STOCK-BOND CORRELATIONS IN ASEAN-5: THE ROLES OF FINANCIAL INTEGRATION AND FINANCIAL DEVELOPMENT

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by

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O Allah, bless our prophet, Muhammad (p.b.u.h), who opened what was closed and sealed what was before. He makes the truth victorious by the truth and he is the guide to Your Straight Path. And bless his Household as it befits his immense stature and splendour.

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LIST OF ABBREVIATIONS

ACMF	ASEAN Capital Markets Forum
AEC	ASEAN Economic Community
AFC	Asian Financial Crisis
APT	Asset Pricing Theory
ASEAN	Association of Southeast Asian Nations
ASEAN-5	Indonesia, Malaysia, Philippines, Singapore and Thailand
BCLMV	Brunei Darussalam, Cambodia, Lao PDR, Myanmar and Vietnam.
DCC- MGARCH	Dynamic Conditional Correlation - Multivariate Generalized Autoregressive Conditional Heteroskedasticity
EU	European Union
FEM	Fixed Effect Model
GARCH	Generalized Autoregressive Conditional Heteroskedasticity
GFC	Global Financial Crisis
GLS	Generalized Least Square
LSDV	Least-Squares Dummy Variable
OLS	Ordinary Least Square
POLS	Pooled Ordinary Least Square
REM	Random Effect Model
SBcorr	Stock returns and changes in bond yield correlation
SUR	Seemingly Unrelated Regression

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KORELASI SAHAM-BON DALAM ASEAN-5: PERANAN INTEGRASI KEWANGAN DAN PEMBANGUNAN KEWANGAN

ABSTRAK

Berdasarkan teori pelaburan moden Markowitz (1952), kajian korelasi saham-bon telah mendapat perhatian dalam dunia akedemik kerana kemampuannya menyelidik faedah kepelbagaian asset antara pasaran saham dan bon. Kajian semasa menunjukkan kurangnya faedah kepelbagaian dalam negara yang sedang membangun menyebabkan negara tersebut menjadi destinasi pelaburan yang kurang menarik. Kajian berkaitan menunjukkan bahawa negara yang melaksanakan inisiatif integrasi kewangan tahap lebih tinggi menawarkan faedah kepelbagaian asset yang lebih baik. Di dalam kajian ini, kewujudan faedah sedemikian ditegaskan di dalam negara maju yang mempunyai risiko rendah, namun tidak pula wujud dalam negara yang sedang membangun di mana kadar risikonya adalah tinggi. Oleh itu, kajian ini dijalankan untuk menilai korelasi dinamik antara pulangan saham dan perubahan kadar hasil bon, SBcorr, dalam negara ASEAN-5, serta bagaimana ia terkesan oleh tahap integrasi kewangan di dalam tempoh masa 2007 - 2016. Terdapat empat tahap dalam kajian ini. Dua tahap awal adalah mengkaji tahap integrasi pasaran saham dan SBcorr menggunakan analisis DCC-MGARCH. Analisis tahap pertama menunjukkan bukti positif pasaran saham pergerakan kerjasama negara ASEAN-5 dengan pasaran dunia. Analisis tahap ketiga dan keempat menekankan objektif utama di dalam kajian ini, dengan menggunakan data panel dan SUR untuk menilai impak integrasi kewangan terhadap SBcorr. Bukti diperolehi menunjukkan bahawa integrasi kewangan memberi impak negatif terhadap SBcorr yang menandakan faedah

kepelbagaian adalah rendah, bercanggah dengan kebanyakkan dapatan kajian lepas. Kajian ini menekankan bahawa integrasi kewangan sahaja tidak mampu memberi faedah kepelbagaian yang tinggi kerana pulangan saham dan bon dalam ASEAN-5 adalah berkorelasi tinggi kerana risiko negara yang tinggi. Pembangunan kewangan diperkenalkan sebagai moderator dalam hubungan antara integrasi kewangan dan korelasi saham-bon bagi melihat sama ada faedah kepelbagaian wujud dalam ASEAN-5. Keputusan mendapati impak positif pembangunan kewangan terhadap hubungan antara integrasi kewangan dan SBcorr, yang menunjukkan kewujudan faedah kepelbagaian antara asset saham dan bon. Pembangunan kewangan digabungkan ke dalam model sebagai penentu tambahan untuk mengurangkan lagi risiko premia agar lebih ramai pelabur memilih pelaburan pasaran saham berbanding bon. Oleh itu, pulangan saham dan kadar hasil bon akan meningkat kerana lebih banyak modal disalurkan ke dalam pasaran yang akan menarik lebih ramai pelabur. Maka, implikasi teori dalam kajian ni menyarankan bahawa peranan pembangunan kewangan sebagai moderator dalam hubungan integrasi kewangan dan dinamik korelasi saham-bon adalah amat penting. Dapatan kajian ini juga menyarankan pelabur harus mengutamakan negara yang mempunyai pembangunan kewangan yang tinggi jika faedah kepelbagaian merupakan objektif utama mereka.

STOCK-BOND CORRELATIONS IN ASEAN-5: THE ROLES OF FINANCIAL

INTEGRATION AND FINANCIAL DEVELOPMENT

ABSTRACT

Based on Markowitz's (1952) modern portfolio theory, studies of stock-bond correlation have gained considerable attention in academia as it explores the extent of asset diversification benefit between stock and bond markets. Existing literature has shown that the asset diversification benefit in developing countries are limited due to its high-country risk, making them less attractive as a destination for investment. In a related literature, countries that engaged in higher level of financial integration initiatives have been known to provide better asset diversification benefit. This study argues that such benefit may only exist in developed countries where country risk is low as opposed to developing countries where the countries risk is high. Hence, this study aims to examine the dynamic correlation between stock returns and changes in bond yields, *SBcorr*, in ASEAN-5 community and how it is affected by the level of financial integration in the period of 2007 - 2016. There are four stages of analyses in this study. The first two stages examine the level of stock market integration and *SBcorr* using DCC-MGARCH analysis. The third and fourth stages of analysis highlight the main objective of this study, whereby the impact of financial integration on *SBcorr* is examined using panel data and SUR estimations, respectively. Evidently, financial integration has a negative impact on *SBcorr*, implying low diversification benefit, contradicting most past findings. The study contends that financial integration alone cannot provide higher diversification benefit as both stock and bond returns in ASEAN-5 are highly correlated due to high country risks.

Financial development is introduced as a moderator in the relationship between financial integration and stock-bond correlation to observe whether diversification benefit is present in ASEAN-5. The result indicates the financial development positive impact on the relationship between financial integration and *SBcorr*, suggesting the diversification benefit existence between the stock and bond assets. Financial development was incorporated into the model as an additional determinant to reduce the risk premia further, so more investors prefer the stock over bond market investment. Consequently, stock return and bond yield increase with more capital channelled into the market, attracting more investors. Therefore, the theoretical implication of this study suggests that financial development role as a moderator in the relationship between financial integration and stock-bond correlation dynamics is imperative. The finding also implies that investors should prioritise countries with higher level of financial development if portfolio diversification is their main objective.

CHAPTER 1 INTRODUCTION

1.1   Introduction

Chapter 1 starts with Section 1.2, which presents the background of the study. This section provides some insights on the studies of stock-bond correlation, the ASEAN background, the level of financial integration in ASEAN-5 community, and the role of financial integration and financial development in affecting the dynamic of stock-bond correlation. Section 1.3 discusses the problem statement arises from the existing studies and its potential implications towards investors and the host countries. Section 1.4 and Section 1.5 outline the research questions and research objectives, respectively. The scope of the study is reviewed in Section 1.6. Then, the study describes the key terminologies used in this study for justification purposes and to avoid any possible confusion. Finally, the study discusses the significance of the study in Section 1.8, while Section 1.9 provides the overview and the flow of the study.

1.2   Background of the Study

1.2.1   Stock-Bond Correlations

As the financial market has become more developed, business owners have higher accessibility to capital, and investors have diverse financial assets available for investment. At this point, the financial sector has become more sophisticated and well-regulated to cater and protect the interest of many parties. With the diverse financial instruments to choose from, investors can shift their portfolios between risk and less risky

financial assets. In many studies, the risky and less risky assets are typically represented by stock and bond markets, respectively (Bayraci, Demiralay, & Gencer, 2018; Campbell & Ammer, 1993; Shiller & Beltratti, 1992). Thus, studies of stock-bond correlation become one of the hot topics in both academia and industry sectors that examine the extent of portfolio diversification benefits. By implementing asset diversification strategy, investors can reduce their potential loss against asset-specific risk.

According to Harry Markowitz (1952), imperfect correlation between asset returns can serve as the basis point for portfolio diversification. In the context of stock-bond correlation literature, Markowitz's inference suggests that if a correlation between stock and bond returns are perfectly correlated, asset diversification benefit is not present since the asset returns move perfectly in tandem with one another. Thus, investors should build their portfolio where assets are not perfectly correlated; or even better, a negative correlation where the assets are moving away from each other, so that if one market goes down, the other would go up. In other words, a negative (positive) correlation between stock return and bond return (changes in bond yield) will provide higher diversification benefits to investors. In the event of financial crisis, having a negative stock-bond return correlation is good for investors because it implies higher diversification benefit which allows investors to rebalance a larger portion of their portfolios towards bond market. If stock-bond return correlation were to be positive, this implies that investing in stock or bond markets during financial crisis does not make much difference since they would still loose their investment.

Investors can also diversify their portfolios by investing in different countries to eliminate country-specific risks. However, if the countries are financially integrated, the investors are exposed to contagion risk effect, whereby, a risk from one country can be transmitted into another country. This can be translated into a lower diversification benefit as the financial markets of the respective countries in the region co-move in the same direction and exposed to the effect, which also known as systematic risks. Thus, it is vital for investors to consider these situations when building their portfolios that contain different assets with different countries of investment. As policymakers make various initiatives to further enhance economic and financial integration with other countries, investors need to be attentive to the change in the economic climate, which could affect their strategic portfolio investment.

Instead of just focusing on portfolio diversification across different stock markets, it is also important to understand how portfolio diversification works across different capital markets. This is where the stock-bond correlation came into the picture. Most studies focus on stock-bond correlation not only because these two assets are different in nature, but they are mostly traded financial assets as compared to other markets. The returns on stocks are based on the risk taken by investors. Bonds, on the other hand, provide investors with a lower return but with lower risk as compared to stocks. Thus, holding a combined portfolio of these two assets allows investors to diversify their risks. A negative correlation of stock and bond return implies a high diversification benefit, while a positive stock-bond return correlation suggests a low diversification benefit.

Capital markets are interconnected. While a certain group of thoughts believe that stocks and bond markets should have an inverse relationship, others claim it to move together with one another. As pointed by Li (2002), the former belief is more prevalent in the 1950s when the first version of The Intelligent Investor written by Benjamin Graham claiming that the return correlations between stock and bond are negative. Graham, however, drops his argument in his second version of the book after the correlation structure has changed. Conversely, Shiller and Beltratti (1992) argue that there should be a simple negative relation between stock prices and long-term interest rate. An increase in the expected future discount rate will cause the stock price to fall can make long-term interest rate to rise. In other words, the increased in long term bond yield will make a bond asset to be a more attractive choice of investment as compared to stocks. In response, the stock has to decrease its price to remain competitive and encourage investors to hold stocks. This can also be interpreted as a positive correlation between stock and bond returns. Although such understanding is not entirely wrong, the answer to the relationship between these two assets is much more complex. For instance, the mixture of positive and negative stock-bond return correlation can be shown in Hong et al. (2014), where they observed positive correlation in the period of 1986–1999 and negative correlation in the period of 2000–2007 in Canada, Germany, Japan, the UK and the US. Such fluctuations are also empirically evident in other studies, such as Ferrer, Bolós, and Benítez, (2016), Ohmi and Okimoto (2016), and Wu and Lin (2014).

In many cases, the dynamic of stock-bond correlation can be explained by various determinants, such as macroeconomic factors, market uncertainty, market integration, asset liquidity, etc. (Baele, Bekaert, & Inghelbrecht, 2010; Bansal, Connolly, & Stivers,

2009; Connolly, Stivers, & Sun, 2005; S. J. Kim, Moshirian, & Wu, 2006; Li, 2002; Panchenko & Wu, 2009). A detail discussion on the impact of these determinants on stock-bond correlation is presented in the literature review section.

Although most studies of stock-bond correlation utilize stock and bond returns to construct the correlation, this study however, employs stock return and changes in bond yield. This is because the bond return for ASEAN-5 is limited and difficult to access. Based on this modification, the interpretation for correlation of stock return and changes in bond yield differs from the stock-bond return correlation, but it is still able to explain the asset diversification benefit between the stock and bond assets. For example, a negative stock-bond return correlation is equivalent to a positive correlation of stock return and changes in bond yield, which imply higher asset diversification.

To catch a glimpse of how stock and bond markets performed in ASEAN-5, Figure 1.1 (page 6) and Figure 1.2 (page 7) shows the movements of stock price and bond yield during 2007 – 2018, respectively. Since the data are collected in local currency, the performance of these assets cannot be compared across countries. However, it is interesting to observe the trend or how the assets performed in certain notable events, such as financial crises. For example, during the Global Financial Crisis (GFC) in 2008 – 2009, all five countries demonstrate declined stock prices, which reflect the severity of GFC. Since then, stock prices have been increasing gradually over the period. Indonesia and Philippines, in particular, show rapid increased in stock prices as presented by the steeper historical prices in Figure 1.1 (page 6) as compared to the rest of economies.

Figure 1.2 (page 7) shows the historical movement of bond yields for ASEAN-5 countries. The most prominent observation is the jump of Indonesian bond yield during the GFC period. Such rise might be the result of capital flight from the bond market, which prompts the Indonesian government to increase the bond yield to attract investors into its bond market. Over the period of 2007 – 2018, Singapore has the least volatile bond yields as compared to other countries, reflecting its strong and stable economic foundation.
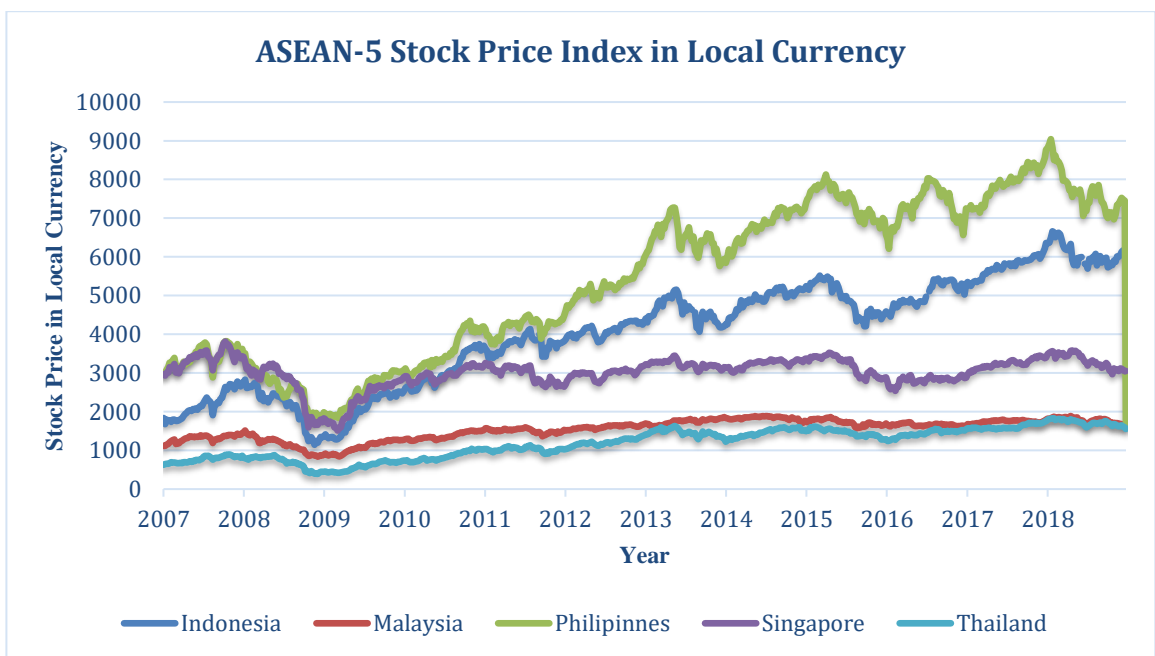
Figure 1.1: ASEAN-5 Stock Price Index in Local Currency
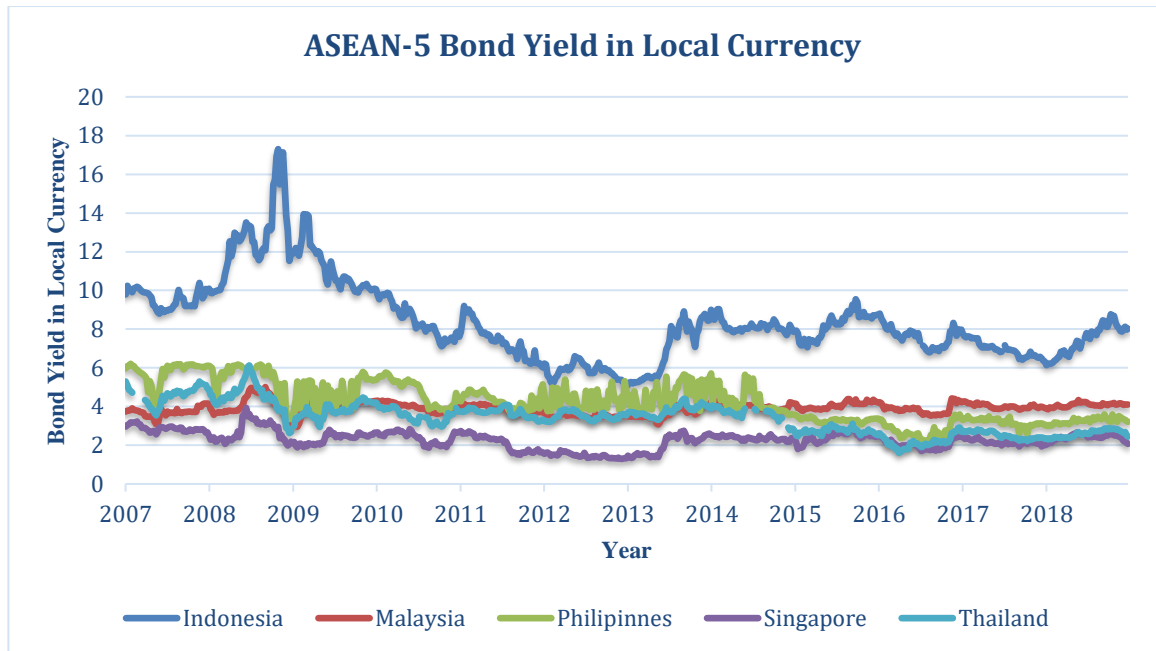
Figure 1.2: ASEAN-5 Bond Yield in Local Currency

1.2.2 ASEAN Background

While there are numerous stock-bond correlation studies conducted in the past, most of them concentrate only on developed markets, especially the European Union. Although there are studies that focus on Asian and emerging economies in general (Dimic et al., 2016; Panchenko & Wu, 2009), studies that focus solely on ASEAN 5 have been relatively scarce. The issue of stock-bond correlation in emerging markets has recently been gaining considerable attention due to its high potential profitability and its lower level of market integration (in comparison with developed countries) to the rest of the world. Therefore, this thesis attempts to fulfil this geographical gap by focusing on the ASEAN-5 market.

The Association of Southeast Asian Nations (ASEAN) is a regionally based international organisation with ten members. It started with the creation of ASEAN-5 in 1967, which consist of Indonesia, Malaysia, the Philippines, Singapore, and Thailand. Then, another five countries from the region have started to join the organisation over time to pursue the economic benefits. The newcomers of the ASEAN community include Brunei Darussalam, which joined the community in 1984, Vietnam in 1995, the Lao's People Democratic Republic (PDR) and Myanmar in 1997, and Cambodia in 1999.

At the 12th Summit of the Association of Southeast Asian Nations (ASEAN) in January 2007, the members pledged to give their commitments in creating the ASEAN Economic Community (AEC) by 2015 for the purpose of establishing "ASEAN as a single market and production base, making ASEAN more dynamic and competitive with new mechanisms and measures to strengthen the implementation of its existing economic initiatives; accelerating regional integration in the priority sectors; facilitating movement of business persons, skilled labour and talents; and strengthening the institutional mechanisms of ASEAN" (*Asean Economic Community Blueprint*, 2008, p. 5). Fast forward to 2015, another blueprint of AEC was created to further reinforce and strengthen the objectives stated in AEC 2015 blueprint, which is, *inter alia*, creating a highly integrated and cohesive ASEAN economy and enhancing connectivity and sectorial cooperation (*ASEAN Economic Community Blueprint 2025*, 2015).

In terms of international trade, most of the ASEAN countries adopt the export-oriented strategy since the birth of the regional agreement. Even though ASEAN community has a surplus of trade export, a larger share of that trade percentage comes

from non-ASEAN countries rather than among the ASEAN countries itself. In 2014, for example, 76% of the total trade by ASEAN member states had gone towards bigger extra-ASEAN economies, such as China, the E.U.-28 and the U.S.A. Figure 1.3 (page 9) and 1.4 (page 10) show the increasing trend of ASEAN-5[1] and BCLMV[2], respectively. Both graphs show a temporary fall in total trade in 2009 due to the Global Financial Crisis (GFC) originated from the U.S., which was then spread throughout Europe and Asia. However, the ASEAN trades continue to shoot back up after the crisis ended as more countries became more open in the international trade with both intra- and extra-ASEAN countries.
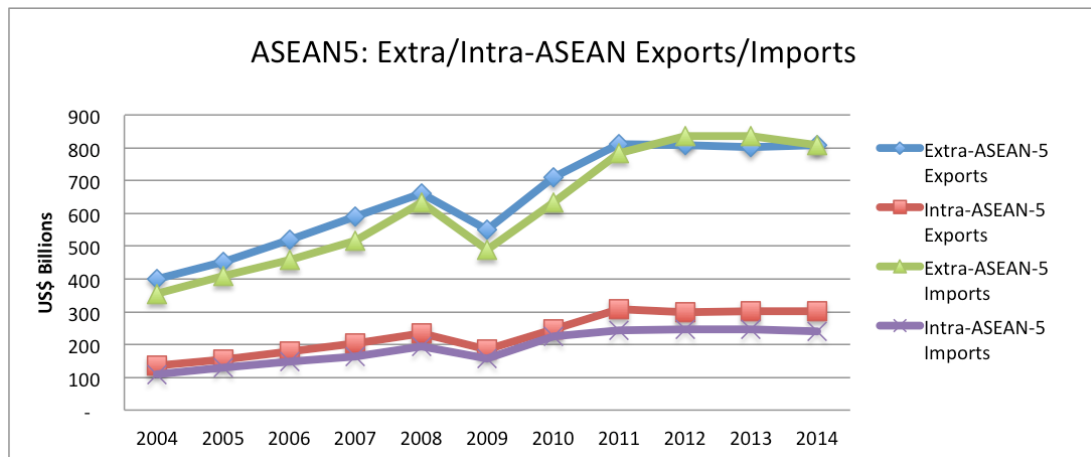
Figure 1.3: ASEAN-5's Extra/Intra-ASEAN Exports/Imports (2004 – 2014)

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[1] ASEAN-5: Indonesia, Malaysia, Philippines, Singapore, Thailand
[2] BCLMV: Brunei Darussalam, Cambodia, Lao PDR, Myanmar, Vietnam.
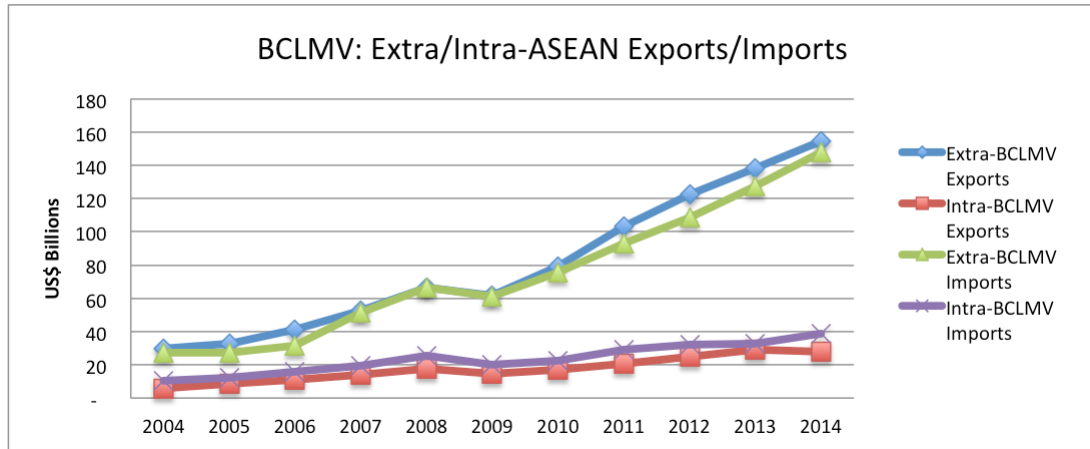
Figure 1.4: BCLMV's Extra/Intra-ASEAN Exports/Imports (2004 – 2014)

1.2.3   Financial Integration in ASEAN

Over the past two decades, financial integration has become increasingly hot topics among academicians and practitioners. One of the prominent factors stimulating this area of research is the increasing globalisation of investments by multinational companies and financial intermediaries as they seek for higher profitability. On the other end, many countries are becoming more aware of the benefits of financial integration, which encourage them to remove their trade barriers and improve their financial system to encourage more capital inflow, all for the purpose of reaping its economic benefits. There are several channels where access to the international capital market can lead to higher economic growth, which are risk-sharing opportunities, better capital allocation, and improved financial development. However, financial integration can also produce some adverse effects, such as the systematic risk that could be contagious from one country to another.

Generally, there are many financial integration indicators used to evaluate the degree of financial integration. The three types of financial integration measurement are price-based measurements, news-based measurements, and quantity-based measurement (Baele, Ferrando, Hordahl, Krylova, & Monnet, 2004). Typically, these measurements use credit market, bond market, money market, and the stock market as the proxies of financial integration. For instance, one can deduce that a specific group of countries is financially integrated if their stock markets are converging or co-moving with each other. Evaluating different markets of integration allows policymakers to understand the markets better and implement the appropriate strategies depending on the economic goals.

To this date, various consensus and agreements have been made between countries towards achieving a cohesive financially integrated region. In Southeast Asia, the creation of the ASEAN community in 1967 and its development throughout several decades are the prime examples of this process. In the context of ASEAN community, many studies have been done to evaluate the level of financial integration through different perspectives; that is, integration within state members, integration with other regions, as well as integration with the global market (Calvi, 2010; Majid, Meera, & Omar, 2008; Majid, Meera, Omar, & Abdul Aziz, 2009; Plummer & Click, 2005). To provide the gist of how well the level of financial integration in ASEAN-5, this section will observe the trend of financial integration using FDI inflow.

From FDI perspective, the ASEAN community has received a total of US$136,181 in 2014. This is an increase of 60.37% from US$ 84,917 in 2007 when the community started to give their full commitment to working towards AEC establishment. Singapore

is the largest country to have received FDI inflows, followed by Indonesia, Thailand, and Malaysia. Note that most of the top members that received high FDI inflows into the region are countries of ASEAN-5. In the period of 2007–2014, ASEAN-5 received a total FDI inflow of US$ 81,700 million per year on average while BCLMV has a total FDI inflow of US$11,807 million per year on average. A larger share of FDI inflows into ASEAN countries came from China, EU-28, Japan, the U.S., and to a lesser extent, among the ASEAN state members itself.

Figure 1.5 (page 13) shows that the intra-ASEAN net FDI inflows are increasing by the year, reflecting the fruitful result of AEC cooperation between ASEAN members. With the increasing trend of FDI inflows into the ASEAN economies, it shows that the community as a whole has become more open in attracting foreign investors to invest in their countries. Figure 1.6 (page 13) shows the trend of intra-ASEAN FDI as the share of total FDI. The trend shows a gradual increase over the years except during the GFC phenomenon in 2008–2009, in which there is a sharp decrease in the percentage. This reflects the significant amount of investments that are pulled out of the region from extra-ASEAN countries.
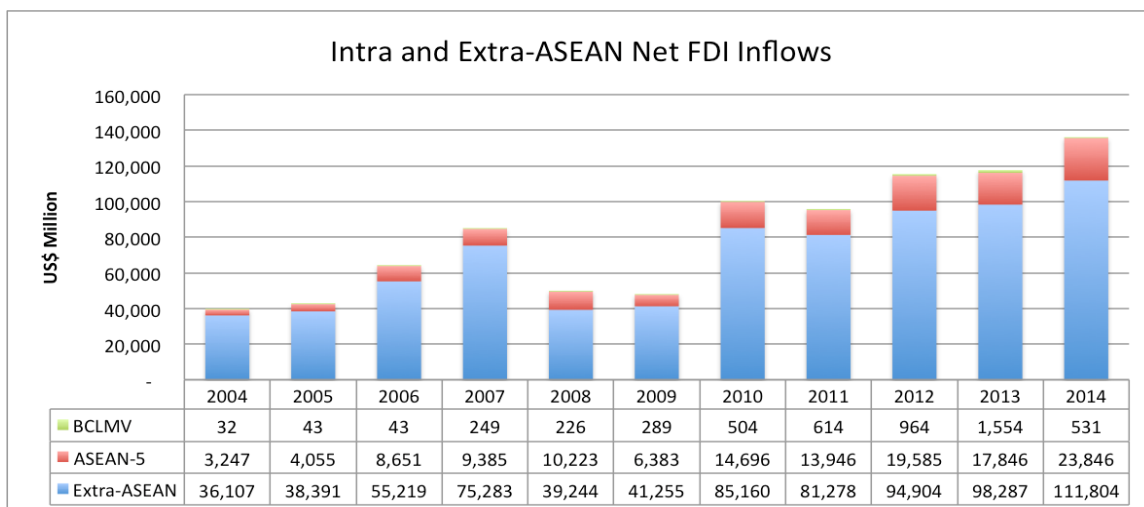
Figure 1.5: Intra and Extra-ASEAN Net FDI Inflows (2004 – 2014)
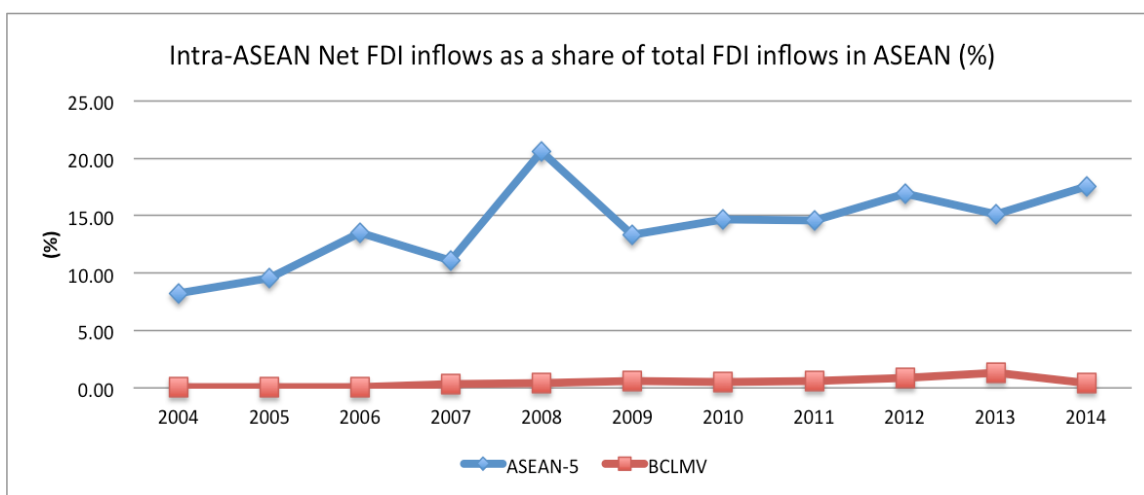
Figure 1.6: Intra-ASEAN Net FDI Inflows as a Share of Total FDI Inflows in ASEAN (2004 – 2014)

From a quantity-based measure perspective, cross-border financial activities, such as capital accounts, can be used to capture the level of financial integration. To catch a glimpse on the progress of financial integration in ASEAN-5 countries, the intra-regional

portfolio investment assets data are used. Total portfolio investment assets are the holdings of portfolio securities issued by non-residents, which are reported by the countries participating in the IMF Coordinated Portfolio Investment Survey (IMF CPIS). Table 1.1 (page 15) has shown a significant increase of US$ 45.4b in 2007 to US$ 96.3b in 2013 due to the significant increase of equity securities. However, most of the portfolio investments were held by non-ASEAN countries, leaving the share of intra-ASEAN portfolio investment holdings in ASEAN's total portfolio holdings to be less than 10% on average.

In term of security composition, the equity security investment has been found to dominate the debt security investment from 2001 to 2007 while the trend goes otherwise in the period 2008 to 2013 on average, as shown in Figure 1.7 (page 15). However, the degree of financial integration cannot be determined by the FDI and portfolio flow investments alone as there are other proxies and techniques that can better quantify the extent of the integration. The discussion will take place under the literature review section where numerous researchers have employed various econometric techniques to empirically evaluate the level of financial integration around the world.

Table 1.1: ASEAN-5 Intra-regional Portfolio Investment Assets (US$ million)

ASEAN-5: Intra-regional Portfolio Investment Assets (US$ million)

	2007	2008	2009	2010	2011	2012	2013	Avg (01-07)	Avg (08-13)
Total Debt Securities	23,767	13,887	19,727	35,959	32,352	49,002	54,416	11,514	34,224
Long-term	17,254	12,080	18,081	30,626	25,950	32,580	28,504	8,716	24,637
Short-term	6,513	1,807	1,646	5,333	6,402	16,422	25,912	2,798	9,587
Total Equity Securities	21,664	13,491	15,262	25,518	27,885	42,961	41,901	12,442	27,836
Total	45,431	27,378	34,990	61,477	60,237	91,963	96,317	23,956	62,060
Memo Item:									
Intra-ASEAN (% of Total)	8.4	6.7	6.5	9.2	8.5	10.2	9.8	8.6	8.5

Source: Asian Development Bank, Asia Regional Integration Center (www.aric.adb.org), based on data from IMF CPIS.

Figure 1.7: ASEAN-5: Composition of Intra-regional Portfolio Investment Assets (%)

1.2.4 Dynamics of Stock-bond Correlation under Financial Integration. The Roles of Financial Development.

For a couple of decades, studies of financial integration have been proliferated in international finance literature. As mentioned before, these studies employ a wide variety of capital market measures coupled with sophisticated econometric techniques to evaluate the degree of financial integration. The general trend shows that countries are becoming more financially integrated around the world, preceded by stable macroeconomic indicators and high level of economic integration among neighbouring countries (Baele et al., 2004; Calvi, 2010; Soyoung Kim & Lee, 2012; Paramati, Roca, & Gupta, 2016; Rughoo & You, 2016). Depending on the level of financial integration, international investors can diversify their portfolio across different countries, which makes them less susceptible to financial loss as a result of country-specific risks.

However, the rise in financial integration may discourage investors from diversifying their portfolios across countries as they are faced with increased systematic risks. For instance, if stock markets of two countries are found to co-move with each other, the potential loss for investors increases because any negative shock that arises in one country can be easily transmitted to the other country (Paramati et al., 2016). In this case, the investors need to rebalance the weightage of their portfolios with different assets, preferably, a less risky asset to minimise their potential loss. One of the safer financial instruments is sovereign bond since it is insured by the issuing government unless the government itself is at the risk of defaulting.

This narrative shows that investors have two options when it comes to diversifying their portfolio investment risks; that is, to diversify across countries or to diversify across asset risk classes. The investors may choose one of the strategies, or they may choose both if the situation needs it. In the presence of financial integration, asset diversification across countries is deemed to be ineffective due to increased vulnerabilities to systematic risks. This leaves the investors for the second option, which is risk diversification across different asset risk classes. In this sense, it is important for investors to understand the underlying relationship between risky and less risky assets. Again, in the context of this study, the risky asset is referred to the stock asset while the less risky asset is referred to as the bond asset. As countries are becoming more globalised, it is also crucial to see how the relationship between stock and bond markets change in the presence of financial integration.

Although attempts in combining financial integration and stock-bond correlation literature have been made, the attention it deserves is miniscule, considering its important implication. In Panchenko and Wu (2009), the authors demonstrate that as financial integration increases across emerging markets, the integration of domestic stock and bond markets decreases. These emerging markets consist of 5 from Latin America (Argentina, Brazil, Mexico, Peru, Venezuela), 4 from the Middle East and Africa (Egypt, Israel, South Africa, Turkey), 5 from Asia (China, India, Indonesia, Philippines, Thailand) and 4 from Emerging Europe (Czech Republic, Greece, Poland, Slovak Republic). The authors argue that the reduction of risk premia in equity returns through the benefits of increased international risk-sharing would increase the demand for equity, while the demand for the bond will either remain unchanged or decreased. Thus, the divergence between the

demand for stock and bond returns will lead to a decrease in stock-bond return correlation. The argument stems from the work of de Jong and de Roon (2005), which postulated that as stock markets become less segmented from the world, there is a reduction of risk premia in equity returns due to increased risk-sharing between domestic and foreign investors.

Although financial integration can be considered a global occurrence, financial development, on the other hand, is heterogenous across countries, especially between developed and developing countries. Financial development plays a vital role in the well-being of a country. If increased financial integration is argued induces higher economic growth, it will happen in the presence of well-developed financial markets (Masten, Coricelli, & Masten, 2008). The higher level of financial development is also associated with higher stock returns co-movement with the world market (Carrieri, Errunza, & Hogan, 2007 and Dellas & Hess, 2005). Additionally, Dellas & Hess (2005) show that financial development could reduce stock return volatility through multiple direct and indirect relationships[3]. Due to the close relationship between financial development and financial integration, Panchenko and Wu (2009) demonstrate that financial development is negatively correlated with stock-bond correlation.

Thus, the main interest of this study is to observe how financial integration may affect stock-bond correlation when it is moderated by the level of financial development. The motivation behind this interest is twofold. First, to confirm the presence of

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[3] Dellas & Hess (2005) discusses four channels through which financial development can reduce stock return volatilities. These channels are through monitoring of managers and corporate controls, provision of liquidity, absorption of macroeconomic volatility and international trade pattern.

diversification benefits in ASEAN-5 countries under the influence of financial integration. If financial integration can induce negative (positive) correlation between stock return and bond return (yield) as proven by the literature above, this study is interested whether the impact is also the same for the ASEAN-5 community.

Second, to evaluate how the level of financial development act as a moderating variable in explaining the level of diversification benefits in ASEAN-5 community. As the degree of financial development tends to be associated with investors' confidence, such confidence may be reflected through the volatility of asset return. The higher the level of financial development, the lower the volatility of the asset return. For example, developed countries such as the U.S. or Germany that possess advanced financial system are rated with high credit ratings since the countries are more resilient to domestic and international risks. As a result, investors feel safer and more confident to invest in these developed economies, which translates into lower volatility asset returns. Therefore, if there is an increase in the level of financial integration and financial development (of which both have the effect of reducing the risk premium and return volatility of the stock market, respectively), the diversification benefits should be more substantial. Consequently, the demand for the stock would increase, while the demand for the less risky bond would decrease or remain unchanged; thereby, inducing negative stock and bond returns correlation.

In summary, this study attempts to examine the diversification benefit of stock-bond correlations of ASEAN-5 under the presence of financial integration. The study extends the current literature by introducing financial development variable that acts as a

catalyst in enhancing the diversification benefit of stock-bond correlation. It will be interesting to see the end result of this study in the context of ASEAN-5 since the community consists of one developed (Singapore) and four emerging (Indonesia, Malaysia, the Philippines, and Thailand) countries with different level of financial development. The study is conducted from 2007 through 2016 and includes other variables into the model, such as globalisation index, domestic stock market uncertainty, inflation, interest rate, and industrial production.

1.3   Problem Statement

As this study concern with the dynamics of stock-bond correlation, it may be helpful to highlight what is the main theme of this research. In particular, this study is looking into the presence of portfolio diversification benefits in ASEAN-5, which can be visible through the negative relationship of stock and bond returns. From the perspective of the investor, portfolio diversification allows investors to manage their risk efficiently by shifting the weightage of their portfolios between risky and less risky assets. However, the diversification benefit may be limited in a country where the level of country risk is high, which is typically associated with emerging economies. As countries are adopting more open policies towards foreign participation, it is vital to see how financial integration may affect the diversification benefits in ASEAN-5.

According to Erb, Harvey, and Viskanta (1999) and Kelly, Martins, and Carlson (1998), the correlation of stock and bond returns are found to be higher in emerging markets in relative to developed markets. This is due to a low credit rating that is

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associated with a high degree of country risk, which makes the return of the debt market to appear "equity-like". In other words, the high-country risk makes the bond market to be not perceived as the "safe-haven" but to resemble the risk of the stock market. Thus, the stock-bond return correlation is high since both stock and bond markets have similar performance. If one of the markets goes down, the other market also goes down and vice versa.

In some cases, there are reports that show the bond market outperform the stock market in emerging countries (Erb et al., 1999; Kelly et al., 1998). This is due to its predicted cash flows and a higher hierarchy in the capital structure, which makes bond to be preferable than stock in a high-risk market. If the country risks were to diminish, risk premiums that are priced into stock and bond markets would fall, and its returns will begin to decouple, that is the stock-bond return correlation will decrease. Alternately, negative stock-bond return correlation is often observed in developed countries as they tend to have low sovereign risks but high credit ratings (see Baur, 2010; S. J. Kim et al., 2006; Ohmi & Okimoto, 2016).

Since the majority of ASEAN-5 are emerging countries, the "equity-like" property of the bond market may arise in this community, implying a limited asset diversification benefit. This could be troublesome for investors, especially when most of the ASEAN-5 countries are becoming more financially integrated with the rest of the world. One of the significant signs of deeper financial integration is the positive co-movements of capital markets. Thus, any shock that may occur in one country can easily be transmissible to another country, thereby limiting the asset diversification benefits across countries. From

the perspective of domestic stock-bond correlation, financial integration has shown to negatively impact the stock-bond return correlation. To reiterate, the negative return correlation suggests that the stock and bond markets are moving apart from each other, which gives asset diversification opportunity to investors. However, this impact may differ from country to country, depending on the level of the country risks.

If portfolio diversification benefit is absent, the countries that engage in financial integration initiatives may not be able to fully reap its benefits of increased economic growth as risk-averse investors will shy away from the financially integrated developing markets. Therefore, the inflows of capital will be distorted and created a negative domino effect on local businesses and economic output. Thus, this study aims to observe whether this "equity-like" bond market, which imply the absence of diversification benefits, would exist in the ASEAN-5 community. If there is no diversification benefit, the impact of financial integration on stock-bond return correlation should be positive, that is a negative impact on stock returns and changes in bond yield correlation, *SBcorr*.

Regardless of the outcome, this study hypothesises that when financial integration is moderated by the level of financial development, the presence of diversification should be evident. According to Dellas and Hess (2002), financially developed countries tend to impose few restrictions on flows of capital, which made them more financially integrated and susceptible to external shocks. Additionally, an advanced financial system is shown to improve stock market performance, which reduces the stock market volatility (Dellas & Hess, 2005). This claim is consistent with Levine (1997) who postulate that as financial development become more advanced, it has the ability to reduce liquidity risk as well as

the idiosyncratic risk through enhance risk diversification process. This will attract more foreign investors into the market and inadvertently, increase the level of financial integration of the market with the rest of the world. Thus, this study posits that for emerging markets to provide portfolio diversification benefits to its constituent investors, the markets need to develop its financial system and adopt more financially open policies, simultaneously at a gradual pace.

An alternative way to assess the level of diversification benefit is to observe how stock-bond correlations move during high market uncertainty. Theoretically, high market uncertainty will make the cash flows of the stock market to become unpredictable, which could be costly for investors. In response, the investors will convert a larger portion of their portfolio to bonds in order to minimise their potential loss. Thus, the demand for stock decreases while the demand for the bond increase. This will induce a negative association between market uncertainty and stock-bond return correlation. However, if the stock-bond return correlation is positive during high market uncertainty, it shows that investors have no confidence in the domestic bond market that can serve as a safe-haven for the capital market.

If a financial crisis were to hit the ASEAN-5 community, the absence of diversification benefits would prompt investors to pull out their funds out of the countries. This scenario could get worse as a country with a higher level of financial integration would observe larger capital outflows compared to a less financially integrated country. As most studies would employ CBOE's volatility index (VIX) to proxy for market uncertainty, this study adopts domestic stock market volatility to represent the market

uncertainty. Section 3.4 shows how this variable is created as an output of univariate GARCH analysis.

1.4 Research Questions

1. To what degree does the stock market of each country in ASEAN-5 integrate with the world market?

2. What is the dynamic of stock-bond correlations for each country in ASEAN-5?

3. What is the impact of financial integration, financial development, and the moderating impact of financial integration and financial development on stock-bond correlation?

4. What is the impact of domestic stock market uncertainty towards stock-bond correlation?

1.5 Research Objectives

In this study, the general objective is to examine the impact of financial integration on stock-bond correlation and how financial development can moderate the relationship between these two variables.

1. To examine the degree of stock market integration of each country in ASEAN-5 and the world market.

2. To determine the dynamic of stock-bond correlations for each country in ASEAN-5.