FINANCIAL MARKET INTEGRATION IN ASIA: EVIDENCE FROM STOCK AND BOND MARKET

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ABSTRACT

Financial integration especially in Asian financial market has been a defining feature of the world economy and has become a central issue in international finance for the past decades. However, there is limited empirical studies on the integration of Asian bond market. Therefore, this study aims to examine the financial market integration in Asia (Stock and Bond Market). The sample of this study is the major of Asian financial markets including Japan, China, Hong Kong, Singapore and South Korea during January 2009 – December 2016. Correlation, co-integration and causality tests used in this study to investigate the financial markets integrations. This study shows that both stock and bond returns are co-integrated and indicate as a common stochastic trends. Stock market integration appears to be much stronger compared to the less developed. This result is very important for investors to assess potential gains from portfolio diversification, and for a financial policymaker to manage market policies effectively and handle contagion risks that might be caused by international shock transmissions.

Keywords: Financial Market Integration, Stock Market, Bond Market

1. INTRODUCTION

1.1 Research Background

Financial integration has been a defining feature of the world economy (Belge and Keil, 2016) and has become a central issue in international finance in the past decades (Kim, Moshirian, Wu; 2006). There is no common definition of financial integration, but at least contain two meaning i.e. integration of financial markets and free movement of capital (Chai & Rhee, 2005). The financial market in the world increasingly integrated into line with the rapid development of information and communication technology, liberalization of cross-border capital flows, financial innovation and economic integration through international trade relations and the internationalization of production through Foreign Direct Investment (FDI) (Berben & Jansen, 2005). Financial integration helps countries allocate resources efficiently and diversify their income risks across border (Yu, 2014).

There are much literatures that examines financial integration. Some studies focus on European financial integration (Kim, Moshirian, & Wu, 2006; Berben & Jansen, 2005; Buzelay, 2008; Deltuvaite, 2015), others focus on American financial integration (Pyun & Jiyoun, 2016, Volosovych, 2011), Asian financial integration (Perera & Wickramanayake, 2012; Rughoo & You, 2015; Nguyen & Elisabeta, 2016; Didier, Montanes, & Schmukler, 2017), and other countries (Balcilar, Kutanc, & Yay, 2017).
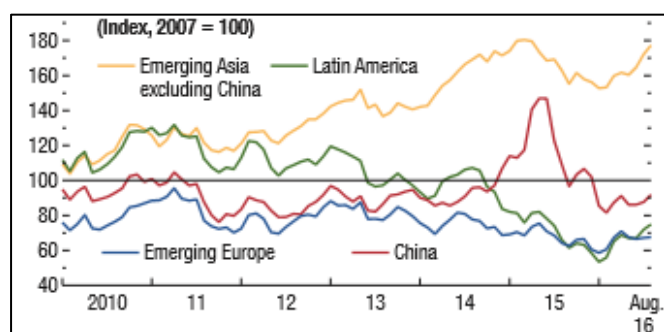
Picture 1 Stock Market Growth

Asian financial market is one of the biggest financial markets in the world. Growing of Asian financial markets in the last decade very rapidly, both stock market or bond market. Even, on October 2016, International Monetary Fund (IMF) report that Asian stock market has been growing fastest in the world (International Monetary Fund World Economic Outlook, 2016). However, empirical studies on the integration of Asian bond market are very limited even though bond market have experienced drastic growth in recent years and it is an important part of the financial market integration process in Asia. Therefore, researcher are interested in examined here.

1.2 Research Problem

Based on the above reasoning, researcher need to evaluate how is the financial market integrationin Asia across two financial markets.

1.3 Research Purpose

The purpose of this research is to evaluate financial market integration in Asia across two financial markets i.e. stock market and bond market. The result of this research is very important for investors to assess potential gains from portfolio diversification, and for a financial policymaker to manage market policies effectively and handle contagion risks that might be caused by international shock transmissions

2. THEORETICAL FRAMEWORK AND HYPOTHESES
2.1 Theoretical Framework
2.1.1 Financial Market Integration

Financial markets are considered to be integrated when assets are priced by the same stochastic discount rate (Flood & Rose, 2004). More precisely, in international financial markets, if the assets with identical risks offer similar level of expected returns, then markets are said to be integrated. Accordingly, if financial integration is complete, homogeneous assets should have the same price irrespective of the location of trading. This situation can be defined under the "law of one price". However, in reality, assets do not have sufficiently similar characteristics and hence, it is required to take into account differences in systematic risk factors and other important characteristics (Perera & Wickramanayake, 2012). Moreover, although complete integration is not observed frequently, some form of integration can be observed across financial markets through several measures and indicators.

There exist three financial integration indicators, which can be used to measure the level of financial market integration i.e. price-based indicators, quantity-based indicators and regulatory and institutional measures (Perera & Wickramanayake, 2012). Price-based indicator classified as direct measures of integration and also have a more clear-cut interpretation than others indicator (Kleimeier & Sander, 2000). Hence, our study focused on this indicator that examine the co-movement between asset prices (stock and bond).

The empirical work of financial integration has grown with proposed different measurement framework on price-based indicator among which Vector Auto-Regression (VAR) Model (Balcilar, Kutanc, & Yay, 2016), which aim to investigate the effect of contagion, and cointegration and error-correction models (Perera & Wickramanayake, 2012), which aim to assess the presence of long run equilibrium among cross-country financial variable. Our study combines this measurement framework.

2.1.2 Research Hypotheses

The hyphoteses in this study are:

H_1: There is a cointegration relationship (long-term balance) between the Stock market and Bond market in Asia.

H_2: There is financial market integration in all of sample country in Asia.

H_3: There is a causality relationship between the Stock market and Bond market in Asia

3.   RESEARCH METHOD
3.1   Research Design

In order to examine the empirical implications of financial integration, we use time-series data of stock market and bond market in Asia. The sample consists of five countries that have biggest financial market in Asia, namely: Japan, China, Hong Kong, Singapura, and South Korea. All of the data set in this study were retrieved from Data stream database.
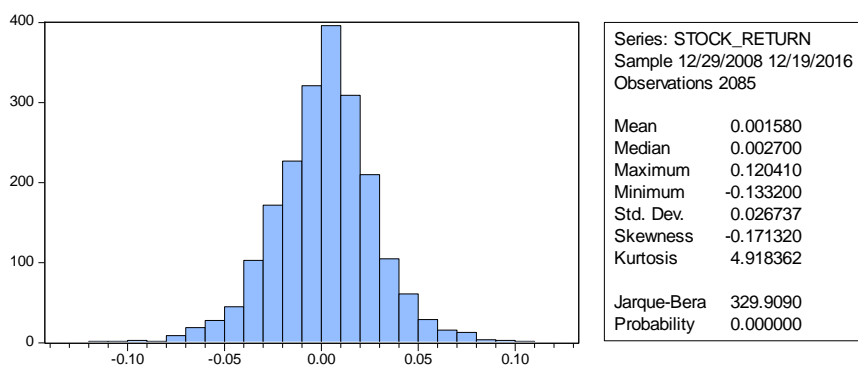
Correlation, co-integration and causality tests, which are widely used methods in empirical applications, were used in this study to investigate the integration in financial markets, both stock and bond market. Under the co-integration analysis, the first step is to check if each series is integrated to the same order. This will be examined by employing the augmented Dickey-Fuller (ADF) test to determine if each series has a unit root. The second step entails testing for co-integration to check if the stock and bond markets share a common long-run trend. This will be investigated at a multivariate level using VAR model in Johansen Fisher Panel Cointegration Test. Finally, the causality among the market would be examined by the Pairwise Granger Causality Test (20). Granger causality tests help to deepen the understanding of integration between financial markets. All of the test running by Eviews 7.
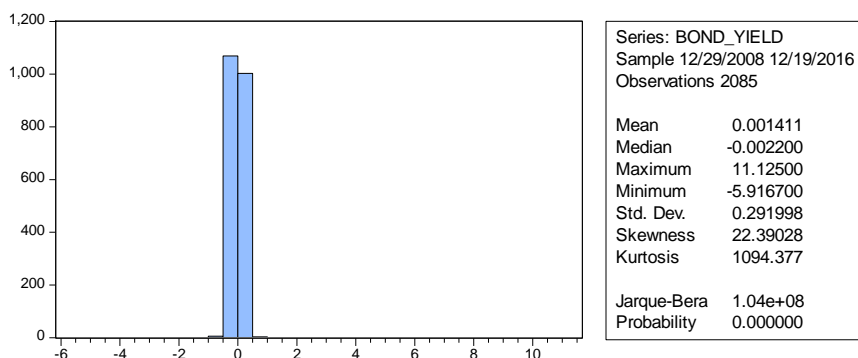
3.2   Population and Sample

Researcher used weekly data of each market and each country in the form of the stock index return and the long-term (10 years) government bond yield, covers period on January 2009 – December 2016.

4.   RESEARCH RESULT AND ANALYSIS

The summary statistics of stock return and bond yield of all sample data displayed in below. As indicated in descriptive statistics of stock return presented in Picture 1, distributions of weekly stock returns of all sample countries have positive means (0.158%). Stock return distributions of data sample shown negatively skewed distributions (-0.171), which indicate a greater probability of high or positive returns compared to low/negative returns. The distribution of stock return report a kurtosis coefficient 4.918, indicating leptokurtic distributions with many extreme observations. The zero p-values of Jarque-Bera test statistic indicate that the stock return distributions do not approximate the normal distributions for any country.

Series: STOCK_RETURN	
Sample 12/29/2008 12/19/2016	
Observations 2085	
Mean	0.001580
Median	0.002700
Maximum	0.120410
Minimum	-0.133200
Std. Dev.	0.026737
Skewness	-0.171320
Kurtosis	4.918362
Jarque-Bera	329.9090
Probability	0.000000

Picture 2 Descriptive Statistic of Stock Return

Picture 3 Descriptive Statistic of Bond Yield

According to descriptive statistics of bond yield presented in Picture 2 bond yield of five sample countries has positive means (0.141). Bond yield distribution is positively skewed (22.390), indicating the absence of high frequencies of higher returns (i.e. distributions are concentrated around low or negative returns). The zero p-values of Jarque-Bera test statistic of bond yield also indicate that the return distributions do not approximate the normal distributions.

Result of stock returns correlation between countries present in Table 1. This table shown that All of the stock return each country indicate strong correlations with stock return of other country (correlation coefficients are significant according to the probability values of the covariance analysis) except stock return of China index market. This result represents that stock market all of country sample in Asia is integrated except stock market of China. On the other hand, the result of bonds yield correlation between countries that are presented at Table 2 shows that a strong correlation occurs only among Japanese bond yields and Singapore bond yields.

Table 1 Results of Stock Returns Correlation Between Countries

	SR_South Korea	SR_Singapore	SR_Japan	SR_Hong Kong	SR_China
SR_South Korea	1.000000	0.559340	0.589328	0.700690	0.086276
SR_Singapore	0.559340	1.000000	0.545346	0.650600	0.040092
SR_Japan	0.589328	0.545346	1.000000	0.620081	0.085916
SR_Hong Kong	0.700690	0.650600	0.620081	1.000000	0.117600
SR_China	0.086276	0.040092	0.085916	0.117600	1.000000

Note: SR is Stock Return

Table 2 Result of Yield Bond Correlation Between Countries

	BY_South Korea	BY_Singapore	BY_Japan	BY_Hong Kong	BY_China
BY_South Korea	1.000000	0.384321	-0.078954	0.459478	0.150462
BY_Singapore	0.384321	1.000000	-0.055218	0.566072	0.080761
BY_Japan	-0.078954	-0.055218	1.000000	-0.001118	0.010010
BY_Hong Kong	0.459478	0.566072	-0.001118	1.000000	0.102530
BY_China	0.150462	0.080761	0.010010	0.102530	1.000000

Note: BY is Bond Yield

Table 3 shows the results of ADF unit root test of stock return and bond yield. From ADF-Fisher Chi-square and ADF-Choi Z-stat probability, indicate that stock return and bond yield are stationary at zero order, significant at 1% level. It means that each series is integrated to the same order. At the same time, an unrestricted VAR was estimated to find the lag length, for which Schwaz information criteria (SIC) was used. SIC is minimized at level 6 and the residual serial correlation Lagrange multiplier (LM) test confirms that there is no autocorrelation. Therefore, lag 6 was selected as the optimal lag length. The result of Cointegration Test is presented on Table.4. Based on Johansen Fisher Panel Cointegration which testing with trace category statistic test and

Maximum Eigenvalue Statistic test in Table 4, the probability value is 0.0000. These results indicate that the null hypothesis, which is stated there is no cointegration relationship between Stock market and Bond market is rejected and accepted the alternative hypothesis as the probability value is less than 0.01 (0.0000<0.01). These results prove that there is a cointegration relationship (long-term balance) between the Stock market and Bond market in Asia with significance level at 1%. This means that there is a relationship of balance and similarity movement in the long term between the stock return and bond yield in Asia. Accordingly, these results convincingly suggest that stock and bond markets in the selected Asian countries are co-integrated. In other words, it indicates that common stochastic trend in these stock and bond markets. It seems that these markets share a long-run stable relationship and can be viewed as one asset market.

Table 3 Results of Augmented Dickey-Fuller (ADF) Unit Root Test

Method	Stock Return		Bond Yield	
	Statistic	Prob.**	Statistic	Prob.**
ADF - Fisher Chi-square	791.879	0.0000	636.136	0.0000
ADF - Choi Z-stat	-27.5229	0.0000	-24.2278	0.0000

Table 4 Results of Johansen Fisher Panel Cointegration Test

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	92.10	0.0000	92.10	0.0000
At most 1	1317.	0.0000	1317.	0.0000

Table 5 Results of Individual Cross Section of Cointegration Test

Cross Section	Trace Test Statistics	Prob.**	Max-Eign Test Statistics	Prob.**
Hypotheses of no cointegration				
JAPAN	357.1143	0.0001	191.1775	0.0001
CHINA	322.9758	0.0001	185.8828	0.0001
HONG KONG	307.3720	0.0001	174.8463	0.0001
SINGAPORE	302.9525	0.0001	166.8049	0.0001
SOUTH KOREA	307.4879	0.0001	159.7499	0.0001
Hypotheses of at most 1 cointegration relationship				
JAPAN	165.9368	0.0000	165.9368	0.0000
CHINA	137.0930	0.0000	137.0930	0.0000
HONG KONG	132.5257	0.0000	132.5257	0.0000
SINGAPURA	136.1476	0.0000	136.1476	0.0000
SOUTH KOREA	147.7379	0.0000	147.7379	0.0000

Table 5 present the result of individual cross section of Cointegration. Probability trace and Maximum Eigenvalue test statistic of Johansen Fisher Panel Cointegration Test all country is 0.0001 on hypothesis of no cointegration and 0.0000 on hypothesis of at most 1 cointegration relationship. This result indicates that there is financial market integration in all of sample country in Asia (Japan, China, Hong Kong, Singapore, and South Korea). Table 5. also shows that the null hypothesis which states stock return does not cause a change in the bond yield is also rejected and accept the alternative hypothesis. This proves that the stock return causes a change in the bond yield is significant at the 1% significance level. These results indicate that the variations that occur in the stock return will cause a variation in stock prices, and vice versa, variation that occurs in the bond yield will lead to variations in the stock return. If the bond yield decline, the more interested investors to invest in Asian stock markets and the Asian stock indexes will be increasing.

Table 6 Results of Pairwise Granger Causality Tests

Null Hypotheses:	Obs	F-Statistic	Prob.
BOND YIELD does not Granger Cause STOCK RETURN	2055	1.82654	0.0902*
STOCK RETURN does not Granger Cause BOND_YIELD		5.06391	4.E-05**
Null Hypotheses:	Obs	F-Statistic	Prob.
SR_HONG_KONG does not Granger Cause SR_CHINA	415	2.11813	0.1216
SR_CHINA does not Granger Cause SR_HONG_KONG		7.27665	0.0008***
SR_JAPAN does not Granger Cause SR_CHINA	415	2.33580	0.0980*
SR_CHINA does not Granger Cause SR_JAPAN		1.57181	0.2089
SR_SINGAPORE does not Granger Cause SR_CHINA	415	0.22432	0.7992
SR_CHINA does not Granger Cause SR_SINGAPORE		6.27814	0.0021***
SR_SOUTH_KOREA does not Granger Cause SR_CHINA	415	1.02115	0.3611
SR_CHINA does not Granger Cause SR_SOUTH_KOREA		4.19256	0.0158**
SR_JAPAN does not Granger Cause SR_HONG_KONG	415	0.75099	0.4725
SR_HONG_KONG does not Granger Cause SR_JAPAN		0.09915	0.9056
SR_SINGAPORE does not Granger Cause SR_HONG_KONG	415	2.50897	0.0826*
SR_HONG_KONG does not Granger Cause SR_SINGAPORE		0.97850	0.3768
SR_SOUTH_KOREA does not Granger Cause SR_HONG_KONG	415	3.96932	0.0196**
SR_HONG_KONG does not Granger Cause SR_SOUTH_KOREA		1.41677	0.2437
SR_SINGAPORE does not Granger Cause SR_JAPAN	415	0.87091	0.4193
SR_JAPAN does not Granger Cause SR_SINGAPORE		1.35939	0.2580
SR_SOUTH_KOREA does not Granger Cause SR_JAPAN	415	2.20752	0.1113
SR_JAPAN does not Granger Cause SR_SOUTH_KOREA		0.91437	0.4016
SR_SOUTH_KOREA does not Granger Cause SR_SINGAPORE	415	0.38085	0.6835
SR_SINGAPORE does not Granger Cause SR_SOUTH_KOREA		0.95028	0.3875
Null Hypotheses:	Obs	F-Statistic	Prob.
BY_SINGAPORE does not Granger Cause BY_SOUTH_KOREA	415	1.92257	0.1475
BY_SOUTH_KOREA does not Granger Cause BY_SINGAPORE		1.13428	0.3227
BY_JAPAN does not Granger Cause BY_SOUTH_KOREA	415	1.42516	0.2417
BY_SOUTH_KOREA does not Granger Cause BY_JAPAN		3.56898	0.0291**
BY_HONG_KONG does not Granger Cause BY_SOUTH_KOREA	415	0.37428	0.6880
BY_SOUTH_KOREA does not Granger Cause BY_HONG_KONG		5.35871	0.0050***
BY_CHINA does not Granger Cause BY_SOUTH_KOREA	415	3.11456	0.0455
BY_SOUTH_KOREA does not Granger Cause BY_CHINA		7.01206	0.0010***
BY_JAPAN does not Granger Cause BY_SINGAPORE	415	0.40499	0.6673
BY_SINGAPORE does not Granger Cause BY_JAPAN		0.75824	0.4691
BY_HONG_KONG does not Granger Cause BY_SINGAPORE	415	1.00794	0.3659
BY_SINGAPORE does not Granger Cause BY_HONG_KONG		1.25113	0.2873
BY_CHINA does not Granger Cause BY_SINGAPORE	415	0.24212	0.7851
BY_SINGAPORE does not Granger Cause BY_CHINA		0.91728	0.4004
BY_HONG_KONG does not Granger Cause BY_JAPAN	415	0.66130	0.5167
BY_JAPAN does not Granger Cause BY_HONG_KONG		1.95844	0.1424
BY_CHINA does not Granger Cause BY_JAPAN	415	0.07044	0.9320
BY_JAPAN does not Granger Cause BY_CHINA		0.07136	0.9311
BY_CHINA does not Granger Cause BY_HONG_KONG	415	0.63241	0.5318
BY_HONG_KONG does not Granger Cause BY_CHINA		2.45792	0.0869*

Note: * Sig. at level 10%

     ** Sig. at level 5%

    *** Sig. at level 1%

The last test to examine the financial market integration in Granger causality test. Based on the Table 6 can be seen that the null hypothesis states that bond yield does not cause a change in the stock return is rejected and accept the alternative hypothesis. Thus, it is proved that bond yield causes a change in the stock return with a significance level of 10%. Table 6 of Pairwise Granger causality tests with the second null hypothesis confirm that there is no integration between the sample countries in Asia because the significant short-run dynamics or causality relationship of stock market (stock return) only exist in China-Hong Kong; Japan-China; China-Singapore; China-South Korea; Singapore-Hong Kong; South Korea-Hong Kong. While, the result of Granger causality tests between countries indicated that only four countries that integrated in a bond market in example South Korea-Japan; South Korea-Hong Kong; South Korea-China and Hong Kong-China.

5.   RESEARCH CONCLUSION AND LIMITATION
5.1. Conclusion
This study result shows that both stock and bond returns are co-integrated, shows as common stochastic trends. Stock market integration appears to be much stronger compared to the less developed. This result is very important for investors to assess potential gains from portfolio diversification. Financial policy-maker also get benefit from this research in managing market policies effectively and in handle contagion risks that might be caused by international shock transmissions.

5.2. Limitation
The study relies on widely cited empirical methods. However, adopting alternative specifications and also allowing time variant factors while examining inter-linkages between stock and bond markets seem to be appropriate for the robustness of the results. In addition, the data used in this study is weekly data, it may has a different results when using daily data.

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