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Stock Synchronicity in the ASEAN Economic Community

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Abstract: This study explores the capital market efficiency of 5 countries in ASEAN economic community including Indonesia, Malaysia, Philippines, Singapore and Thailand during 2006-2012. Researchers investigate the R^2 which represents the stock price synchronicity andfind that the Philippines stock exchange has lowest R^2 and is more efficient than others in the same region. This contradicts to previous research results which find that R^2 values of emerging markets are higher than the developed economies. From the overall regression estimates of ASEAN, researchers find that higher synchronicity stocks are larger and have higher volume but less leveraged. The regression results from individual countries confirm the relationship, except leverage which is mildly positive for the Philippines.

Key words: ASEAN economic community, efficient capital market, R^2, synchronicity, Thailand

INTRODUCTION

Capital market is an intermediary in allocating long-term savings to those who need long-term funding. Capital market can be categorized into primary and secondary markets. While the primary market is a market for new shares issuance, the secondary market is a market place for trading existing securities and financial instruments which are previously issued. Capital market plays an important role in the economy in enhancing the economic development of the country in the long run. Major functions of capital market include saving function, funding function, wealth function, risk management function, workforce function and economic policy function.

The ASEAN Economic Community (AEC) shall be the goal of regional economic integration by 2015. AEC aims to envisage the region to be a single market and production base, a highly competitive economic region with equitable economic development and a fully integrated region into the global economy. The AEC will transform ASEAN into a region with free movement of goods, services, investment, skilled labor and free flow of capital with the cooperation in many areas, such as human resources development, recognition of professional qualifications, capacity building, consultation on macroeconomic and financial policies, enhanced infrastructure and communications connectivity, development of electronic transactions and industries integration across the region to promote regional sourcing.

In recent years, finance and economics literature has shown increasing interest in the determinants of firms' stock price synchronicity (Morck *et al*., 2000; Jin and Myers, 2006). Previous studies find that R^2 values of emerging markets are higher than the developed economies (Morck *et al*., 2000; Khandaker, 2011). However, does this evidence persist among samples of emerging markets? Are the R^2 values of less developed emerging markets are higher than the more developed emerging economies? Also what factors specifically affect stock price synchronicity in the ASEAN remains an open qestion.

This study aims to test for stock synchronicity in ASEAN economic community, specifically 5 stock markets which are the Indonesia stock exchange (IDX), the Kuala Lumpur Stock Exchange (KLSE), the Singapore Exchange (SGX), the Philippine Stock Exchange (PSE) and the Stock Exchange of Thailand (SET).

Literature reviews: The key indicators for market development include market size, access, stability and efficiency. Among these indicators, market efficiency will be the focus of this study. The Efficient Market Hypothesis (EMH) states that stock price will adjust rapidly when new information is revealed. Further, all information and risk of individual stocks are incorporated in stock prices. The efficient market indicators comprise ofthree variables which are private information trading, transaction cost or liquidity and stock synchronicity or co-movement of stocks.

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Stock price co-movement can be driven by market-level information, industry-wide information and firm-level information. In the literatures, the R^2 of the market regression are used to measure stock price co-movement and by construction, it depends on the relative amount of the firm-level and market-level information incorporated into stock prices. Thus, synchronicity is one of the efficient market indicators and also one of the market development indicators. Durnev *et al.* (2003) employ synchronicity as the proxy of information efficiency. If the market is informational inefficient, then the stock price movement will depend solely on the market condition and not based on firm-specific information. Thus, the higher the synchronicity, the lower the stock market efficiency.

Researchers can basically measure stock synchronicity by calculating the percentage of stocks moving together. The process suggested in Khandaker and Heaney (2009) and Khanna and Thomas (2009) starts from counting the number of securities with upward and downward adjustments at the end of period, then calculating the geometric mean of the higher proportion of stocks that move together.

Another approach proposed by Roll (1988) is the R^2 measure which is the percentage of returns variation explained by the market. The R^2 in Morck *et al.* (2000) is obtained from the regression analysis where the dependent variable is the stock returnand the independent variables are return onstock indices in each market and return on world market index where Jin and Myers (2006) employ the US stock market returns and also include the exchange rate as independent variable. However, Morck *et al.* (2000) has made the conclusion that the returns on world index do not add any explanatory power to the regression equation. Xing and Anderson (2011), then propose to employ the industry indices instead.

Previous study by Morck *et al.* (2000) finds that the results from both methods in measuring stock synchronicity are consistent and there is no significant difference. However, the R^2 appears to be more appropriate in an international context. Though some previous literatures on market efficiency cover the major stock markets or samples in some regions (Ghosh and Revilla, 2007), there is no study accessing the stock market efficiency in the AEC in particular. Therefore, it is of interested to explore the stock synchronicity issue in ASEAN. Researchers aim to answer the most prevalent research question whether emerging markets have higher stock synchronicity by using sample of only ASEAN equity markets.

According to the importance of capital market and the integration of the ASEAN Economic Community (AEC), the differences in capital market structures of each country should be recognized. Then, the efficiency of the capital market becomes crucial issue to investigate in determining the readiness and the achievement of the integration. This study aims to test for stock synchronicity in AEC, specifically 5 stock markets which are the Indonesia stock exchange (IDX), the Kuala Lumpur Stock Exchange (KLSE), the Singapore Exchange (SGX), the Philippine Stock Exchange (PSE) and the Stock Exchange of Thailand (SET).

MATERIALS AND METHODS

In this study, researchers obtain the R^2 from the following regression Eq. 1:

$$r_{it} = \alpha_i + \beta_{1,i} r_{m,jt} + \beta_{2,i} \begin{bmatrix} \text{Return of world} \\ \text{index} + e_{jt} \end{bmatrix} + \varepsilon it \qquad (1)$$

Where:

r_{it} = The return on stock i in week t
j = For each country
$r_{m,jt}$ = The return on local market index
e_{jt} = The rate of change in the exchange rate of country j per US dollar

Researchers measure the firm-specific return by the residual return from Eq. 1. For the world market index return, this study employs the Dow Jones, Morgan Stanley Capital International Index, namely MSCI/ASEAN and also FSTSE/ASEAN for comparison purposes. Researchers follow the measure of stock price synchronicity in Roll (1988) and French and Roll (1986). The R^2 of each country j is defined by Eq. 2, as a measure of stock price synchronicit:

$$R_j^2 = \frac{\Sigma_i R_{ij}^2 \times SST_{i,j}}{\Sigma_i SST_{i,j}} \qquad (2)$$

Where, $SST_{i,j}$ is the sum of squared total variations. A higher R_j^2 indicates that stock prices frequently move together. In this study, researchers explore the synchronicity at firm level and find the relationship between this variable and its determinants among listed firms in 5 AEC members. The dependent variable is Synch, the logarithm of R_j^2, as measured by Eq. 3:

$$Synch_j = Log\left[\frac{R_j^2}{1-R_j^2}\right] \qquad (3)$$

For independent variables, researchers use firm level data, such as market value of the company, firm size, leverage and cumulative stock return as noted in Eq. 4. Using individual stock returns from a panel of 5 countries during 2006-2012, the fixed-effect ordinary least square estimation is conducted to find the relationship, as indicated in Eq. 4:

$$\text{Synch}_j = \alpha_j + \beta_{1,j}\text{DTA} + \beta_{2,j}\text{Log}(\text{size}) + \beta_{3,j}\text{Log}(\text{volume}) + \beta_{4,j}\text{Tobin's Q} \quad (4)$$

For each country j, DTA, the ratio oftotal debt to asset is a proxy of capital structure of the company. The size of the firm is measured by log (size), the natural logarithm of market capitalizations of the firm. Next, log (volume) is the natural logarithm of trading volume of firm. Last, Tobin's Q is defined as number of shares outstanding multiplied by price plus total assets in excess of the firm's book value of common equity over deferred taxes, standardized by total assets. This variable is a proxy of market value of the firm.

The coefficients of Tobin's Q and log (size) are expected to be positive as suggested by Xing and Anderson (2011). Under the irrelevance theory of Modigliani and Miller (1958) in an efficient market, financial leverage is irrelevant to the firm value. Researchers suspect that the AEC financial market is inefficient, so the coefficient of DTA should be significant because the ASEAN capital market is considered as inefficient market with higher return. The synchronicity should also be lessening over time.

RESULTS

Researchers investigate the stock synchronicity in ASEAN economic community including Indonesia, Malaysia, Philippines, Singapore and Thailand. The weekly data of stock returns, market index returns, returns on world index and also the exchange rates are obtained from data stream. After matching the available information for dependent and explanatory variables, researchers end up with a sample size of 1.277 firms from 5 countries over the period 2006-2012. Table 1 reports the synchronicity of stock returns in 5 ASEAN countries according to Eq. 1.

A high R^2 indicates a high degree of stock price synchronicity. The R^2's for individual stocks are averaged, using value weights and equal weights for each country and year. The results reveal no significant difference. The results reveal that Malaysia and Philippines have the lowest stock price synchronicity then have efficient firm-specific information in stock markets. In other words, they are the most efficient capital markets among the 5 ASEAN countries explored. The lower R^2 or synchronicity also indicates better future earning in stocks (Durnev *et al*., 2003). In contrast, the highest value of R^2 of Thailand stock market reveal the highest stock price synchronicity. Researchers can conclude from the study that Thailand stock market has lower efficiency compared to other ASEAN counties investigated. For the standard deviation, Malaysia exhibits the lowest variation of R^2 while the standard deviation of Indonesia and Thailand are the highest. The robustness check is also performed on the world index and researchers find nsignificant difference among various definitions of the indices used.

Figure 1, researchers can see that Thailand and Indonesia are 5 equity markets among others that have high R^2. This is because Thailand and Indonesia have recently attracted foreign investors. The movements of stock return in these countries have high impact on regional equity markets, therefore they are more relatively correlated to the regional index, such as MSCI ASEAN Index, especially during the period of crisis. The efficiency at firm specific informationhas impacts on investor confidence. Increased synchronicity can signal several events including a loss of confidence in firm specific accounting data, reduced transparency and etc. For example in 2008, the value of R^2 is highest for all countries between 0.3005-0.1347 due to financial crisis in the US known as subprime mortgage crisis which also affects the

Table 1: Value and equal-weighted R^2 of 5 countries in AEC during 2006-2012

Parameters	Indonesia	Malaysia	Philippines	Singapore	Thailand
No. of companies	295	755	188	493	437
R^2 (value-weighted)	0.1036	0.0649	0.0643	0.0775	0.1318
R^2 (equal-weighted)	0.1150	0.1097	0.1101	0.1345	0.1602
Standard deviation	0.1559	0.1081	0.1410	0.1378	0.1541
Maximum	0.6926	0.5554	0.6279	0.7580	0.8029
Minimum	0.0000	0.0000	0.0001	0.0000	0.0001
P_2	0.0073	0.0165	0.0048	0.0247	0.0214
P_4	0.0266	0.0471	0.0252	0.0628	0.0785
P_6	0.0661	0.1071	0.0801	0.1192	0.1705
P_8	0.2119	0.1891	0.2143	0.2339	0.2657

Table 2: Regression estimates of the relationship between stock price synchronicity and a set of independent variables for firms in 5 countries during 2006-2012

Countries	DTA	Log (size)	Log (volume)	Tobin's Q	R^2	Adjusted-R^2
Indonesia	1.1850**	0.1694	0.2479***	-0.0071	0.6226	0.5519
Malaysia	-0.1377	0.3300***	0.2267***	-0.0239	0.5426	0.4647
Philippines	1.1452*	0.0363	0.0955*	0.0037	0.6916	0.6298
Singapore	-0.1066**	0.2361***	0.1987***	0.0016	0.5805	0.5086
Thailand	0.4346	0.2101**	0.1907***	-0.0110	0.6320	0.5681
AEC	-0.1089***	0.2026***	0.2120***	0.0023	0.5845	0.5147

***, **, * Significant at 1, 5 and 10%, respectively

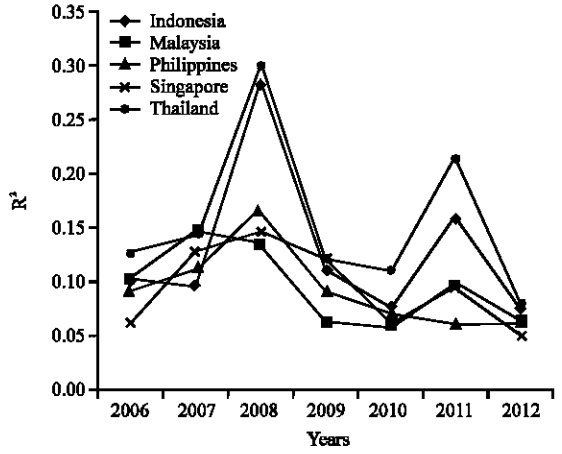

Fig. 1: R^2 of selected stock markets in AEC during 2006-2012

ASEAN region. Another year that has high R^2 is 2011, ranging between 0.2161-0.0597. It is because there is a big flood in many countries in the AEC which affects investor confidence.

Table 2 reports the coefficient estimates of Eq. 4 from the fixed effect ordinary least square regression using panel data. There are 1.253 firms from 5 countries during 2006-2012. The regression results are report in rows 1-5 for each market and overall picture for ASEAN region in row 6.

In this study, researchers report the results for the determinants of the stock price synchronicity using firm-level data. All regression models include dummy variables to account for fixed firm and year effects. Stock price synchronicity measures the level to which individual stocks move along with the market, reflecting the amount of market-wide information relative to firm-specific information. While the market-wide information is affected greatly by the public news that is simply noticeable, the firm-specific information is known more by firm managers than outsiders.

Financial structure of the firms is one of the important significant factors in explaining R^2. As firms have higher leverage, there is higher demand for firm-specific information disclosures for outsiders; therefore the information and the market are more efficient. The regression results show that the coefficient of DTA ordebt to asset in ASEAN is negative and significant, as researchers expected. The overall ASEAN equity market's R^2 is significantly negative related to firm leverage, DTA. This is also consistent with the results of individual countries, such as Singapore. However, the leverage ratio can positively explain R^2 in Indonesia and the Philippines. Also, there is no significant relationship between R^2 and DTA coefficient from the regression estimates of Malaysia and Thailand.

Next, the natural logarithm of market capitalization is studied to proxy for firm size. If highly synchronous returns truly signal less informative stock prices, as suggested by Morck *et al*. (2000), researchers could infer that the market is informational less efficient for large firms (Roll, 1988; Kelly, 2005; Chan and Hameed, 2006; Ferreira and Laux, 2007). Empirically, the results of market capitalization from the regression estimates report a positive and significant coefficient in either overall ASEAN estimate or individual country, except Indonesia and the Philippines. This implies that larger firms have higher stock price synchronicity. In other word, market is less efficient for large firms in term of information. However, this argument is to a certain extent counter-intuitive, given the fact that large companies are more actively traded have more firm-specific information released by the popular press and media and are tracked by more analysts than small firms. Thus, the size effect is controversial.

Actively traded stocks have higher stock price synchronicity because they can quickly incorporate market information. Researchers define the volume variable as the logarithm of the total number of shares traded in a year which is from data stream. As expected, high volume stocks exhibit higher level of synchronicity.

Companieswith high stock price synchronicity, inside managers possess little information advantage over outside investors. Therefore, higher R^2 is related to lower the adverse selection risk the market maker faces in trading with informed investors, then lower expected returns and lower costs of capital. Ultimately, this leads to higher firm values (Pastor and Stambaugh, 2003). Therefore, a positive relation between R^2 and Tobin's Q ratio is expected. However, built on the premise that R^2 mirrors firm-specific information impounded in stock prices, R^2 can also be inversely associated with firm value.

When R^2 is high and therefore the stock price reflects little firm-specific information, corporate investments will become less efficient, a notion consistent with the empirical evidence in Chen *et al.* (2007). Because lower investment efficiency often means lower future cash flows, investors will assign a lower value to a firm with lower investment efficiency all else being equal.

In regional regression, the regression results show that, overall, ASEAN equity markets R^2 are negatively related to leverage and positively but insignificantly related to firm size and volume. If researchers analyze the data for each country separately, researchers can see that the value of R^2 in Indonesia and the Philippines stock market can positively be explained by leverage and volume but not other variables. For Malaysia, Singapore, and Thailand, researchers observe that big and actively traded stocks have higher stock price synchronicity. The regression results show that the coefficient of DTA ordebt to asset in Singapore is negative and significant.

CONCLUSION

Stock market synchronicity is a growing area of research for finance and economics literature. There is a novel body of research arguing that stocks with lower stock return synchronicity, measured as the R^2 from the market model have more firm-specific information incorporated in their prices. The literatures argue that lower synchronicity means more informative stock prices. At the aggregate level, current evidence is mostly consistent with this view. Morck *et al.* (2000) is among the first to find that R^2 values of emerging markets are higher than the developed economies.

This study analyses stock market data of 5 emerging equity markets in ASEAN economic community. Researchers find that among a group of emerging markets, the conclusion of Morck *et al.* (2000) might not be applied. There is evidence where R^2 values of emerging equity market like the Philippines stock market is lower than Singapore, Malaysia and Thailand. The results show that Bursa Malaysia and Philippine stock exchange are more efficient than others while Thailand exhibits the highest R^2 which means the highest stock price synchronicity and lowest market efficiency. This leads to an inconclusive and contradicting research results to previous literature which believe that R^2 values of emerging markets are higher than the developed economies.

Based on regression results of individual country, the regression results show that the value of R^2 in Indonesia and the Philippines stock market can positively be explained by leverage and volume but not other variables. For Malaysia, Singapore and Thailand, researchers observe that 1big and actively traded stocks have higher stock price synchronicity. The regression results show that the coefficient of DTA ordebt to asset in Singapore is negative and significant, implying that highly leveraged firms reduce R^2 and hence, are more efficient. The results suggest that highly synchronous returns truly signal less informative stock prices for large and highly traded firms but more informative for less leverage firms.

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