of Moment (GMM) based on dynamic panel data. The results of this study indicate that all variables significantly affect international financial integration in ASEAN-5, except for domestic credit and exchange rate volatility. Market capitalization, trade openness and GDP per capita have positive relationships to international financial integration, while the inflation variable has a negative relationship to international financial integration.

Key words

International Financial Integration, Financial and Trade Globalization, Generalized Method of Moment (GMM)

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1. Introduction

In the current era of globalization, every country moves to integration by removing barriers, especially in the trade, finance and investment sectors. Globalization in the economic sense refers to increasing economic openness for international trade, financial flows, and direct foreign investment (Todaro, 2015). Global integration between goods and financial markets will generate large profits from trade in terms of lowering prices, increased innovation, and faster economic growth (Samuelson, 2010: 32). Integration in the economic field will shape economic integration between countries, including its supporting elements, namely financial integration.

Financial integration is the process of integration through financial markets between two or more countries to increase connection (Eyraud *et al.*, 2017). International financial integration has the role of removing barriers to capital flows between countries, which include direct investment (FDI), portfolio investment (equity and debt), inter-state payment systems, and bank credit flows between countries. With the loss of barriers to capital flows, the flow of capital in each country that is mutually integrated would become highly dynamic. In the macroeconomic context, the level of economic development, such as GDP

per capita, becomes an essential factor in explaining the tendency of domestic residents to be involved in assets trading between countries (Abdullah and Mishra, 2014). However, the interference of risk factors such as inflation and high exchange rate volatility could limit investors to invest in the domestic market and disrupt international financial integration (Hardouvelis, 2002).

Financial integration within the Association of Southeast Asian Nations (ASEAN) has been running for 40 years, accelerated during the 1997 Asian financial crisis and the 2008 global financial crisis, which provided an impetus to increase regional financial integration. Financial integration is developed in four main factors: the banking sector, liberalization of foreign direct investment in the region, liberalization of capital flows, and efforts in ensuring regional financial stability. After the global financial crisis in 2008, the development of FDI and portfolio equity of assets and liabilities, the components that form the international financial integration in ASEAN-5 had increased rapidly until 2017.

Based on these conditions, this study tries to analyze the degree of influence of financial globalization and trade and macroeconomics on international financial integration in ASEAN-5, namely Indonesia, Malaysia, Philippines, Singapore, and Thailand, from the period 2008 to 2017. The study refers to the Bhattacharya & Ghosh analysis model (2016), which uses the method of equity-based measurement to measure the international degree of financial integration and the Generalized Method of Moments (GMM) research method to estimate the dynamic approach of the panel data model. The advantage of using GMM as a panel data estimation technique is to exploit the time variation in the data and allow it to add the lag of the dependent variable as a regression, but still be able to overcome endogenous problems that might arise.

This study modifies the independent variables of various supporting journals from the research of Lane & Ferretti (2003), Vo & Daly (2007), Fakhr & Tayebi (2009), Arfoui & Abaoub (2010), Abdullah & Mishra (2014), Garali & Othamani (2015), Bhattacharya & Ghosh (2016), Eyraud *et al.* (2017) and Cheng and Daway (2018) so that determinants of international financial integration in ASEAN-5 are financial and trade globalization (market capitalization, domestic credit, trade openness) and macroeconomics (GDP per capita, inflation and exchange rate volatility) using the Generalized Method of Moments (GMM) method from 2008 to 2017.

2. Literature review

According to Balassa (1962), perfect financial market integration is achieved when there are no barriers, and capital controls, laws, and institutional regulations that can prevent investors from changing their portfolios instantly, would no longer be valid. According to traditional neoclassical theory, financial integration will have a positive impact on economic growth by spurring capital growth (Kose *et al.*, 2009). Financial integration stimulates capital flows from countries with abundant capital to countries that lack capital because it offers higher returns on capital (Vinokurov, 2017).

Baele *et al.* (2004) explain that there are three benefits from international financial integration, namely more opportunities for risk-sharing and risk diversification, better allocation of capital as investment opportunities, and as a potential for higher economic growth. Stavarek *et al.* (2011) also added financial development as a benefit of financial integration.

Research on international financial integration has different results, and this is because no formula can definitely measure the level of international financial integration. According to Lane & Ferretti (2003), there are two ways of measuring international financial integration. In its development, there are numerous ways to measure the international degree of financial integration, and some studies use methods of measurement based on components of foreign assets and liabilities (Bhattacharya & Ghosh, 2016). Based on research by Lane & Ferretti (2003) in (Bhattacharya & Ghosh (2016), the equity-based measurements from international financial integration are as follows:

$$\text{IFIEQit} = [(\text{PEQait} + \text{FDIAit} + \text{PEQLit} + \text{FDILit}) * 100] / \text{GDPit} \quad (1)$$

In which PEQ is used for portfolio equity and FDI (Foreign Direct Investment). A and L are assets and liabilities.

Some previous research studies, such as Lane & Ferretti (2003), were potentially the first to provide a detailed and comprehensive analysis of international financial integration using panel data estimation with a sample of 18 OECD countries during the period 1978-2001. Lane & Ferretti (2003) measure international financial integration using volume-based and equity-based. Volume-based measures the ratio of the number of foreign assets and liabilities to GDP, while equity-based measures the ratio of the number of portfolio equity and FDI from assets and liabilities to GDP. Lane & Ferretti (2003) analyzed the relationship between foreign assets and liabilities with independent variables, namely GDP per capita, trade openness, financial depth, external liberalization, privatization revenues, stock market capitalization. Lane & Ferretti (2003) found that GDP per capita, trade openness, and market capitalization had significant effects on international financial integration.

Subsequent research by Vo & Daly (2007) tried to analyze the determinants of international financial integration in 79 countries during the period 1980-2003 using least square and GMM panel data estimates. Vo & Daly (2007) measure international financial integration variables using eight different measurement methods. Vo & Daly (2007) consider policies on capital controls, level of development, economic growth, institutional, legal and investment environment, trade openness, financial market development, financial system and banking system, and tax policy as independent variables. Vo & Daly (2007) found that policies on capital controls, trade openness, domestic credit, and economic growth have a significant effect on international financial integration.

Garali & Othmani (2015) have examined the determinants of international financial integration in eight Middle Eastern and North African countries (MENA), where they take external debt as a mean of measuring international financial integration. Garali & Othmani (2015) consider different independent variables such as trade openness, level of development, financial market development, inflation rate, exchange rate volatility, 2008 financial crisis, and tax policy. Garali & Othmani (2015) used a seven-year panel data regression method from 2006 to 2012. The results from Garali & Othmani (2015) found trade openness, exchange rate volatility, and GDP per capita as significant variables explaining the international financial integration at MENA.

Bhattacharya & Ghosh (2016) analyzed the determinants of international financial integration using volume-based and equity-based measurements in 32 middle-income countries in 2002-2011. Bhattacharya & Ghosh (2016) use the GMM model estimation method and use independent variables, including financial development as measured by domestic credit, capital account openness, GDP growth rate, market size, and political stability. The results found in the Bhattacharya & Ghosh (2016) study show that all variables have a significant effect on international financial integration, but the trade openness variable has a negative effect.

The latest research came from Cheng & Daway (2018) explain international financial integration in 75 countries, including developed countries and developing countries in the period 1996-2010 using the estimation method sys-GMM (System Generalized Method of Moment). Cheng & Daway (2018) measure international financial integration with the ratio of the number of foreign assets and liabilities to GDP. The independent variables used in this study are domestic credit, market capitalization, and GDP per capita, while the control variables include trade openness, capital account openness, and institutional quality index. Cheng & Daway (2018) found that domestic credit, market capitalization, and GDP per capita had a significant effect on international financial integration, but GDP per capita showed a negative sign.

3. Methodology of research and data analysis

The model used in this study refers to the analytical model of Bhattacharya & Ghosh (2016), which uses the Generalized Method of Moments (GMM) research method to estimate the dynamic approach of the panel data model. Anderson & Hsiao (1982) state that the dynamic panel model (dynamic panel) is a model that has a dynamic relationship, characterized by the lag of the dependent variable between the independent variables. The GMM analysis model used in this study is as follows:

$$IFlit = \alpha + \gamma IFlit-1 + \beta_1 MARKETit + \beta_2 CREDITit + \beta_3 TRADEit + \beta_4 GPCit + \beta_5 INFit + \beta_6 EXRATEit + \epsilon it \quad (2)$$

In which IFI is an international degree of financial integration; $\gamma IFlit-1$ is a lag international financial integration; MARKET is a market capitalization; CREDIT is a domestic credit; TRADE is trade openness; GPC

is GDP per capita; INF is inflation; EXRATE is exchange rate volatility; ϵ_{it} is an error term; i signifies the country and t signifies the period.

The type of data used in this study is secondary data. The data covers the period of 2008-2017. IFI component data was published by the IMF in the International Financial Statistics (IFS) dataset. Market capitalization data, domestic credit, trade openness, GDP per capita, inflation, and exchange rates are published periodically by the World Bank in the World Development Indicators (WDI).

Arellano & Bond (1991) use GMM (Generalized Method of Moment) to estimate parameters in dynamic panel data regression equations. GMM Arellano & Bond (1991) produce estimates that are unbiased, consistent, and efficient. Blundell and Bond (1998) suggest estimators that are considered more efficient than the Arellano & Bond (1991) estimators, namely the GMM-System Estimator. The GMM system was developed by Arellano & Bover (1995) and Blundell and Bond (1998), and this method is considered superior to the GMM difference. System GMM (Arellano-Bover, 1995) developed by Blundell & Bond (1998) estimates the system of equations from first difference and level, where the instruments used are first-difference.

Bhattacharya & Ghosh (2016) stated that 2 prerequisites must be met to use GMM, namely the Sargan test for over-identifying restrictions and the Arellano-Bond autocorrelation test. The validity of the instrument is critical to determine the validity of the instrument in the model used. The validity of additional instruments can be determined using the Sargan test for over-identifying restrictions. This test was conducted to determine the validity of the model. Zero hypotheses (H_0) in the Sargan test are valid over-identifying restrictions. This test has a chi-square probability value, and if the probability value is below 1%, 5%, or 10% significance level, then H_0 is rejected. If the probability value is above 1%, 5%, or 10% significance level, then the model is said to be valid or (H_0) is accepted.

The second prerequisite is the AR Arellano-Bond autocorrelation test (2), which was used to detect autocorrelation between variables in the model. The null hypothesis (H_0) in this test determines that there is no autocorrelation. The Arellano-Bond test has a probability value of z , where if the probability value is below the significance level of 1%, 5%, or 10%, H_0 is rejected, which indicates an autocorrelation in the model that reduced the model to be invalid. If the probability value is above the 1%, 5%, or 10% significance level, H_0 is accepted, which indicates that there is no autocorrelation that verifies the validity of the model.

Then, partial tests and simultaneous tests were conducted. The t-test is a partial test to test the coefficients of the independent variables. This test was conducted to see the significance level of the independent variables individually in influencing the dependent variable. The t-test hypothesis is as follows:

$$H_0: \beta_i = 0, i = 0, 1, 2, \dots, n$$

$$H_1: \beta_i \neq 0$$

The testing was conducted by comparing the value of t count on the estimation results with t table. If the value of the t count $\geq t$ table, then H_0 is rejected, and H_1 is accepted, which means there is a relationship between the dependent variable and the independent variable. Testing can also be conducted by looking at the value of the p -value t -test. If the values are below the significance level of 1%, 5%, or 10%, then there is a relationship between the dependent variable and the independent variable. Prob $>$ F was used to determine the significance of the independent variables together in influencing the dependent variable. The simultaneous test hypothesis is as follows:

$$H_0: \beta_1 = \beta_2 = \dots = \beta_n = 0$$

$$H_1: \text{at least one } \beta \neq 0$$

Simultaneous tests are carried out by looking at the significance of Prob $>$ F. If the value of Prob $>$ F is below the 1%, 5%, or 10% significance level, H_0 is rejected, and H_1 is accepted, which states that the independent variables together influence the dependent variable.

4. Analysis and discussions

Table 1 shows the results of the estimation of international financial integration determinants in ASEAN-5 countries in 2008-2017 using sys-GMM (System - Generalized method of the moment). To

interpret the results using the GMM system, the values of the parameters used in this model was ensured to be estimated statistically.

Table 1. GMM Estimator System Result

| Variable | SYS-GMM |
|------------------------|------------|
| L.IFI | 0.4884*** |
| MARKET | 0.0016*** |
| CREDIT | 0.00001 |
| TRADE | 0.0012*** |
| Ln_GPC | 0.2398*** |
| INF | -0.0314*** |
| Ln_EXRATE | -0.002 |
| AR (1) | 0.190 |
| AR (2) | 0.827 |
| Sargan test | 0.692 |
| Sargan Test (GMM) | 0.593 |
| Sargan Test (diff GMM) | 0.652 |
| Sargan test (IV) | 0.663 |
| Sargan (diff IV) | 0.561 |
| Prob > F | 0.000 |

Description: *** $\alpha < 0.01$ ** $\alpha < 0.05$ * $\alpha < 0.1$

Numbers in parentheses state p-value

In the generalized method of moment, the overidentifying identification test was used to test whether the validity of the instrument. The test was conducted using the Sargan test, which is a distributed chi-square statistics. The estimation result of sys-GMM shows the value of the Sargan test is 0.692. This shows that over-identifying is accepted, and the model is valid.

To see whether there is an autocorrelation between variables, the study used Arrelano-Bond for AR (2). Z-statistical distributed autocorrelation test. Table 1 estimation of sys-GMM shows that AR result (2) is 0.827 so that H_0 is accepted, which indicates there is no autocorrelation between variables.

Based on the estimation results, the market capitalization variable has a positive and significant relationship to international financial integration. This is evidenced by the coefficient value in the market capitalization variable, which is significant at $\alpha = 1\%$ with a value of 0.0016. The higher the level of economic development means higher degree of positive influence of the stock market on international financial integration (Cheng & Daway, 2018). Market capitalization has the potential to increase the value of foreign equity liabilities that it wil would directly impact the rise of international financial integration in ASEAN-5. The results of this study are in line with the research conducted by Lane & Ferretti (2003), Vo & Daly (2007), Arfoui & Abaoub (2010), Bhattacharya & Ghosh (2016) and Cheng & Daway (2018), who found that market capitalization has positively influenced international financial integration.

However, domestic credit variables have no significant effect on international financial integration. This is evidenced by the coefficient value on domestic credit variables that is not significant at $\alpha = 1\%$, 5% , and 10% but has a coefficient direction that is under the existing theory, namely an increase in domestic credit will increase international financial integration by 0, 00001. In theory, domestic credit is an indirect effect of financial development. The role of the domestic financial system as a financial intermediary is to provide credit for financing the economy and increasing the national index that drives the profitability of national companies. This research is not in line with what was done by Vo & Daly (2007), Abdullah & Mishra (2014), Bhattacharya & Ghosh (2016), and Cheng & Daway (2018), who found that domestic credit has a significant influence on international financial integration indicators.

Furthermore, trade openness variables have a positive and significant relationship to international financial integration. This is evidenced by the value of the coefficient on the trade openness variable, which is significant at $\alpha = 1\%$ with a value of 0.0012. Economic development and trade openness attracted the attention of foreign investors that bring foreign funds to flow into the country (Garali & Othamani, 2015). Trade openness contributes to increasing international financial integration through the willingness to conduct financial transactions between countries and profit from international financial diversification. The

results of this study are in line with the research of Lane & Ferretti (2003), Vo & Daly (2007), Arfoui & Abaoub (2010), Abdullah & Mishra (2014), Garali & Othamani (2015) and Eyraud *et al.* (2017).

From macroeconomic variables, the GDP per capita variable has a positive and significant relationship to international financial integration. This is evidenced by the significant coefficient on the variable GDP per capita at $\alpha = 1\%$ with a value of 0.239. GDP per capita allows a systematic relationship between financial activity between countries with the level of economic development (Lane & Ferretti, 2003). An important implication of the higher GDP per capita in ASEAN-5 countries is to increase asset trade between countries. This stimulates international capital flows through portfolio investment and FDI to increase international financial integration in ASEAN-5. The results of this study are in line with research by Lane & Ferretti (2003), Arribas *et al.* (2009), Garali & Othmani (2015), and Eyraud *et al.* (2017). They found that GDP per capita has a positive influence on international financial integration.

The inflation variable has a negative and significant relationship to international financial integration. This is evidenced by the coefficient value on the inflation variable, which is significant at $\alpha = 1\%$ with the value of -0.031. Countries with high inflation rates will cause the domestic currency to depreciate, and this creates unfavorable conditions for foreign investors due to the inflation rate risk, which causes lower capital inflows to the country (Vo & Daly, 2007). The study highlights that an increase in inflation will reduce the incoming capital flow so that it will have an impact on the decline in international financial integration in ASEAN-5. This result is in line with the research conducted by Vo & Daly (2007), Arfoui & Abaoub (2010), and Eyraud *et al.* (2017), which state that inflation has a negative and significant influence on international financial integration.

The variable exchange rate volatility does not have a significant effect on international financial integration. This is evidenced by the value of coefficient of the variable exchange rate volatility is not significant at $\alpha = 1\%$, 5%, and 10%, but has a coefficient direction that is following the existing theory, namely a decrease in exchange rate volatility will reduce international financial integration amounting to -0.002. Exchange rate volatility is an obstacle to the development of international trade, capital flow movements, and financial integration (Garali & Othmani, 2015). However, this study is not in line with that of Garali & Othmani (2015). They found that exchange rate volatility had a negative and significant effect on international financial integration in MENA (the Middle East and North Africa).

5. Conclusions and policy recommendations

Based on the results of the study, several conclusions can be outlined. The first conclusion is related to the influence of financial and trade globalization variables (market capitalization and trade openness) on international financial integration in ASEAN-5, precisely the higher the size of the market would have the better ability to raise funds and diversify the increase in risk in international financial integration. Financial activity between countries is related to trade between countries to help encourage broader international financial integration. Next is related to the influence of macroeconomic variables (GDP per capita and inflation) on international financial integration in the ASEAN-5 period 2008-2017, GDP per capita can influence the tendency to engage in international asset trading because of the level of development The state facilitates international capital flows, while countries with high inflation create unfavorable conditions for foreign investors due to the inflation rate risk which causes lower capital flows to the country.

From the results of the research, several policy suggestions can be submitted. The first suggestion is related to financial and trade globalization factors. ASEAN-5 countries need to improve their institutional quality, accelerate the development of the financial sector, and improve financial deepening in their countries to benefit from the existence of international financial integration. The next suggestion is macroeconomic policies need to maintain the economic stability of a country to affect international financial integration (except exchange rate volatility). Suggestions for policies such as special regulations are needed to protect their participation in international financial integration, not only benefiting the capital state.

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