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**THE INFLUENCE OF ASYMMETRIC INFORMATION
ON FOREIGN CAPITAL INFLOWS IN ASEAN PLUS
THREE COUNTRIES**

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ABSTRACT

This paper examines the influence of asymmetric information on foreign capital inflows in ASEAN PLUS THREE (ASEAN+3) countries. Linking capital flows to stock market setting, it substantiates other efforts concerning the debatable issues of the effect of asymmetric information on foreign direct investment (FDI) and foreign portfolio investment (FPI). The asymmetric information is captured through the stock market microstructure perspective on the width and depth dimensions using highly frequency cross sectional data from year 2000 to 2015. Roll and Amivest models are employed to quantify the

width and depth aspects of the asymmetric information. Employing the panel data technique, the results demonstrate the significant effect of market transparency on foreign capital inflows specifically the FDI as compared to the FPI. An increase in the width and depth analysis based on the Amivest model signifies a high informational transparency, thus shows a lower asymmetric information which consequently leads to the high foreign capital inflows. The results of the study provide information to the policymakers in monitoring capital inflows on the aspect of market transparency and highlight the importance of the stock market microstructure in assessing the asymmetric information for ASEAN+3 countries.

Keywords: Asymmetry information, stock market microstructure, market transparency, capital inflow, ASEAN plus three countries.

INTRODUCTION

The liberalisation and globalisation of the world economy in the post Bretton Woods system have led to a rise in cross-border capital flows. Theoretical underpinnings on the relationship between capital flows and economic growth have highlighted the importance of capital flows on the economic development and have been debatable evidences on the determinants of capital flows (Hannan, 2018; Tchorek et al., 2017) which have motivated studies on this issue. Meanwhile, the information asymmetry has been identified as among the important factors that influence capital flows (Gordon & Bovenberg, 1996; Razin et al., 1998; Yousefinejad et al., 2018). Razin et al. (1998) defined asymmetric information as the differences in the access of information between a buyer and a seller in a financial contract that generates the imbalance of control or power in a transaction, which is caused by the different informational access between borrowers and lenders (Akerlof, 1970). Many studies have stressed the key role of asymmetric information in the financial market. The theory of asymmetric information (developed in the 1970s and 1980s) proposes that an imbalance of information between buyers and sellers can lead to the inefficient outcomes in certain markets. This theory is supported by Gertler and Rogoff (1990) who stated that asymmetric information is the cause for capital immobility in which capital flows may move from poor to rich markets when there exist asymmetric information in the markets. The significant role of asymmetric information has

also been emphasised in numerous studies, for instance, by Barbaroux (2014), de Wet (2004) and Yaacob et al. (2017). They pointed-out that the asymmetric information affects capital flow in developing countries even if the capital return in those countries are high.

In addition to the general studies, other studies have examined a deeper component of capital flow which is the composition of capital flows. The non-debt capital flow comprises two major types; the Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI). In the study of capital flow composition, asymmetric information has been captured based on the macroeconomic indices which focus more on the use of aggregate country data. This include the use of several macroeconomic based indices to capture the asymmetric information such as the institutional quality index (Goldstein et al., 2007), opacity index (Goldstein et al., 2010), transparency index, geographical distance (Martin & Rey, 2004) and expected liquidity. The strength of such macroeconomics approach relies on the ability to capture the market movements in the long run and extreme circumstances, for example, shortage events in liquidity and also during financial crises (Laurini et al., 2008). However, this macroeconomic approach is very broad and is characterised by the symmetric information, absence of transaction costs, representative agent structures and rational expectations that cannot accommodate the short run movements and heterogeneous nature of the firms in the system. To depart from such macroeconomics approach, the following development has inspired this study to measure asymmetric information within the microstructure view: i) the availability of stock market data, ii) evidences on the important role of asymmetric information on stock market trading (Moosavi et al., 2019; Lai & Lin, 2020), and iii) the high association between capital flows represented by FDI or FPI and stock markets (Tsagkanos et al., 2019). The proxies of informational transparency based on the market microstructure is highly associated with the market liquidity and adverse selection (Amihud & Mendelson, 1986; Eleswarapu & Reinganum, 1993; Yaacob et al., 2017; Yousefinejad et al., 2018). Furthermore, the microeconomic analysis is often made based on the asymmetric and heterogeneous structures (Laurini et al., 2008).

Garman (1976) was the first to introduce the term “market microstructure” which takes into account the underlying details of trading and exchanges of the market at the centre of the analysis and

aims to understand how these changes the equilibrium of supply and demand. He described microstructure as how asymmetric information in the market is reflected in the prices of securities. According to de Arruda (2015), information released by the companies can lead to alterations in their share prices, through the aspects of reporting of relevant facts. Most of the studies on market microstructures quantify the degree of asymmetric information and extend the application to the firms' perspectives. Based on the market microstructure approach, Mustarudin et al. (2017) examined the effect of asymmetric information on the capital structure in Indonesia. They argued the importance of microstructures approach to measure asymmetric information; however, it is not clear how this information within the stock market will influence capital flows which becomes the main objective of this study. The main assumption of the model in this study is that the countries with higher degree of asymmetric information on the stock markets attract less foreign capital flow. Prior studies have emphasised that one model cannot fit all aspects of asymmetric information in the stock market due to the heterogeneous nature of the markets in terms of measures, criteria's and structure and instead suggested the use of multiple measures in order to achieve more valid results (Amihud, 2002). Such suggestion is supported by Yong et al. (2016) in their study on the determinants of FDI in China. They claimed that due to the vast geographical distribution of FDI in China, the results would reflect the differences in locational advantages, the policies initiated and the temporal differences of FDI inflows among different regions. Based on the data from 1994 to 2008, the results show that the determinants of FDI vary among the three regions, depending on the motives of the investor and the results of policy bias. Similarly, Benić and Franić (2008) asserted that no single measure fully proxies the adverse selection in market because of its multidimensional features. Furthermore, studies by Tchorek et al. (2017) and Hannan (2018) emphasised the relative importance of the evolution of both the global and country-specific factors in shaping the capital flow landscape. These factors have varied over time and the effects differ depending on the type of capital flows and the group of countries.

This paper discusses the study which examines the influence of asymmetric information on foreign capital inflows in selected ASEAN+3 countries. In order to confirm the accuracy of the results in measuring the asymmetric information as suggested by the previous studies two models were used, namely Roll and Amivest. By employing these two models of market microstructure asymmetric information

based, it will allow to capture wider and deeper information horizons through both width and depth dimensional measures. Can asymmetric information become determinants to the capital inflows? Does international capital flow composition affect asymmetric information? The reactions to these questions are significant for the policy makers and researchers. The findings of this study can assist policy makers in regulating and governing capital inflow leveraging on the depth and width dimensions of stock market information.

The Association of Southeast Asian (ASEAN) aimed to accelerate the economic growth, social progress and the cultural development of ASEAN region. This is done through joint endeavours among member countries within the spirit of equality and partnership in order to strengthen the foundation for a prosperous and peaceful community. ASEAN countries are highly open economies as measured in terms of the trade flows and inward FDI stock relative to GDP. However, some ASEAN countries have higher inflation rates resulting in dissimilar price levels and unequal purchasing power across ASEAN member countries. Such price differential gives rise to different access to goods market in which some countries are able to purchase more goods than the other member countries (Poolttiwong & Ramirez, 2016), hence lead to increase in asymmetric information among member countries. Furthermore, based on the ASEAN Investment Report 2019, the trend of FDI in ASEAN is expected to continue given the dynamic industrial developments and improvement of investment and business environment in the region. According to the report, FDI flows into ASEAN rose for the third consecutive year, reaching an all-time high level of \$155 billion in 2018 from \$147 billion in 2017. The region's share of global FDI inflows also increased to 11.5 percent in 2018 from 9.6 percent in 2017. The above points with regards to the asymmetric information and capital flows will suffice as the motivation factor of this study on ASEAN. The focus on ASEAN+3 (the ASEAN members plus China, South Korea and Japan) are based on the merits provided in the Regional Economic Outlook 2017 of the ASEAN+3 Macroeconomic Research Office (AMRO) which will be discussed further in the data section.

LITERATURE REVIEW

Studies on the cross-border capital flows in the early years revolve around the neoclassical theory centring on the concept of Lucas

Paradox. The neoclassical theory explains that the capital flow shifts from rich to poor countries. Part of the reason is because developing countries move further from their steady state that makes the rate of capital investment return in developed countries is much lower than developing countries. This theory predicts that under the free capital mobility, economies converge to their steady state income levels. Furthermore, rich countries will make new investments into the poorer countries as long as the investments return receive is equal with the return made in other wealthy countries (Solow, 1956). In this regard, many studies have examined the validity of this theory. Some studies have shown that the capital inflows of developing country are much lesser than the expected level. For instance, Lucas (1990) found that the North-South capital flow contradicts with the theory when examining the issue using data from the United States of America (US) and India. He applied the neoclassical model in 1998 and discovered that the marginal product of capital in the US was about fifty-eight times lower than India, thus, it was expected that the capital flow moved to India. However, the results show that such expectation is not true which leads to the raised questions on the validity of the neoclassical model.

The asymmetric information has been identified in the literature as one of the defining characteristics of capital inflows and to partly account for the Lucas Paradox. There are claims that in an integrated world of capital market with perfect information, all types of capital flows would be identical (Kirabaeva & Razin, 2010). However, this might be a myth as Lo and MacKinlay (1988) claimed that full efficient market with perfect information does not exist. They stressed that friction exist when traders and investors need some time to process new information and then integrate them into the models and theories on stock markets which is called time lapse. This time lapse triggers the asymmetric information. In addition, Goldstein and Razin (2006) developed a mathematical trade off model that considers the information level and project efficiency related to portfolio and direct investors. Both sides of this trade-off are determined by the asymmetric information which comes with a control. They revealed that the asymmetric information is the basis of trade-off model between portfolio and direct investment. Decreasing the level of asymmetric information can affect the trade-off between these two forms of investment. Emphasising the importance of asymmetric information

on cross-border capital flows (Jain et al., 2017) will provide evidence on the adverse impact of corruption on FPI. They showed that corruption which is associated with asymmetric information has a significant effect on the financial market. Their study concluded that the highly transparent nations attract most of the foreign investors, where there is a 'level playing field' between the local and foreign investors because of the limited information asymmetries associated with corruption. On FDI, a more recent study by Yousefinejad et al. (2018) uncovers the role of information asymmetry on FDI for selected ASEAN countries.

Regarding the international capital flows, there are three major forms of investments which comprises FDI, FPI and debt. The FPI and FDI equity-like features in terms of their stability and less prone to reversals. The debt component refers to the government bond because of its size, liquidity and lack of credit risk (Kirabaeva & Razin, 2010). The FPI is stock (share) and/or bond purchase that does not create a lasting interest in or effective management over an enterprise (World Bank, 2014). In the context of FDI, it can be transferred in several means, firstly, by increasing overseas operations over a joint venture dealings or merger contract, or acquisition of shares of a foreign company. Secondly, to purchase or establish companies overseas (Moran, 2001). According to (Haufler & Wooton, 1999), the FDI investors will gain from the lower cost in terms of low incomes, tax benefit, exemption or tariff incentives extended to the country that invests.

Motivated by the importance of these capital flow components on the economy, many studies have attempted to uncover the determinants of FPI and FDI. Al-Smadi (2018) among others documented evidence on the determinants of foreign portfolio investment in Jordan from year 2000 to 2016. He defined FPI as a component of international capital flows which involved the transfer of financial assets such as cash, stock or bonds across international boundaries in search of profit. The FPI caters for funds needed for domestic companies which affect positively on employment and income and consequently intensify the economy's capacity to transfer its savings to the national productive activities (Al-Smadi, 2018). Propelled by these linkages between capital flows and economy, many studies have used macroeconomic factors as proxy or measurement to capture the asymmetric

information in examining its effect on capital flows. This includes the usage of several macroeconomic based indices such as opacity index (Goldstein et al., 2010) and others. However, due to the development in global investment landscape such as dynamic financial structure and technology and heterogeneous nature of the firms as players in the system, several other studies have utilised the stock market microstructure to capture for asymmetric information. Such attempt is workable in considering the important role of asymmetric information on the stock market as highlighted in some studies (e.g., Lai & Lin, 2020; Moosavi et al., 2019; Roque & Cortez, 2014; Singhanian & Saini, 2018; Yousefinejad et al., 2018) and the evidences on the close association between the FPI and stock market (Abdul Karim et al., 2016; Haider et al., 2017; Makoni & Marozva, 2018; Mustarudin et al., 2017; Tsagkanos et al., 2019).

Roque and Cortez (2014) investigated the determinants of international equity investment focusing on the institutional investors. Singhanian and Saini (2018) uncovered the determinants of FPI for both developed and developing countries from the aspect of stock market performance and other monetary variables. Their study showed that a good and stable environment could provide enough liquidity to meet its obligation attracts foreign investors. Yousefinejad et al. (2018) examined the mediating effect of information asymmetry on the relationship between IFRS and FDI inflows in ASEAN countries. Their studies indicated that information asymmetry mediates the relationship between IFRS and FDI inflows. Focusing similar issues on the investors' confidence, Moosavi et al. (2019) provided evidence on the important role of asymmetric information on stock trading. Based on Multivariate Generalized Autoregressive Conditional Heteroskedasticity (MGARCH) for seasonal data of the stock market in Iran during the period from 1991-2016, their findings showed a significant effect of information asymmetry of the financial market on the investors' confidence. A similar study on the stock trading was conducted by Lai and Lin (2020) who examined the relationship between the asymmetric information and stock momentum. Using the winner and loser approach, they found that winners with exaggerated forecast of earnings per share were more likely to have contrarian profits in subsequent holding periods. On the other hand, winners with low or middle-low information asymmetry tended to continue their good returns in future holding periods and the losers with middle

information asymmetry obtained the highest contrarian profits known as the “white lie effects” (Lai & Lin, 2020).

Several studies have provided evidences on the close link between capital flows and stock market. Such association is through the effect of liquidity of domestic capital markets on market efficiency. A more liquid market becomes deeper and broader which provides more financing opportunities for a wider range of investments. In linking the stock market to capital flows, Haider et al. (2017) studied the impact of the stock market on FPI in China. By including the stock market element in the study for Malaysia, Abdul Karim et al. (2016) provided evidence on the impact of financial variables and other macroeconomic variables such as the exchange rate and foreign interest rates on FPI. The study was done by using the portfolio balance approach which covered the interest parity rates for the period of 1991 to 2012. Their study highlighted significant linkage between the stock market and FPI which can further substantiate the possibility of incorporating stock market microstructure in the capital flow movements. To gauge such element, other studies have investigated the substantial position of asymmetric information on capital flow from the settings of stock market microstructure. Mustarudin et al. (2017) studied the effect of asymmetric information towards capital structure in the Indonesian market using the sample from firms listed in the Indonesian stock market. Amivest illiquidity ratio is utilised to measure the asymmetric information and firm size which is quantified by the book value of total assets with two controlling variables of gross domestic product and Altman Z-Score. The data were analysed using multiple regressions with random effect panel data estimation. The results demonstrate that the impact of asymmetric information on capital structure is consistent before and after considering the controlling variables. The evidence revealed that it was not robust to the inclusion of illiquidity ratio. On the link between FDI and stock market, Tsagkanos et al. (2019) provided evidence for Greece, an emerging market using the data from 1988 to 2014. The results exhibited a symmetric long-run relationship depending on the sub-period. However, in contrast to the above studies, a study by Makoni et al. (2018) found no significant relationship between the FPI and financial market development. They studied the issue for Mauritius during the period 1989 to 2016. Employing the ARDL, VECM and Granger causality, the study shows no causality running from FPI to financial development which

suggests that Mauritius is internally catalysed. Thus, such debatable evidence warrants for further studies to be carried on this issue using different data sets and market environment.

ASEAN members have experienced many ups and downs on the path towards economic development. Their economies grew at miraculous rates before the 1997 to 1998 Asia crisis with natural resources, hardworking labour force and pragmatic policymakers. After recovering, their economies again grew quickly until the global financial crisis of 2008 to 2009 (Thorbecke & Komoto, 2010). In the ASEAN region, higher capital flows were contemporaneous with high rates of domestic saving, investment, and economic growth and, to this extent, they could absorb with relatively little disruption to macroeconomics stability.

METHODOLOGY

This study aims at investigating the influence of asymmetric information on foreign capital inflows in ASEAN+3. Focusing on ASEAN+3 (ASEAN countries plus three more countries that have signed the free trade agreement with ASEAN which are Korea, China and Japan) is justified based on the following merits highlighted in the ASEAN+3 Macroeconomic Research Office (AMRO) Regional Economic Outlook 2017: 1) In the trade and financial development, the regional bodies are becoming more important. The belt road initiatives (BRI), for instance, has become significant initiative; 2) ASEAN+3 region's economic growth over the past few decades has been inextricably linked to trade and growing prominence in the global financial architecture. 3) The region is one of the most open areas in the world and very dependent on the trade, in particular. In addition, successful exports strategy in the region for many years has taken many countries from being poor to being rich. The above argument justifies ASEAN+3 as an appropriate venue for examining asymmetric information from the capital inflows perspectives.

Towards achieving the research objective, the capturing of asymmetric information is within the stock market microstructure using both the width and depth spectrums. This study covers the period from the year 2000 to 2015 for selected ASEAN+3. The period of study is justified by the fact that the ASEAN+3 Macroeconomic Research Office

(AMRO) was established in 2011. It has been actively promoting both the trade and financial market activities thus is considered sufficient to capture the adjustment after its establishment. This study involved a huge volume of daily data in calculating the asymmetric information based on the market microstructure. In addition, this period is free from any disruptive events or major crises that may affect the analysis. Five countries were selected from the ten ASEAN countries which are Malaysia, Indonesia, Philippines, Thailand and Singapore. These are the members that initially formed the ASEAN countries and followed by the other five members (Vietnam, Cambodia, Burma, Laos and Brunei). These countries are comparatively similar in terms of economy and trade. Data for the eight countries of limited geographic areas are used in order to ensure the homogeneity nature of the samples (Farid et al., 2015). The variables selected for quantifying the asymmetric information include at the firm level and in daily frequency, collected from the Thomson Reuters DataStream. Initially, the total number of companies for this study is 26,600. However, due to the limitations and incomplete information, more than 22 thousand of them have been removed (i.e., 22,817). Thus, the remaining 3,783 companies are the population of this study. Table 1 presents the distribution of sample companies for all the countries.

Table 1

Sample of Companies in the Selected Countries

No.	Country	No. of Companies
1	China	779
2	Indonesia	204
3	Japan	935
4	Korea	710
5	Malaysia	443
6	Philippines	165
7	Singapore	246
8	Thailand	301
Total		3,783

This study estimates a set of daily cross section data that explain the influence of the stock market-based of informational transparency on

capital flows for both FPI and FDI, whereby the data are extracted from the Coordinated Portfolio Investment Survey (CPIS) and Coordinated Direct Investment Survey (CDIS), which are the databases provided by the International Monetary Fund (IMF) on the capital inflows, both the FDI and FPI. Other data necessary for the scope of intended countries from year 2000 to 2015 are collected from the international liabilities data which are equivalent to foreign investment inflows provided by the International Financial Statistics (IFS) database, IMF. Regarding this data, Lane and Milesi-Ferretti (2007) classified international liabilities into four types comprising official reserves, external debts, foreign direct investment and portfolio investment. The study takes into account the effect of selected control variables in order to better clarify the relationship between asymmetric information and the capital inflows.

In addition, the study follows others, for instance, Razin and Serechetapongse (2011) who examined the effect of expected liquidity shock on the composition of capital flow in selecting the control variables and Goldstein et al. (2010) who examined the factors influencing the composition of the external liabilities in the country. These selected macroeconomic variables are stock market capitalisation (MC), gross domestic product (GDP), official exchange-rate (OEX), trade openness (TO) and the real interest rate (RIR) represented by vector \mathbf{X} . The data for these control variables are collected from the World Bank Development. Table 2 shows the variables that are used in these studies.

Based on the perspectives of the stock market microstructure, the asymmetric information is intended to gauge the information advantage which is enjoyed by the firm insiders in the financial markets' environment. This information advantage is defined as the adverse selection costs, proxy by the measures of market microstructure for quantifying asymmetric information. Several aspects of measurements are used for the market microstructure and previous studies have stressed on utilising multiple measures as reliance only on one measure could affect the accuracy of the analysis (Amihud, 2002, Phylaktis & Chen, 2010). In this regard, Harris (1990) introduces four dimensions of measuring the asymmetric information based on the microstructure namely, width, depth, immediacy and resiliency. The depth dimension represents the number of shares that can be traded

at a given bid and ask quotes; the width dimension denotes the bid-ask spread which is the amount by which the ask price exceeds the bid, whereas immediacy signifies how fast trading of a given size can be completed at a given cost and finally, the resiliency describes the speed of the prices to revert to past levels after going through the adjustment in reaction to large order flow imbalances introduced by uninformed traders.

Table 2

Sources of Variables and Indicators

Variable	Description	Data Sources	Indicator
FPI	Foreign portfolio investment	International Monetary Fund (IMF)	Capital inflows
FDI	Foreign direct investment	International Monetary Fund (IMF)	Capital inflows
ROLL	Roll	Thomson Reuters DataStream	Asymmetric information
AMIVEST	Amivest	Thomson Reuters DataStream	Asymmetric information
GDP	Gross domestic product	World Bank Development	Market size
MC	Stock market capitalisation	World Bank Development	Economic growth
OER	Official exchange rate	World Bank Development	Wealth effect
RIR	Real interest rate	World Bank Development	Macroeconomic stability
TO	Trade openness	World Bank Development	Openness of the trade

From such definitions, the interrelatedness of the dimensions is evident. As such, these dimensions do not stand independently on their own. The study relies on the width and depth dimensions due to the constraints in data collection for the immediacy and resiliency dimensions. Furthermore, the width and depth are more popular dimensions and have been frequently used by previous studies such as Phylaktis and Chen (2010) and Tayeh (2016).

With the purpose to minimise the impact of survivorship bias, the information asymmetry was measured through two micro techniques, the Roll measure and the Amivest measure. The using of these two models are in line with the suggestions by Amihud (2002) who suggested that employing multiple measures was necessary to achieve the valid results,. Utilising a two-dimensional approach with diverse properties offers a better accuracy of asymmetric information measures especially regarding the two spectrums, the width and depth. Thus, it is fully possible that a decrease in asymmetric information could signify a decrease in the depth dimension even if there are no changes in the width dimension (Dupont & Lee, 2007; Farid et al., 2015; Heflin et al., 2000).

Roll Measure

Roll (1984) provided a measure for the width aspects of the informational transparency. He suggested that an implicit extent of the effective spreads between the bid and ask based on the serial covariance of the stock price changes. Also, to echo him, we let signify the transaction price at time t and assume that it evolves as:

$$P_t = V_t + \frac{1}{2} S Q_t \quad (1)$$

Where V_t is the unobserved fundamental value of the stock at the time t that randomly fluctuates. S is the effective spread described in the previous section, and Q_t is a transaction indicator at the time t , which is 1 for a buy status and -1 for a sold status. Assuming the value of Q_t is independent of the public information shocks at the time t and is serially uncorrelated. The Roll Model suggests that the effective bid-ask spread can be estimated by employing the return auto-covariance as;

$$\text{Spread} = -2\sqrt{-\text{cov}(P_{t+1} - P_t, P_t - P_{t-1})} \quad (2)$$

Where, P_t denotes the transaction price at the time t , P_{t+1} denotes the transaction price at the time $t+1$ and P_{t-1} denotes the transaction price at the time $t-1$.

The major asset of the Roll measure is that it can be easily measured by employing the daily price. However, the Roll measure is undefined

when the sample covariance is positive, which is more likely to occur in the emerging markets with low market efficiency. Similarly, to echo Goyenko et al. (2009), this study substitutes a default numerical value of zero. Thus, the modified version of the Roll measure can be applied as follows:

$$Roll = \begin{cases} -2\sqrt{-cov(P_{t+1} - P_t, P_t - P_{t-1})} & \text{when } Cov(\Delta P_t, \Delta P_{t-1}) < 0 \\ 0 & \text{when } Cov(\Delta P_t, \Delta P_{t-1}) \geq 0 \end{cases} \quad (3)$$

Amivest Measure

Cooper et al. (1985) proposed a statistical measure to detect the adverse selection in the market liquidity. Following Amihud approach, they relied on the percentage process change and volume to calculate the price impact. The outcome is known as the Amivest ratio or liquidity ratio which acts as the depth estimator. The ratio refers to asset turnover over the daily absolute percentage of the stock return. Considering the liquidity ratio is undefined for zero return, days with the zero return are not included. The Amivest ratio is calculated by using the equation below:

$$LR_{it} = \frac{Tn_t}{r_t} = \frac{\sum_{i=1}^N P_i \times Q_i}{|r_t|} \quad (4)$$

Where LR_{it} is liquidity ratio for stock i at time t , r_t is stock return i at time t and Tn_t is daily turnover for the similar stock.

Hence, our models used for this study are:

Model 1: Width Dimension of Asymmetric Information and FPI

$$FPI_{i,t} = \alpha_i + \beta_1 ROLL_{i,t} + \beta_2 GDP_{i,t} + \beta_3 MC_{i,t} + \beta_4 OEX_{i,t} + \beta_5 RIR_{i,t} + \beta_6 TO_{i,t} + \varepsilon_{i,t} \quad (5)$$

Model 2: Depth Dimension of Asymmetric Information and FPI

$$FPI_{i,t} = \alpha_i + \beta_1 AMIVEST_{i,t} + \beta_2 GDP_{i,t} + \beta_3 MC_{i,t} + \beta_4 OEX_{i,t} + \beta_5 RIR_{i,t} + \beta_6 TO_{i,t} + \varepsilon_{i,t} \quad (6)$$

Model 3: Width Dimension of Asymmetric Information and FDI

$$FDI_{i,t} = \alpha_i + \beta_1 ROLL_{i,t} + \beta_2 GDP_{i,t} + \beta_3 MC_{i,t} + \beta_4 OEX_{i,t} + \beta_5 RIR_{i,t} + \beta_6 TO_{i,t} + \varepsilon_{i,t} \quad (7)$$

Model 4: Depth Dimension of Asymmetric Information and FDI

$$FDI_{i,t} = \alpha_i + \beta_1 AMIVEST_{i,t} + \beta_2 GDP_{i,t} + \beta_3 MC_{i,t} + \beta_4 OEX_{i,t} + \beta_5 RIR_{i,t} + \beta_6 TO_{i,t} + \varepsilon_{i,t} \quad (8)$$

RESULTS AND DISCUSSION

This section reports the results of the impact of depth and width dimensions on the asymmetric information to the capital inflows, the FPI and FDI using the panel static technique. In the initial stage, to find the best specification of the model, the Likelihood Ratio Test is employed to find out whether the dataset is pooled or panel. In the following stage, the Hausman Test is used to determine whether the model is random effect or fixed effect in order to run the analysis. In order to check the multicollinearity, the Variance Inflation Factor (VIF) are used. The VIF's value more than 10 indicates that there is a multicollinearity problem (Gujarati 2003). The results of multicollinearity test for all four models are the same because all the two asymmetric information measures and the control variables considered are the same. The results range between 1.044 and 2.123 which shows that there are no issues of multicollinearity. Next, this study uses the white robust standard errors to control the heteroscedasticity and autocorrelation problems. The significance level of the model is also examined.

Width and Depth Dimensions of Asymmetric Information on FPI.

The first and second model examines the influence of width dimension and depth dimension of the asymmetric information respectively on FPI.

Table 3 shows the results of width and depth dimensions of the asymmetric information on FPI. The Likelihood Ratio Test for Model 1 shows that the p -value obtained is less than 0.05, the null hypothesis is rejected, thus this model should run based on the panel data. For the next stage, according to the Husman Test, p -value is less than 0.05, the random effect is rejected, thus the best specification for this model is fixed effect. The results for Model 2 are the same as Model 1.

The other point which confirms the validity of results is to consider the OLS assumptions as any violation in assumptions leads to error in computing the model estimators. According to Verbeek (2004), although the fixed effect model eliminated the effect of omitted variable, there is no guarantee that the heteroscedasticity and autocorrelation problem will be removed.

Hence, this paper uses the Generalized Least Squares (GLS) technique which is a statistical technique to estimate the unknown parameter in a linear regression model. According to Farid et al. (2015), under the OLS assumptions, in order to have efficient OLS estimators, the model residuals ought to be homoscedastic and independent while GLS adhere to the main equation of OLS with one main difference. The residual assumptions of GLS are not obliged to be similar to the OLS residual assumptions.

Table 3

Results of Width and Depth Dimensions of Asymmetric Information on FPI

Variable	Model 1			Model 2		
	Coefficient	Std. Error	p-value	Coefficient	Std. Error	p-value
ROLL	0.0199	0.0226	0.3803			
AMIVEST				0.1646	0.0539	0.0031***
LNGDP	3.4638	0.2940	0.0000***	3.3083	0.2615	0.0000***
LNMC	0.8069	0.1013	0.0000***	0.7427	0.1022	0.0000***
LNOER	-0.4501	0.2161	0.0404**	-0.1997	0.2227	0.3725
LNT0	-0.4712	0.1529	0.0028***	-0.2289	0.1405	0.1071*
RIR	8.42E-05	0.0072	0.9908	-0.0032	0.0054	0.5571
C	-18.3458	3.1342	0.0000***	-20.4852	3.0941	0.0000***
R ²	0.9770			0.9808		
Adjusted-R ²	0.9734			0.9777		
	Chi-Sq.		p-value	Chi-Sq.		p-value
Likelihood Ratio Test	171.1696		0.0000***	173.5272		0.0000***
Hausman Test	404.7397		0.0000***	209.0536		0.0000***

Note: *** p≤0.01, ** p≤0.05, * p≤0.10 denote statistical significance at levels of significance respectively.

Based on the results, the Roll variable as an asymmetric information index is insignificant as the P-value is greater than 0.05 and Amivest variable is statistically significant as the P-value is less than 0.05. The Roll variable representing the width spectrum of asymmetric information shows that Model 1 failed to confirm that it has an effect on the FPI. On the other hand, Amivest variable which represents

the depth spectrum of asymmetric information shows that Model 2 significantly affects FPI inflow. Between the Roll and Amivest model, Amivest which represents the depth dimension has a positive and higher influence on the FPI inflows, in which one (1) unit increase in Amivest means the increase in the information transparency (lower asymmetric information) thus increases the FPI inflows by 0.1646 units. Amongst the control variables, for Model 1, GDP, market capitalisation, exchange rate and trade openness are significant except for real interest rates. For Model 2, all the variables are significant, except for the official exchange rate and real interest rate. The results on the inconsistencies of the effect of control variables confirm the suggestion by Amihud (2002) that multiple measures are required to model the asymmetric information.

Width and Depth Dimensions of Asymmetric Information on FDI

The third model examines whether width dimensions of the informational transparency (asymmetric information) affect FDI or not and the fourth model examines the depth dimension effect on FDI. After executing all the necessary steps as described before, the results are provided as below.

Based on the results (Table 4), the panel data types are used for Model 3 and Model 4 since the P-values of Likelihood Ratio Tests obtained are less than 0.05. The results of Hausman Tests show that the models have fixed effects. In Models 3 and 4, both measures of width and depth dimensions show that the significant effects on the FDI as *p*-values are less than 0.05. Besides, Amivest has a positive and higher influence on the FDI inflows than Roll, which reflects that one (1) unit increase in Amivest means the increase in the informational transparency (lower asymmetric information) would increase the FDI inflows by 0.1499 units. Thus, this supports the conjecture that the increase in market transparency (associated with lower asymmetric information) would increase the capital inflows, particularly the FDI. In contrast, the results using Roll show a negative association between market transparency and FDI, in which the increase in transparency would reduce FDI by 0.0547. For Model 3, all control variables, namely GDP, market capitalisation, exchange rates and level of trade openness are significant, except for real interest rates. As for Model 4, GDP, the official exchange rates and trade openness are significantly

signed but not market capitalisation and real interest rate. In all the models, it can be concluded that for this study, the real interest rates exhibit no significant influence in examining the impact of market transparency on capital flows.

Table 4

The Results of Width and Depth Dimensions of Asymmetric Information on FDI

Model 3				Model 4		
Variable	Coefficient	Std. Error	p -value	Coefficient	Std. Error	p -value
ROLL	-0.0217	0.0111	0.0547**			
AMIVEST				0.1499	0.0290	0.0000***
LNGDP	2.6567	0.2427	0.0000***	1.9723	0.1177	0.0000***
LNMC	0.1162	0.0654	0.0795*	0.0671	0.0707	0.3449
LNOER	-1.0596	0.2619	0.0001***	-1.2049	0.1956	0.0000***
LNT0	-0.3224	0.0798	0.0001***	-0.2253	0.0568	0.0002***
RIR	-0.0043	0.0057	0.4594	-0.0060	0.0049	0.2232
C	-6.2180	2.8708	0.0332**	-1.5579	1.7921	0.3872
R ²	0.9763			0.9788		
Adjusted-R ²	0.9725			0.9754		
	Chi-Sq.	p -value		Chi-Sq.	p value	
Likelihood Ratio Test	215.6849	0.0000***		232.4050	0.0000***	
Hausman Test	85.8081	0.0000***		43.5343	0.0000***	

Note: *** p≤0.01, ** p≤0.05, * p≤0.10 denote statistically significance at levels of significance respectively.

As presented, the results reveal the importance of asymmetric information that reflects the market transparency which is consistent with Neumann's (2003) and Kirabaeva and Razin's (2009) studies. These results are also consistent with Mody et al. (2002)'s study which stated that a higher level of stock market transparency led to an increased in the entry of FDI. Both methods of measuring asymmetric information, the depth and width aspects have significant effects on FDI and FPI. Therefore, a higher market transparency (lower asymmetric information) will lead to the higher FPI and FDI and vice versa which

supports the results revealed by Aggarwal et al. (2005) and Chipalkatti et al. (2007). They concluded that factors that highly associated with the higher degree of information transparency were significant in attracting international investors. Based on the findings, Models 2 and 4 clearly show that asymmetric information affects capital inflows. Therefore, an increase in the transparency (associated with lower asymmetric information) from the perspective of stock market causes an increase in capital inflows; FPI and FDI. The results from Models 1 and 3 do not support the theory, whereas Models 2 and 4 which measure the depth aspects of asymmetric information can managed to describe the changes in FPI and FDI better than Model 1 and Model 3 which utilise the width dimensions of asymmetric information. As explained by Neumann (1999), the differences between FPI and FDI are that, the increased ownership associated with FDI would imply more significant control of a firm and thus would be less costly in regulating the actions of the manager of the firm. Furthermore, in the models being presented, countries with high GDP shows the tendency of having higher FPI and FDI. This is in parallel with Mody et al. (2002)'s study which revealed that an increase in GDP indicates the rise in national prosperity and the level of financial development. From the results, the stock market capitalisation is more significant in models associated with FPI as compared to the FDI, thus supports the study by Goldstein et al. (2010) who suggested that a significant stock market capitalisation is another evidence on the importance of stock market in attracting foreign capital to host countries especially on the FPI. The results are also in line with the study by Sakuragawa and Watanabe (2010) which indicated that the stock market capitalisation is an index to measure the market development.

CONCLUSION

This paper aims at investigating the influence of asymmetric information on foreign capital inflows specifically on FPI and FDI. The positive results of this study as shown by the Amivest models reflect that when the market transparency increases (asymmetric information reduce), this will attract foreign investors and increase capital inflows and vice versa, which is consistent with the theory. That is, when the market asymmetric information increases (decrease), meaning less (high) market transparency, this will then reduce (attract) the FPI and FDI. The findings suggest that the market with a

lesser degree of asymmetric information which reflects higher market transparency is preferred more by foreign investors. This research also introduces asymmetric information from the perspectives of the stock market which can act as a risk index towards enhancing financial stability through adjustment and the control of the monetary policy and liquidity by the policymakers. In addition, it provides valuable information for the stock market portfolio diversification at the global arena. Additionally, the results of the study provide valuable information to policymakers in monitoring the transparency of the market that relates to the foreign capital inflows and highlight the relevance of the market microstructure in assessing asymmetric information for ASEAN+3 countries.

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