

## ISLAMIC CAPITAL MARKET INTEGRATION AND ASYMMETRIC INFORMATION: A STUDY IN THE FIVE ASEAN COUNTRIES FROM THE POST-GLOBAL FINANCIAL CRISIS

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**Abstract.** This study aims at examining the integration impact of the five ASEAN Islamic capital markets on asymmetric information for ASEAN Economic Community (AEC) development. Utilizing samples of market and financial panel data from 2009 to 2015 among the five ASEAN Islamic capital markets, and applying two-country portfolios of the Islamic capital markets among the five ASEAN countries to measure the different levels of Islamic capital market integration, this study suggests that the different levels of the Islamic capital market integration between Indonesia and Malaysia are found to result in asymmetric information negatively. The strongest Islamic capital market integration between Indonesia and Malaysia affect reduced asymmetric information more consistently than the other two-country portfolios, while the weakest level of integration between the Philippines and any other four Islamic capital markets that affects asymmetric information inconsistently is also supported. These results confirm an interplay between a modern portfolio theory, Efficient Market Hypothesis (EMH), contract theory, and general economic theory, and also provide new insights for stakeholders in investment decisions and strategies, cross-border regulation of economic resources, and other plentiful benefits.

**Keywords:** Islamic capital market integration, asymmetric information, a modern portfolio theory, Efficient Market Hypothesis, contract theory, the five ASEAN countries.

**JEL Classification:** F02, G14, G15, M48, H11, H30, H87.

### Introduction

To date, there has been a great deal of literature on capital market integration, both related to Islamic and conventional capital markets. Previous studies were not only conducted in the specific regional areas (ASEAN, European Union, MENA, or other regions) but also had involved a broader context (international), for example, the extent to which the integration of capital markets among developed countries and global capital market has an impact on capital markets in developing countries with a variety of research models (see Swanson, 1987; Click & Plummer, 2005; Simpson, 2008; Majid et al., 2007; Siddiqui, 2009; Kabir et al., 2013; Rangvid et al., 2016; Chevallier et al., 2018; Miyazawa et al., 2019; Caporale et al., 2019; Tinta et al., 2018; Nittayagasetwat & Buranasiri, 2018). Besides, capital market integration has been also proven to bring many benefits, e.g., an increase in liquidity (Singh, 2009), the more efficient resource-allocation for improved productivity and more access to investment opportunities (Bonfiglioli, 2008; Gehringer, 2013), the easier

risk diversification (Abbes & Trichilli, 2015), the increased market efficiency (Hooy & Lim, 2013; Aawaar et al., 2017), and the less volatility (Kose et al., 2003), all of which lead to the increased economic growth (Hanna et al., 2019; Ehigiamusoe & Lean, 2018).

While the previous studies address more general issues regarding the conventional capital market integration, mostly linked with international diversification, this issue concerning the impact of the Islamic capital market integration on asymmetric information among the five ASEAN countries, to the best of the author's knowledge, has not been empirically explored yet, specifically focusing on the extent to which the integration levels empirically affects asymmetric information. The socio-cultural, geographical uniqueness, the difference in governance, and market-efficiency levels especially in the ASEAN countries (Mauro, 1996; Hussain et al., 2017; Dima et al., 2018; The World Bank, 2015; Shaik & Maheswaran, 2017) are the other reasons why this issue is worth examining. Besides, applying a two-country portfolio as a dummy variable

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rather than a single country portfolio is also considered a distinctive approach to measure levels of capital market integration (De Santis & Sarno, 2008; Bekaert et al., 2009; Lekovic, 2018). Given that argument, this study aims to examine empirically the impact of the Islamic capital market integration (using a two-country portfolio as a dummy variable to measure Islamic capital market integration levels) on asymmetric information among the five ASEAN countries, following up on the findings of Qizam et al. (2020).<sup>1</sup> For instance, the strongest Islamic capital market integration exists in the integration between Indonesia and Malaysia, while the weakest integration is experienced by the integration between the Philippines and any other country of the four ASEAN countries (Qizam et al., 2020). Thus, this research is expected to provide additional evidence, more specifically, related to how the effect of integration levels among the ASEAN countries drives asymmetric information. Referring to Qizam et al. (2020), the integration levels of Islamic capital markets among the five ASEAN countries will be adopted to further look into their effects on asymmetric information.

Conclusively, these findings will contribute to, first, providing evidence that the use of a two-country portfolio as a dummy variable to see Islamic capital market integration effect on asymmetric information is empirically proven. Second, these findings are also expected to provide empirical evidence confirming an interplay between a modern portfolio theory by Markowitz (1952), contract theory, EMH by Fama (1970), and general economic theory (Edison et al., 2002; Ehigiamusoe & Lean, 2018). These theories that lead to efficient price and economic efficiency due to capital market integration are also expected to get empirical support. Third, these results imply that investors should be alert when capital markets are getting more integrated because the benefits from international diversification will decrease so that trading strategies and investment strategies should be directed to respond to and to accommodate the changes in Islamic capital market integration. Fourth, because of the imperfect integration, knowing integration levels among stock indices of

different countries should be beneficial for stakeholders, especially for investors who want to get returns from international diversifications and for policymakers who can improve the ecosystem to reduce informational and regulatory barriers among Islamic capital markets in different countries, especially the five ASEAN countries.

The rest of this study covers the following sections: Section 1 explores a literature review and hypothesis development; Section 2 describes research methods applied to examine the impact of the five ASEAN capital market integration on asymmetric information, and Section 3 presents the results and discussion. Next, this study will be closed by conclusions and implications.

## 1. Literature review and hypothesis development

Why capital market integration is important, and why it is indispensable to link it to asymmetric information can be explained by exploring an interplay between a modern portfolio theory (Markowitz, 1952), efficient market hypothesis (EMH) (Fama, 1970), contract theory, and general economic theory. A modern portfolio theory (MPT) by Markowitz (1952) affirms the importance of diversification, and is also consistent with a conventional adage: “don’t put your eggs in one basket” (Fabozzi et al., 2002). There are two types of risks faced by investors: systematic and unsystematic risk. Unsystematic risk is a risk that can be reduced by diversifying, such as diversification among equities, industries, or countries. Islamic capital market integration is carried out to reduce risk; this is indicated by asymmetric information (proxied by the bid-ask spread of stock prices). Lekovic (2018) posits that when foreign securities are included and mixed with one’s domestic investment in a portfolio, part of systematic risk in the domestic market is transferred into unsystematic risk, while the rest of systematic risk remains unchanged because of global macroeconomic variables as common factors that cannot be diversified. This unsystematic risk, among other things, may stem from asymmetric information because of institutional, regulatory, or monetary differences between domestic and foreign markets or the differences between the more-informed investors from domestic countries and the less-informed investors from foreign countries. Through capital market integration among the five ASEAN countries, the differences in all barriers between domestic and foreign markets should be decreased so that asymmetric information, in turn, is also reduced (Reeb et al., 1998; Mondria & Wu, 2013).

Albuquerque et al. (2009), among others, also assume that global investors have international information that is considered important to be communicated to other countries for trading purposes. Because it is suspected that asymmetric information has occurred between local investors and international investors, which is exacerbated by international obstacles and regulations of investment among countries, investors are not usually quick to react to international information so that the price formed is slow to reflect the international information. Given the

<sup>1</sup> Qizam et al. (2015) focus on examining integration among the five Islamic Capital markets in ASEAN (Indonesia, Malaysia, Philippines, Singapore and Thailand) in the crisis period from 2007 to 2012, while Qizam et al. (2020) not only continue to investigate the nature and integration of Islamic stock markets across the five ASEAN countries for ASEAN economic community (AEC) development but also explore its potential benefits from literature review using data in the post-crisis period from 2009 to 2014. In this regard, my current study addresses not only the issue of capital market integration and its potential benefits but also provides empirical evidence of its impact and benefits on asymmetric information, using data in the post-crisis period from 2009 to 2015, being parallel to data used in the study of Qizam et al. (2020) who also used the post-crisis data series from 2009 to 2014. Thus, the different data period ending in 2014 and 2015 in the study of Qizam et al. (2020) and my current study is merely needed to accommodate different research methods applied in the two studies, not influencing the substance of analysis.

existence of capital market integration which loosens regulatory barriers among countries, asymmetric information is reduced so that market efficiency increases, and, thus, is consistent with the theory of EMH (Fama, 1970), where the existence of market efficiency is subject to how asymmetric information can be pressed to a minimum.

At the same time, this situation is also in line with the predictions of general economic theory, which states that when there is capital market integration, the limitations on capital mobility are reduced or relaxed so that the international exchange of economic resources can work smoothly, especially when the exchange of economic resources runs from countries that have abundant resources to those that have no/fewer resources (Park, 2013). Capital market integration as a part of economic integration can also play a vital role to take part in the mobilization of trade and capital accumulation for productivity growth, leading to economic growth through many channels, e.g., the increased capacity to support capital allocation, risk-sharing for international consumption, risk-diversification opportunities, better allocation of capital in investment chances, production concentration and specialization, and financial development (Ehigiamusoe & Lean, 2018; Stavarek et al., 2011; Gehringer, 2013).

Asymmetric information is also linked to contract theory, that is, exploring the degree to which business contracts and arrangements are built among economic agents under **asymmetric information**, whereby usually one party is in a better position about some information than another party in making a decision, leading to some problems, such as adverse selection and moral hazard. If these two problems occur in extreme conditions, the markets will enjoy their failure. It means that the lower the **asymmetric information** is, the better the market will be, attributable to the decreased transaction cost (see, *inter alia*, Akerlof, 1970). These phenomena are specifically not only observed in the micro context of imbalance between managers and investors and between employers and employees (Mikołajek-Gocejna, 2014) but also in the macro context of financial development for economic growth (Stavarek et al., 2011), that is, through channels of decreased asymmetric information and the consistently-enforced application of international accounting standard (IFRS). This condition will also result in informational efficiency (Hooy & Lim, 2013; Aawaar et al., 2017; Guan & Wooi, 2017; Aney et al., 2017; Gnath et al., 2019). Thus, asymmetric information is also reduced because the information from various sources and different countries is exchanged and flows into the capital market smoothly along with the flow and exchange of economic resources among countries so that expectations of prices by investors become more homogeneous and symmetrical, which, in turn, will also result in price/market efficiency, leading to be consistent with the EMH theory.

Owing to the importance of capital market integration, much research has addressed this issue since the 1980s, and this issue has gained popularity during the 2000s (Sharma & Seth, 2011). Since then, many scholars

have addressed this issue in many countries, such as Indonesia, the ASEAN countries, India, Greece, Australia, the UK, the USA, and many others. Most of them support the capital market integration hypothesis, but with the difference in samples and periods (Roca et al., 1998; Simpson, 2008; Majid et al., 2007; Click & Plummer, 2005; Siddiqui, 2009; Kassim, 2010; Matei, 2020; Yao et al., 2018; Miyazawa et al., 2019; Caporale et al., 2019).<sup>2</sup> In selected ASEAN countries, specifically, this issue is also addressed by some scholars, leading to the similar conclusion that capital markets among countries are interconnected (see, *inter alia*, Roca et al., 1998; Chan et al., 2018; Nittayagasetwat & Buranasiri, 2018; Qizam et al., 2015).

While these abovementioned studies address this issue in a more general context, regarding the nature of the integration (short or long term; unidirectional or bidirectional), linked with international diversification, and its benefits from a theoretical point of view, no study, to the best of the author's knowledge, is intended to examine the extent to which the integration level among the five ASEAN Islamic capital markets empirically affects asymmetric information. Given the argument, this study aims to examine the impact of the Islamic capital market integration on asymmetric information among the five ASEAN countries empirically, following up on the findings of Qizam et al. (2020). Given the above description, a hypothesis is proposed as follows.

**H1.** The Islamic capital market integration among the five ASEAN countries negatively affects the asymmetric information, i.e., the stronger the Islamic capital market integration among the five ASEAN countries is, the lower the asymmetric information will be, and *vice versa*, the weaker the Islamic capital market integration among the five ASEAN countries is, the higher the asymmetric information will be.

## 2. Research method

### 2.1. Data and sample

First, dummy variables of two-country portfolios as independent variables were employed to measure the levels of Islamic capital integration among the five ASEAN countries based on the results of Qizam et al. (2020). Keeping in mind the findings of Qizam et al. (2020), the two countries of Indonesia and Malaysia are found to enjoy the strongest integration, while the weakest integration contrarily occurs in the integration between the Philippines and any other country. Lekovic (2018) confirms that combining some stock indices from selected countries in a portfolio will generate better benefits from international diversification because of lower correlation and lower total portfolio risk (including lower asymmetric information)

<sup>2</sup> Meanwhile, despite many benefits from capital market integration as aforementioned, some scholars do not agree with the idea of capital market integration (e.g., Stavarek et al., 2011; Valadkhani & Chancharat, 2008; etc.).

than combining all stock indices from countries all over the world or a single country (see also De Santis & Sarno, 2008; Bekaert et al., 2009). It means that through integration involving different stock indices in different countries, that is, a two-country portfolio as a dummy variable, total portfolio risk, specifically unsystematic risk sourced from asymmetric information, will also decrease, but the combination of two-country portfolios will certainly generate different levels of integration. Therefore, to illustrate Islamic capital integration between one country and another country in the five ASEAN countries can be further proxied by a portfolio consisting of two countries, each of which uses a dummy variable being equal to 1 for each two-country portfolio of the five ASEAN countries, and dummy value = 0 for other portfolios. The dummy variables compared integration levels of two-country portfolios among the five ASEAN countries.

Second, to measure asymmetric information, a spread between the bid and ask prices were used as dependent variables. Referring to Demsetz (1968) as also cited in Rodrigues and Galdi (2017), bid-ask spreads were measured as in the following formula/model:

$$BAS_{i,t} = \frac{\sum A_{it} - B_{it}}{\sum M_{it}}, \quad (1)$$

where:  $A_{i,t}$  = quoted ask (lowest selling offer) in year  $t$  of a company  $i$ ;  $B_{i,t}$  = quoted bid (highest purchase offer) in year  $t$  of a company  $i$ ;  $M_{i,t}$  = mid-point spread in year  $t$  of a company  $i$ ;  $BAS_{i,t}$  = annualized average bid-ask spread in year  $t$  of firm  $i$ ;  $\Sigma$  = Greek letter sigma, which portrays the operation sum in this paper. The midpoint spread ( $M_{i,t}$ ) is given by  $(A_{i,t} - B_{i,t})/2$ .

Meanwhile, price to earnings ratios (PER), total sales (SALE) converted to the natural logarithm of SALE in US dollars (LNSALE), debt to assets ratios (DTA), total assets (TA) converted to the natural logarithm of TA in US dollars (LNTAD), and price to book ratios (PTB) was employed as the variables to control for firms' growth and size effects. To measure these variables, the annual balanced panel-data of the five ASEAN Islamic capital markets sourced from Thompson Reuters Datastream was collected to include 240 firms from Indonesia, 255 firms from Malaysia, 90 firms from the Philippines, 105 firms from Singapore, and 135 firms from Thailand for a period of 2009–2015<sup>3</sup>. Each of the variables covers 3,800 observations. The variance of growth variables (PER and PTB) is relatively higher than the other variables. Besides, since all VIF-values for all models were not greater than 5 (the results are not reported), all these models were not interrupted by multicollinearity problems. Besides, to deal with heteroscedasticity and autocorrelation problems, Estimated Generalized Least Square (EGLS) was applied.

## 2.2. Models for testing the impact of integration on asymmetric information

To see how the results are consistent about the integration impact on asymmetric information, statistical tests were conducted in Model 2, Model 3 (Models 3a, 3b, 3c), Model 4 (Models 4a1, 4a2, 4a3, 4a5, 4b1, 4b2, 4b3, 4b4, 4c1, 4c2, 4c3, 4c4) by employing price to earnings ratios (PER) and price to book ratios (PTB) to control for growth variables, and the natural logarithm of total sales in US dollars (LNSALE), debt to assets ratios (DTA), the natural logarithm of total asset in US dollars (LNTAD) to control for size effect.

Model 2 portrays the restricted model (non-dummy model), only including control variables as independent variables and excluding all dummy variables assumed to have zero coefficients. Meanwhile, Models 3a, 3b, and 3c respectively show the unrestricted models by employing dummy variable of two-country portfolios for group  $k$  (DIM, DIP, DIS, and DIT),  $l$  (DMP, DMS, DMT), and  $m$  (DPS, DPT, and DST) and control variables (PER, PTB, LNSALE, DTA, LNTAD) as their independent variables and BAS as their dependent variables.

Meanwhile, the next models are classified into three groups of Model 4. The first group consists of Models 4a1, 4a2, 4a3, and 4a4 respectively. They are the unrestricted models which include the dummy variables of two-country portfolios for group  $k$  (DIM, DIP, DIS, and DIT), and all multiplicative coefficients between each dummy variable in group  $k$  and all the control variables as their independent variables. Model 4a5 includes all independent variables, consisting of all dummy variables of two-country portfolios in group  $k$  (DIM, DIP, DIS, and DIT), and all multiplicative coefficients between all dummy variables in group  $k$  and all the control variables as their independent variables. The second group (Models 4b1, 4b2, and 4b3) and the third group (Models 4c1, 4c2, and 4c3) respectively include the same independent variables as the first group, but use the dummy variables of two-country portfolios for group  $l$  (DMP, DMS, DMT) and group  $m$  (DPS, DPT, and DST) respectively. Meanwhile, Model 4b4 (the last model in the second group) and Model 4c4 (the last model in the third group) contain the same independent variables as Model 4a5, but consist of the dummy variables of two-country portfolios for group  $l$  and  $m$ , and all multiplicative coefficients between all dummy variables in group  $l$  and  $m$ , and all the control variables as their independent variables. In this regard, BAS serves as the dependent variable for all the models (either restricted or unrestricted models). To support Hypothesis 1, the coefficients of the dummy variables of two-country portfolios are assumed to be significant if tested in Models 3a, 4a1, 4a2, 4a3, 4a4, 4a5 (unrestricted models in Table 3), Models 3b, 4b1, 4b2, 4b3, 4b4 (unrestricted models in Table 4), and Models 3c, 4c1, 4c2, 4c3, 4c4 (unrestricted models in Table 5). Also, all F-statistic values for a comparative test between all the unrestricted models and the restricted model (Model 2) are assumed to be significant.

<sup>3</sup> Due to the time-varying and dynamics of capital market integration among the five ASEAN countries, to ensure comparability, the data were collected using the comparable periods as depicted in Qizam et al. (2020), that is, from 2009 to 2015.

End of Notation

$$BAS_{i,t} = \alpha_{10} + \alpha_{11}PER_{i,t} + \alpha_{12}LNSALED_{i,t} + \alpha_{13}DTA_{i,t} + \alpha_{14}LNTAD_{i,t} + \alpha_{15}PTB_{i,t} + \varepsilon(a)_{i,t}; \quad (2)$$

$$BAS_{i,t} = \alpha_{20} + \alpha_{21}PER_{i,t} + \alpha_{22}LNSALED_{i,t} + \alpha_{23}DTA_{i,t} + \alpha_{24}LNTAD_{i,t} + \alpha_{25}PTB_{i,t} + \alpha_{26}DDC^{(k,l,m)}_{i,t} + \varepsilon(b)_{i,t}; \quad (3a, 3b, 3c)$$

$$BAS_{i,t} = \alpha_{30} + \alpha_{31}PER_{i,t} + \alpha_{32}LNSALED_{i,t} + \alpha_{33}DTA_{i,t} + \alpha_{34}LNTAD_{i,t} + \alpha_{35}PTB_{i,t} + \alpha_{36}DDC^{(k,l,m)}_{i,t} + \alpha_{37}DDC^{(k,l,m)}_{i,t} \times PER_{i,t} + \alpha_{38}DDC^{(k,l,m)}_{i,t} \times LNSALED_{i,t} + \alpha_{39}DDC^{(k,l,m)}_{i,t} \times DTA_{i,t} + \alpha_{40}DDC^{(k,l,m)}_{i,t} \times LNTAD_{i,t} + \alpha_{41}DDC^{(k,l,m)}_{i,t} \times PTB_{i,t} + \varepsilon(c)_{i,t}.$$

(4a1, 4a2, 4a3, 4a4, 4a5; 4b1, 4b2,4b3, 4b4; 4c1, 4c2, 4c3, 4c4)

Notation:

Variables	Definition and proxy of:
$BAS_{i,t}$	bid-ask spread which is measured by dividing $A_{i,t}$ = quoted ask (lowest selling offer) for firm $i$ period $t$ minus $B_{i,t}$ = quoted bid (highest purchase offer) for firm $i$ period $t$ divided by $M_{i,t}$ = mid-point spread for firm $i$ period $t$ as a proxy of asymmetric information level; the bigger BAS is, the greater the imbalance of information will be.
$PER_{i,t}$	Price-earning-ratio for firm $i$ period $t$ in all samples of Islamic capital market among the five ASEAN countries as a proxy to control for firm-growth effects.
$LNSALED_{i,t}$	Natural logarithm of the total sale in US dollars for firm $i$ period $t$ in all samples of Islamic capital market among the five ASEAN countries as a proxy to control for firm-size effects.
$DTA_{i,t}$	debt to total asset ratio measured by a ratio of total debt to total asset for firm $i$ period $t$ in all samples of Islamic capital market among the five ASEAN countries as a proxy to control for firm-financial-leverage effects.
$LNTAD_{i,t}$	Natural logarithm of the total asset in US dollars for firm $i$ period $t$ in all samples among the five ASEAN countries as a proxy to control for firm-size effects.
$PTB_{i,t}$	Price-to-book value ratio for firm $i$ period $t$ in all samples of Islamic capital market among the five ASEAN countries as a proxy to control for firm-growth effects.
$DDC^{(k,l,m)}_{i,t}$	Dummy variable of two-country portfolios consisting of each pair of two-countries for group $k$ as pairs of dummy variables, starting from dummy variable equal to 1 if a two-country portfolio coming from Indonesia and Malaysia (DIM), and 0 if otherwise; equal to 1 if a two-country portfolio coming from Indonesia and the Philippines (DIP), and 0 if otherwise;

Variables	Definition and proxy of:
	and this also applies to the other pairs, i.e., Indonesia-Singapore (DIS) and Indonesia-Thailand (DIT) respectively; for group $l$ as pairs of dummy variables, starting from dummy variable equal to 1 if a two-country portfolio coming from Malaysia-the Philippines (DMP), and 0 if otherwise; equal to 1 if a two-country portfolio coming from Malaysia-Singapore (DMS), and 0 if otherwise; and equal to 1 if a two-country portfolio coming from Malaysia-Thailand (DMT), and 0 if otherwise; for group $m$ as pairs of dummy variables, starting from dummy variable equal to 1 if a two-country portfolio coming from the Philippines-Singapore (DPS), and 0 if otherwise; equal to 1 if a two-country portfolio coming from the Philippines-Thailand (DPT) and 0 if otherwise; and equal to 1 if a two-country portfolio coming from Singapore-Thailand (DST) and 0 if otherwise. All dummy variables for group $k, l, m$ cover firm $i$ period $t$ .
$\varepsilon(a)_{i,t}, \varepsilon(b)_{i,t}, \varepsilon(c)_{i,t}$	Error terms for firm $i$ period $t$ for all models related to testing the impact of integration on asymmetric information.

### 3. Results and discussion

#### 3.1. Results

The results of Table 1 show the F-statistic values for the dummy model (unrestricted) is higher than the critical F-statistic value (i.e., 2.8 at a significance level of 0.01 and 2.1 at a significance level of 0.05). The unrestricted models comprising dummy variables of two-country portfolios are better than the restricted models excluding dummy variables of two-country portfolios. Table 1 shows that all the unrestricted models (F-statistic values = 260.961, 42.448, 123.238, 56.782, 22.811, and 56.149 for Models 3a, 4a1, 4a2, 4a3, 4a4, and 4a5 respectively are greater than the critical values of F-statistic) are significantly better than the restricted model (Model 2).

The results from Table 1 suggest that all the coefficients of the dummy variable (two-country portfolios) of DIM consistently and significantly meet Hypothesis 1 and the expected objective of this study (at significance levels of 0.01). Meanwhile, the other dummy variables of two-country portfolios i.e., DIP and DIS (see Models 3a, 4a2, 4a3, 4a4, 4a5) denote its significant coefficients, but with the unpredicted (positive) signs, and DIT shows inconsistent coefficients (see Model 4a5 and Model 4a4). Conclusively, the strong impact of Islamic capital market integration on asymmetric information is significantly reflected in the dummy variable of a two-country portfolio of DIM, which is also consistent with Qizam et al. (2020) that place the Islamic capital market integration between Indonesia and Malaysia at the strongest level. The strongest Islamic capital market integration between Indonesia

and Malaysia that proves to result in the reduced asymmetric information can be consistently represented from all the significant-negative coefficients of the dummy variables of DIM in all the tests.

Following the same procedure as testing models in Table 1, the results of Table 2 shows that all the unrestricted models (F-statistic values = 301.183, 115.733, 59.764, 71.408, and 41.463 for Models 3b, 4b1, 4b2, 4b3, and 4b4 respectively) are significantly better than the restricted

model (Model 2). The F-statistic values are greater than the critical values of the F-statistic at a 1% level of significance. In partial tests, however, the coefficients of the dummy variable (two-country portfolios) of DMP in the unrestricted models in Table 2 are inconsistently significant and only denote the significant coefficients with predicted (negative) signs in Model 3b and Model 4b1, while with the insignificant coefficient in Model 4b4; for the other dummy variables of two-country portfolios of

Table 1. Impact of Islamic capital market integration(using a two-country portfolio dummy) for group  $k$  on asymmetric information among the five ASEAN countries (source: these results are adapted from statistical outputs (EViews 10))

Independent Variables	Predicted signs	Model 2	Model 3a	Model 4a1	Model 4a2	Model 4a3	Model 4a4	Model 4a5
C	?	0.094***	0.128***	0.181***	0.062***	0.067***	0.095***	0.187***
PER	?	-1.16E-07	-7.33E-08	8.62E-07	1.35E-06	4.56E-06**	7.84E-07	-3.27E-05*
LNSALED	?	-0.003***	-0.008***	-0.005***	-0.002***	-0.003***	-0.006***	-0.005***
DTA	?	0.009**	0.006***	0.006**	0.005**	-0.013***	0.029***	0.015***
LNTAD	?	-0.002***	-0.002***	-0.007***	-0.001***	-0.0002	0.0003	-0.010***
PTB	?	-0.0001	-3.71E-05***	-2.28E-05**	-4.48E-05	-0.001***	-3.06E-05	0.0007***
DIM	-		-0.048***	-0.091***				-0.081***
DIP	-		0.025***		0.118***			0.108***
DIS	-		0.035***			0.167***		0.035***
DIT	-		0.005***				0.0009	-0.137***
DIM×PER	?			-1.20E-06				-1.41E-05
DIM×LNSALED	?			-0.001				-0.009***
DIM×DTA	?			-0.009				0.015***
DIM×LNTAD	?			0.008***				0.009***
DIM×PTB	?			-0.0006***				-0.0008***
DIP×PER	?				-1.60E-06*			-1.59E-05
DIP×LNSALED	?				-0.005***			0.0017*
DIP×DTA	?				-0.005			0.001
DIP×LNTAD	?				-0.004***			-0.007***
DIP×PTB	?				3.86E-05			0.002***
DIS×PER	?					-4.85E-06**		3.35E-05*
DIS×LNSALED	?					0.002***		0.008***
DIS×DTA	?					0.024***		-0.011***
DIS×LNTAD	?					-0.014***		-0.006***
DIS×PTB	?					0.0009***		-0.0007***
DIT×PER	?						-9.79E-07	2.89E-05
DIT×LNSALED	?						0.005***	0.004***
DIT×DTA	?						-0.029***	-0.013***
DIT×LNTAD	?						-0.005***	0.008***
DIT×PTB	?						-0.0002***	-0.001***
F-statistic values for dummy models (unrestricted) vs non-dummy (restricted) model			260.961	42.448	123.238	56.782	22.811	56.149
Adjusted-R squared		0.713	0.301	0.650	0.424	0.611	0.908	0.341
F-statistic		1889.351	1829.345	6430.031	2552.870	5437.593	3427.867	6885.668
Prob. (F-statistic)		0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: Table 1 documents the results from Models 2, 3a, 4a1, 4a2, 4a3, 4a4, and 4a5 as explained in Sub-section 2.2. The asterisks of \*, \*\*, and \*\*\* refer to significant levels at 10%, 5%, and 1% respectively.

DMS, their coefficients in Models 3b and 4b2 are negatively significant; in Model 4b4, however, they are positively significant; for the other dummy variables of two-country portfolios of DMT, their coefficients (in Models 3b, 4b3, and 4b4) are consistently significant at significance levels of 0.01. This does meet the predicted (negative) signs. Overall, only the last dummy variable of DMT shows its consistent coefficients.

The results from Table 2 suggest that all the coefficients of the dummy variable (two-country portfolios) of DMP and DMS inconsistently show their significance. Conclusively, the weaker impact of Islamic capital market integration on asymmetric information is significantly reflected in the inconsistent coefficients of the dummy variables of a two-country portfolio of DMP and DMS, which is also in line with the findings of Qizam et al. (2020) that

place the Islamic capital market integration between Malaysia and The Philippines [DMP], and between Malaysia and Singapore [DMS] at the weaker level. Exceptionally, the two-country portfolio of DMT also shows that the strong Islamic capital market integration that leads to the reduced asymmetric information can be documented in their significantly-negative coefficients of all the tests. This evidence is, of course, a little different from the expectation in this study. This is also consistent with Hypothesis 1.

In Table 3, all the unrestricted models show that F-statistic values of 153.890, 70.218, 105.945, 129.529, and 36.581 for Models 3b, 4b1, 4b2, 4b3, and 4b4 respectively are greater than the critical values of F-statistic at 0.01 level of significance), suggesting that these models are significantly better than the restricted model (Model 2). The partial tests in the unrestricted models in Table 3

Table 2. Impact of Islamic capital market integration (using a two-country portfolio dummy) for group *l* on asymmetric information among the five ASEAN countries (source: these results are adapted from statistical outputs (EViews 10))

Independent Variables	Predicted signs	Model 2	Model 3b	Model 4b1	Model 4b2	Model 4b3	Model 4b4
<i>C</i>	?	0.094***	0.127***	0.112***	0.151***	0.276***	0.183***
<i>PER</i>	?	-1.16E-07	5.88E-07	2.07E-08	-3.01E-07***	-3.21E-07	-8.63E-07*
<i>LNSALED</i>	?	-0.003***	-0.006***	-0.0004*	-0.006***	-0.005***	-0.0001
<i>DTA</i>	?	0.009**	-0.0002	0.006***	-7.99E-05	0.024***	0.0004
<i>LNTAD</i>	?	-0.002***	-0.001***	-0.007***	-0.004***	-0.013***	-0.011***
<i>PTB</i>	?	-0.0001	-3.11E-05	-1.64E-05	-4.75E-05	-5.36E-05***	-0.0006***
<i>DMP</i>	-		-0.012***	-0.036***			0.016
<i>DMS</i>	-		-0.009***		-0.080***		0.027***
<i>DMT</i>	-		-0.030***			-0.213***	-0.149***
<i>DMP</i> × <i>PER</i>	?			2.95E-05			4.61E-05
<i>DMP</i> × <i>LNSALED</i>	?			-0.003***			-0.009***
<i>DMP</i> × <i>DTA</i>	?			-0.028***			0.018**
<i>DMP</i> × <i>LNTAD</i>	?			0.006***			0.006***
<i>DMP</i> × <i>PTB</i>	?			-0.001***			-0.002***
<i>DMS</i> × <i>PER</i>	?				1.98E-06*		2.15E-06*
<i>DMS</i> × <i>LNSALED</i>	?				0.003***		0.003**
<i>DMS</i> × <i>DTA</i>	?				0.002		0.016***
<i>DMS</i> × <i>LNTAD</i>	?				0.003***		-0.005***
<i>DMS</i> × <i>PTB</i>	?				3.11E-05		0.0005***
<i>DMT</i> × <i>PER</i>	?					7.43E-06*	7.84E-06*
<i>DMT</i> × <i>LNSALED</i>	?					0.002***	-0.0006
<i>DMT</i> × <i>DTA</i>	?					-0.021***	0.0003
<i>DMT</i> × <i>LNTAD</i>	?					0.013***	0.010***
<i>DMT</i> × <i>PTB</i>	?					-0.0008***	0.0004*
<i>F</i> -statistic values for dummy models (unrestricted) vs non-dummy (restricted) model			301.183	115.733	59.764	71.408	41.463
Adjusted <i>R</i> -squared		0.713	0.307	0.397	0.491	0.657	0.647
<i>F</i> -statistic		188.935	211.719	228.617	334.315	661.768	303.762
Prob. ( <i>F</i> -statistic)		0.000	0.000	0.000	0.000	0.000	0.000

Note: Table 2 documents the results from Models 2, 3b, 4b1, 4b2, 4b3, and 4b4 as explained in Sub-section 2.2. The asterisks of \*, \*\*, and \*\*\* refer to a significance levels at 10%, 5%, and 1% respectively.

suggest that the coefficients of the dummy variable of DPS show their significance, but with the unpredicted (positive) signs in all models (Models 3c, 4c1, and 4c4). The coefficient of the dummy variable of DPT only shows its significance at a level of 0.01 with predicted (negative) signs in Model 3c, while it indicates its significance with the unpredicted (positive) signs in Model 4c2, but denotes its insignificance in Model 4c4. All the coefficients of the dummy variable of DST show their significance at a level of 0.01, but in Model 3c and Model 4c3, they do not meet the predicted (negative) signs, and their coefficients only meet their significance with the predicted (negative) signs in Model 4c4 at a significance level of 0.01. Conclusively, the weakest impact of Islamic capital market integration on asymmetric information is significantly reflected in the inconsistent coefficients of the dummy variables of DPS,

DPT, and DST. This is also in line with Qizam et al. (2020) that place the Islamic capital market integration between the Philippines and the four other countries at the weakest level, thereby leading to support Hypothesis 1.

### 3.2. Discussion

Given Tables 1, 2, and 3, all the unrestricted models (as seen in Models 3 and 4) containing the dummy variables of two-country portfolios to reflect the Islamic capital market integration levels are proven to be significantly better than the restricted model (Model 2). These results suggest that the Islamic capital market integration levels are significantly found to affect asymmetric information negatively. The strongest Islamic capital market integration, proxied by the two-country portfolio of Indonesia and Malaysia

Table 3. Impact of Islamic capital market integration (using two-country portfolio dummy) for group *m* on asymmetric information among the five ASEAN countries (source: these results are adapted from statistical outputs (EViews 10))

Independent Variables	Predicted signs	Model 2	Model 3c	Model 4c1	Model 4c2	Model 4c3	Model 4c4
C	?	0.094***	0.074***	0.075***	0.072***	0.075***	0.089***
PER	?	-1.16E-07	-7.00E-08	-2.76E-07*	5.47E-07	-4.64E-07***	-3.36E-07
LNSALED	?	-0.003***	-0.003***	-0.004***	-0.003***	-0.004***	-0.006***
DTA	?	0.009**	0.004***	0.0008	-0.002	-0.008**	-0.003
LNTAD	?	-0.002***	-0.001***	-0.0007*	-0.0008*	-0.0002	0.0009
PTB	?	-0.0001	-4.40E-05*	-0.0005***	-4.35E-05	-0.0006***	-0.0006***
DPS	-		0.024***	0.260***			0.189***
DPT	-		-0.009***		0.062***		0.017
DST	-		0.006***			0.034**	-0.057***
DPS×PER	?			7.92E-07			-2.19E-05**
DPS×LNSALED	?			0.001			0.003***
DPS×DTA	?			0.002			0.011**
DPS×LNTAD	?			-0.019***			-0.016***
DPS×PTB	?			0.0005***			0.002***
DPT×PER	?						
DPT×LNSALED	?						
DPT×DTA	?						
DPT×LNTAD	?						
DPT×PTB	?						
DST×PER	?						
DST×LNSALED	?						
DST×DTA	?						
DST×LNTAD	?						
DST×PTB	?						
F-statistic values for dummy model (unrestricted) vs. non-dummy (restricted) model			153.890	70.218	105.945	129.529	36.581
Adjusted R-squared		0.713	0.388	0.534	0.353	0.362	0.655
F-statistic		188.935	302.780	396.828	189.726	1972.908	315.397
Prob. (F-statistic)		0.000	0.000	0.000	0.000	0.000	0.000

Note: Table 3 documents the results from Models 2, 3c, 4c1, 4c2, 4c3, and 4c4 as explained in Sub-section 2.2. The asterisks of \*, \*\*, and \*\*\* refer to significant levels at 10%, 5%, and 1% respectively.



as a dummy variable, affects negatively asymmetric information more consistently than the weaker Islamic capital market integration among any other two-country portfolios of the five ASEAN countries. The weakest Islamic capital market integration between the Philippines and any other four ASEAN countries proves to indicate inconsistent results. As such, these results are consistent with Hypothesis 1. These results also support Lekovic (2018), who states that a portfolio containing a specific number of stock indices from the selected countries enjoys lower total portfolio risk, including lower asymmetric information (see also De Santis & Sarno, 2008; Bekaert et al., 2009). Overall, using dummy variables of two-country portfolios to test the effect of Islamic capital market integration on asymmetric information among the five ASEAN countries is theoretically reasonable and empirically supported.

Also, these findings are in line with contract theory as reaffirmed by Mondria and Wu (2013), suggesting that imperfect financial integration and asymmetric information complement each other. On the one hand, there is a great number of foreign investors' barriers and regulatory constraints that make capital market integration imperfect, while, on the other hand, asymmetric information also occurs between domestic and foreign investors, leading to informational advantage for domestic investors. When viewed from a modern portfolio theory (Markowitz, 1952), the more integrated the capital markets are, the lower asymmetric information will be; when capital markets are internationally integrated, some portion of the systematic domestic risk is converted into unsystematic risk, leaving a systematic global risk. Henceforth, the unsystematic risk, among others, also stems from asymmetric information (e.g., because of informational advantage for domestic investor relative to a foreign investor or adverse selection problem), in which it decreases along with an increase in the correlation among different stock indices in different countries (decreased noise trading), in turn, leading to "fair price" or increased market efficiency (being consistent with EMH). From the economic theory perspective, the 'fair price' from market efficiency can also occur when an exchange of economic resources and capital mobility, among different countries, can be smoothly carried out by eliminating a great number of informational, regulatory, monetary barriers, and the consistent application of international accounting standard (IFRS) (Park, 2013; Gnath et al., 2019; Guan & Wooi, 2017; Mikołajek-Gocejna, 2014; Hooy & Lim, 2013; Aney et al., 2017), leading to efficient trade and capital accumulation for productivity growth, and, in turn, to economic growth (Ehigiamusoe & Lean, 2018; Aawaar et al., 2017; Guan & Wooi, 2017).

Henceforth, the results also imply that the strongest integration of Islamic capital markets between Indonesia and Malaysia consistently and negatively affect asymmetric information. Why the strongest integration of Islamic capital markets occurs between Indonesia and Malaysia can be explained as follows. First, among the five ASEAN countries, Indonesia and Malaysia represent the most

dominant Islamic capital market players, enjoying the top ranks of the Islamic Finance Country Index (IFCI) with scores of 81.05 and 81.93 in 2019 respectively (IFCI, 2019). They are also the only two countries from the five ASEAN countries that belong to QISMUT (Qatar, Indonesia, Saudi Arabia, Malaysia, the United Arab Emirates, and Turkey), which accounts for more than 78% out of the world's Islamic financial assets (Lackmann, 2014). Second, socio-culturally, the Indonesian people are in the same clan as the Malaysian people, who come from *Melayu*, and geographically, Indonesia and Malaysia are close neighbors. Besides, most of the people in both countries are Moslem, so that most investors for both countries are also Moslem. These conditions make the Indonesian and Malaysian capital markets exchange each other in many things, especially information, labor force, and other economic resources.

Meanwhile, the effect of the weakest integration between the Philippines and any other four ASEAN countries on asymmetric information can be concluded from the results showing its inconsistent coefficients from Tables 1, 2, 3. All these results conclusively support Hypothesis 1. Previous literature suggests that the governance problem is also the critical reason why capital market integration does not work effectively. Up to 2015, the World Bank has reported the worldwide governance indicators (The World Bank, 2015). The Philippines is placed at the poorest governance, especially in rule of law (34.13), compared to the other ASEAN countries. In political stability, the Philippines enjoys the lowest scores (12.86), compared to the other ASEAN countries. This is consistent with the insights from Dima et al. (2018), who provide evidence that the rule of law positively affects capital market development (the data were taken from 45 countries in a period from 2009 to 2014). Likewise, Mauro (1996) and Hussain et al. (2017) also present evidence that corruption has a negative relationship with investment and economic growth.

## Conclusions and implications

This paper suggests that the negative impact of Islamic capital market integration on asymmetric information exists among the five ASEAN countries. These findings also imply that the strongest Indonesia-Malaysia linkage of the Islamic capital markets has also prominently and negatively affected asymmetric information (as reflected on bid-ask spreads). The dummy variables of the two-country portfolios that reflect stronger Islamic capital market integration have a significant and negative impact on asymmetric information among the five ASEAN countries (see Lekovic, 2018; De Santis & Sarno, 2008; Bekaert et al., 2009) more consistently than those that reflect weaker capital market integration (e.g., between the Philippines and any other four ASEAN countries). Thus, these results support Hypothesis 1. The negative impact of capital market integration on asymmetric information is also consistent with the explanation from an interplay between

a modern portfolio theory by Markowitz (1952), EMH (Fama, 1970), contract theory as reaffirmed by Mondria and Wu (2013), and also general economic theory. All the theories lead to the efficient capital market, efficient productivity, and also economic growth (see, *inter alia*, Aney et al., 2017; Park, 2013; Gnath et al., 2019; Hanna, 2019; Ehigiamusoe & Lean, 2018; Hooy & Lim, 2013; Aawaar et al., 2017; Guan & Wooi, 2017; and many others). Thus, these results imply that reduced asymmetric information will induce the expanded mobilization and exchange of external funds and broader investment opportunities, thereby, in turn, boosting economic growth. Also, socio-cultural, geographical, and neighborhood position, as well as the similarity of Moslem population majority among countries, could be some reasons why the integration of Islamic capital markets between Indonesia and Malaysia is placed at the strongest level among the five ASEAN countries, while the poor governance is also most likely to be another reason why capital market integration is weak, e.g., between the Philippines and the other four ASEAN countries that is positioned at the weakest level.

Despite the results supporting Hypothesis 1, some limitations such as a limited period in the data sample admittedly appear in this paper. As such, to extend generalizability and to develop the ASEAN Economic Community (AEC), instead of only applying the five ASEAN countries, an extensive investigation should be directed to cover a longer period of data samples and wider economic unions of other regional areas. Meanwhile, to explain more broadly favorable implications from capital market integration, future studies should move from looking into the practical and micro-economic impact of Islamic capital market integration, e.g., dwindled asymmetric information, informational efficiency, more investment chances, etc. (see also Mikołajek-Gocejna, 2014; Hooy & Lim, 2013; Guan & Wooi, 2017) to empirically examining the macro-economic and geopolitical impact of Islamic capital market integration, i.e., *inter alia*, economic growth and the new worldview on financial and social stability, as theoretically highlighted by Stavarek et al. (2011) and also Ehigiamusoe and Lean (2018).

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### Author contributions

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