Comparing the Benefits of International Diversification Using Industrial Correlation and Non-Systematic Risk

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ABSTRACT
Roll (1992) stated that the ASEAN capital market is still attractive for international diversification in various industries. To test the benefits of this international diversification, I used the industrial correlation between stock exchanges index and MSCI, and non-systematic risk measurement from Goeztmann, et. al. (2005). Based on the calculations that took into account the problem of the local and USD exchange rates, this study found out the results of calculation between ASEAN countries compared to each other, and from the results of data analysis, I found the smallest consumption goods industry in the Philippines. These results are followed by almost all the mainstay of portfolios for the Philippines in every GICS industry. A different pattern can be demonstrated by the steepest reduction in non-systematic risk in Indonesia during the 2008 global financial crisis. If it is presented using the data of 2006-2009, then perhaps the sharpest reduction in non-systematic risk is the Philippines.
Keywords: *ASEAN Stock Market, International Diversification Benefit, Intra-Industry Correlation, GICS (Global Industry Classification Standard), Non-Systematic Risk*

1. INTRODUCTION

As one of the economic regions that has an appeal for global investors, the ASEAN stock exchanges are expected to become one of the potential portfolios for global investors. The main consideration among global investors is because the stock exchanges in ASEAN offer relatively higher yields compared to those in other regions. The reason for this high yield is due to the high interest-rates of banks in this region. Therefore, it is not uncommon for Foreign Direct Investment fund flows called FDI or the indirect ones called PI (Portfolio Investment) to continue to increase from year to year.

Based on a study conducted by the author a few years ago referring to the Asian Capital Market Monitors (2009), the ASEAN capital market profile was obtained based on the balance between domestic interest-rates (i_d) and foreign interest-rates (i_f) which explains the conditions for effective IRP (Interest-Rate Parity) in each of the ASEAN stock exchange. If the condition is $i_d - i_f < 0$, it will be reflected as favorable conditions of domestic investment. And vice versa, if the condition is $i_d - i_f > 0$, then the condition of foreign investment is more favorable. According to Ismailov and Rossi (2018), the condition expected to support international diversification is the condition of $i_d - i_f > 0$. Because in the condition $i_d - i_f > 0$, global investors will still capture potential benefits of diversification from positive spread between i_d and i_f in each portfolio.

In the next development of the international diversification study, it turns out that global investors have considered the industry aspect as an important parameter. The classic study from Roll (1992) stated that when the benefits of international diversification cannot be achieved due to the process of increasing the integration of capital markets in one region, the choice of diversification between industries becomes more relevant. This is based on the idea that the process of capital market integration is more rapid at the country level and will be less rapid at the industry level. Several other researchers also stated that the industrial factors in a capital market between countries have a more non-systematic nature than those of the country factors. Heston and Rouwenhorst (1994) as the most contra researchers of Roll (1992) also failed to prove the effectiveness of diversification among countries in one of the developing markets such as ASEAN.

So, based on the explanation above, this study was intended to re-measure the benefits of international diversification in the ASEAN stock exchanges by using the industry characterization profile of the GICS (Global Industry Classification Standard) consisting of 10 industrial sectors namely Oil & Gas (OG), Industrial Goods (IG), Basic Materials (BM), Consumer Goods (CG), Health Care (HC), Financial Institutions (FI), Services Goods (SG), Technologies (TC), Property & Real Estate (PR) and Utilities & Telecommunications (UT), by using the industrial correlation (Pearson) and conducting the non-systematic risk mapping between industries in several ASEAN countries with a model from Goeztmann, et.al. (2005).

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2. LITERATURE REVIEW

2.1 Measurement of the Benefits of International Diversification

According to Husnan and Pudjiastuti (1994) along with Joseph and Mitchel (2010), international diversification raises several problems that are not found in the domestic market. These include the exchange-rate risks, the restrictions on foreign capital flows, the additional dimensions of economic and political risks (such as the early 1991 Gulf war, 1999 European economic integration, the 2008 global financial crisis to the USA and China 2018 trade wars), the country-specific regulations, and the practices of different accounting. In addition, some other problems are the difficulties and timeliness of information in foreign markets, the smaller economies with smaller securities markets, the higher transaction costs and liquidity, and the international investment problems that will involve exchange-rate risks.

However, the fear related to the risk of international diversification is the empirical evidence such as Baca, et al. (2000) showing that it is still safer to diversify a portion of one's portfolio internationally than to diversify all the industries in a country. Many researches have been conducted to create good schemes on how to maximize the risk-return trade-off of one's portfolio, and the efficient frontiers among others. Efficient limits describe the relationship between portfolio returns and risk (volatility). This can be described as a curve on the risk graph against the expected portfolio returns. Efficient borders provide the best return that can be expected for a certain level of risk or the lowest level of risk needed to achieve the expected rate of return. Efficient borders are a key concept of modern portfolio theory. Things become more interesting in post-modern portfolio theory which has an unlimited number of efficient limits for each investor depending on risk appetite & preferences [see Bai, et.al. (2008)].

Efficient limits are usually used to describe a curve drawn without the risk-free assets. With risk-free assets available, it becomes a straight line: The Securities Market Line (SML). The market portfolio is located at the efficient limit, at the point in which this graph will touch the SML. Efficient borders are very important for construction theory and portfolio valuation. The concept of efficient borders can be used to illustrate the benefits of diversification. Portfolios that are not diversified can be moved closer to the border efficiently by diversifying them. Diversification can therefore, increase the returns without increasing the risk, or reduce the risk without reducing expected returns.

2.2 The Importance of International Diversification at Industry Level

Since Roll (1992) stated that industrial factors have an important role in the effectiveness of international diversification, then many researchers have begun to use industrial category data such as GICS (Global Industrial Classification Standard). GICS which has the same function as another industrial categorization such as USSIC (United States Standard Industrial Classification). The only difference is that GICS is more globalized than USSIC, which is only effectively used in the USA as discussed by Mochero and Moroshov (2011). This GICS has become more developed since it was handled by a reputable investment analyst institution called MSCI (Morgan Stanley Capital Index) which in recent times has been able to release industry index data for stocks. Industrial index data becomes a reference for investors and analysts in calculating the expected return or return to be achieved. The advantage of GICS is that the company data is already organized based on the industrial sector, making it easier to calculate the correlation later.

3. RESEARCH METHOD

3.1. Unit Analysis

This research was descriptive and exploratory because, first, it aimed to measure the benefits of international diversification industrially in ASEAN. Following Roll (1992), Baca, et.al. (2000) and Monchero and Morozov (2011), the measuring tool for the benefits of diversification is unconditional correlation (see Pearson Correlation). It is already known that the comparison between the mean and standard deviation parameters in the investment literature is often referred to the Sharp Ratio, which will indicate the effectiveness of the portfolio's performance. Low correlation reflects maximum Sharp Ratio. The second thing is that this study mapped the non-systematic risk profile of Goetzmann, et.al. (2005), which was formulated as follow:

$$\text{Var}(p) = 1 / n + (n-1) / n \, [\text{Cov } X_i, X_j / \text{Var}_{Xi}] \; *** \qquad (1)$$

Description:

p : The portfolio of X_i and X_j a number of n (number of industries i.e. 1-10)

X_i : The industry index return i equally and value-weighted, either in local exchange-rate or in USD currency.

X_j : The MSCI international index return.

*** : The details of derivation of the formula (1) that can be seen in Goetzmann, et.al. (2005).

3.2 Data

The data source for this research was the stock index data per industry in all ASEAN exchanges starting from the Philippines, Malaysia, Thailand, Singapore, and Indonesia during the period of 2006-2009 by using the access to Bloomberg, Thomson Reuters, OSIRIS, and MSCI websites. The nature of this index data is the time series by

considering the problem of local and USD exchange rates. When calculating the correlation and estimation of non-systematic risk, the model by Goetzmann, et.al. (2005) was carried out. The data from OSIRIS and Bloomberg mostly supported this research.

4. RESULT, ANALYSIS, AND DISCUSSION

4.1. Benefits of International Diversification using Correlation

From The Philippines Stock Exchange, there were 96 selected companies divided into 5 Oil & Gas companies (code 10), 11 Basic Material companies (code 15), 10 Industrial Goods companies (code 20), 13 Services Goods companies (code 25), 11 Consumer Goods companies (code 30), 2 Health Care companies (code 35), then 15 Financial Institution companies (code 40A), 15 Property & Real Estate companies (code 40B), 8 Technology companies (code 45) and 6 Utilities companies (code 50). As seen in Table 1, the best sector was Consumer Goods (ρ = -0.0317). While from Thailand Stock Exchange, there were 125 companies divided into 9 Oil & Gas companies (code 10), 15 Basic Material companies (code 15), 15 Industrial Goods companies (code 20), 10 Services Goods companies (code 25), 16 Consumer Goods companies (code 30), 12 Health Care companies (code 35), then 17 Financial Institution companies (code 40A), 11 Property & Real Estate companies (code 40B), 14 Technology companies (code 45), and 7 Utilities companies (code 50). The best sector was Services Goods (ρ = 0.18896).

From Malaysia Stock Exchange, 119 companies were divided into 3 Oil & Gas companies (code 10), 15 Basic Material companies (code 15), 15 Industrial Goods companies (code 20), 10 Services Goods companies (code 25), 16 Consumer companies Goods (code 30), 6 Health Care companies (code 35) and so on. The best sector for global investors, as seen in Table 1 Panel A, was the Utilities sector (ρ = 0.05141).

Table 1. Benefit of International Diversification in Five ASEAN Countries

Panel A. Philippines (PHI), Thailand (THAI) and Malaysia (MAL)

Industrial Sector (GICS)	CORR. PHI	CORR. THAI	CORR. MAL
Oil and Gas (10)	0.13938	0.60729	0.16892
Basic Material (15)	0.46599	0.49442	0.53806
Industrial Goods (20)	0.35396	0.28919	0.57866
Services Goods (25)	0.05039	0.18896	0.33420
Consumer Goods (30)	-0.03170	0.39781	0.40059
Health Care (35)	0.13250	0.34873	0.33277
Financial Institution (40a)	0.44119	0.38308	0.45528
Property & Real Estate	0.43397	0.49793	0.38647
Technology (45)	0.18174	0.51318	0.51930
Utilities (50)	0.34091	0.24804	0.05141

Panel B. Singapore (SIN) and Indonesia (IND) and the Candidate of Portfolio

Industrial Sector (GICS)	CORR. SIN	CORR. IND	CANDID. PORTO
Oil and Gas (10)	0.64050	0.44800	PHI, MAL
Basic Material (15)	0.58314	0.64044	PHI, THAI
Industrial Goods (20)	0.70314	0.60312	THAI, PHI
Services Goods (25)	0.61359	0.31949	PHI, THAI
Consumer Goods (30)	0.46896	0.14762	PHI, RI
Health Care (35)	0.49529	0.50410	PHI, MAL
Financial Institution (40a)	0.72705	0.68049	THAI, PHI
Property & Real Estate	0.69029	0.22480	RI, MAL
Technology (45)	0.12530	0.44528	SIN, PHI
Utilities (50)	0.66013	0.45871	MAL, THAI

Note: CORR is correlation and CANDID. PORTO is candidate of portfolio

From Singapore Stock Exchange, 108 companies were acquired, namely 10 Oil & Gas companies (code 10), 8 Basic Material companies (code 15), 15 Industrial Goods companies (code 20), 15 Services Goods companies (code 25), 13 Consumer Goods companies (code 30), 5 Health Care companies (code 35), 8 Financial Institution companies (code 40A), 10 Property & Real Estate companies (code 40B), and so on. The best sector was Technology (ρ = 0.12530) as stated in panel B.

From Indonesia Stock Exchange, there were 113 companies divided into 5 Oil & Gas companies (code 10), 14 Basic Material companies (code 15), 14 Industrial Goods companies (code 20), 14 Services Goods companies (code 25), 14 Consumer Goods companies (code 30), and so on. The best sector was Consumer Good with ρ = 0.14762.

Overally, the best of the best sector was Consumer Goods (ρ = - 0.0317) and Philippines became the most reliable portfolio. This result does not only support in terms of the finding from Husnan and Pudjiastuti (1994) which together had a sample of the Philippines, but also strengthen the methodology from Monchero and Morozov (2011).

4.2. Benefits of International Diversification using Non-Systematic Risk Profile Goetzmann, et al. (2005)

In this section, I will show the benefits of international diversification by looking at the non-systematic risk calculation charts of 10 industrial sector portfolios in each ASEAN stock exchange with a sample of observations from the year 2008, because the period of global financial crisis and the relatively stable data distribution patterns of 2006, 2007, and 2009 can be explained in the calculation of the benefits of diversification with unconditional level of industry correlations. The inspiration for this non-systematic risk calculation chart analysis is to review the classic debates of international diversification from Roll (1992) and Heston and Rouwenhorst (1994) which are still relevant in conditions of time-varying integration. This is proven by the emergence of Baele and Inghelbrect (2009) and Bai and Green (2010) studies. Based on observations in each ASEAN country with 2008 data in Figure 1, then the same pattern appears to reduce the non-systematic risk (Std. Dev, Var (p)) for local exchange rates. This means that in the 2007 / 2008 global financial crisis, the benefits of international diversification could still be obtained by global investors if they were able to diversify among industries (Roll, 1992).

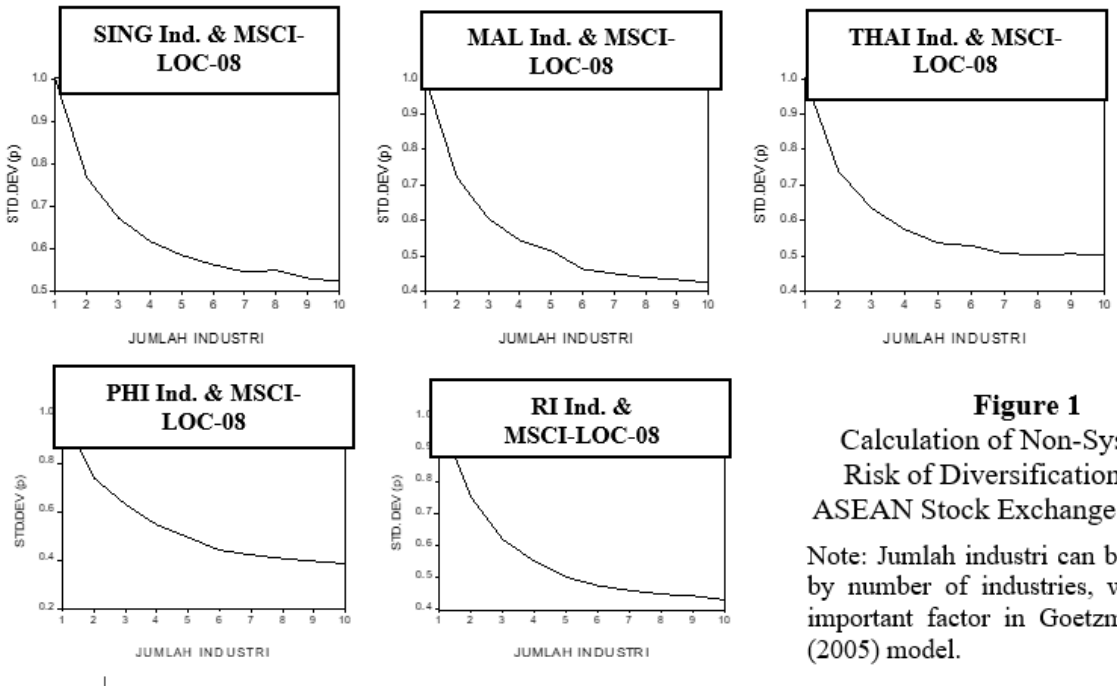

Figure 1
Calculation of Non-Systematic Risk of Diversification among ASEAN Stock Exchange Industries

Note: Jumlah industri can be translated by number of industries, which is an important factor in Goetzmann, et al. (2005) model.

Although graphically the pattern of non-systematic risk reduction is relatively the same, but when observing per industry composition in the portfolio, it turns out that there are differences. As we can see in the Singapore Stock Exchange, the most efficient portfolio composition (n = 10) occurred in the order of the industries namely BM, UT, TC, IG, CG, FI, PR, OG, HC, SG. Then the Malaysia Stock Exchange had the order of the industrial sectors on the basis of diversification ratio using a study model from Goeztmann, et al. (2005) namely IG, OG, HC, PR, BM, UT, CG, TC, FI, SG.

Furthermore, in Thailand Stock Exchange, it was found that the order of industrial sectors was expected to form the most efficient portfolio (n = 10), namely CG, TC, UT, IG, BM, SG, HC, PR, OG, FI. Meanwhile, in the Philippine Stock Exchange, the industrial sector sequences were namely HC, TC, OG, UT, CG, SG, BM, IG, PR, FI. And from the results of the Indonesia Stock Exchange, the industrial orders were namely UT, FI, PR, CG, SG, BM, IG, TC, OG, HC.

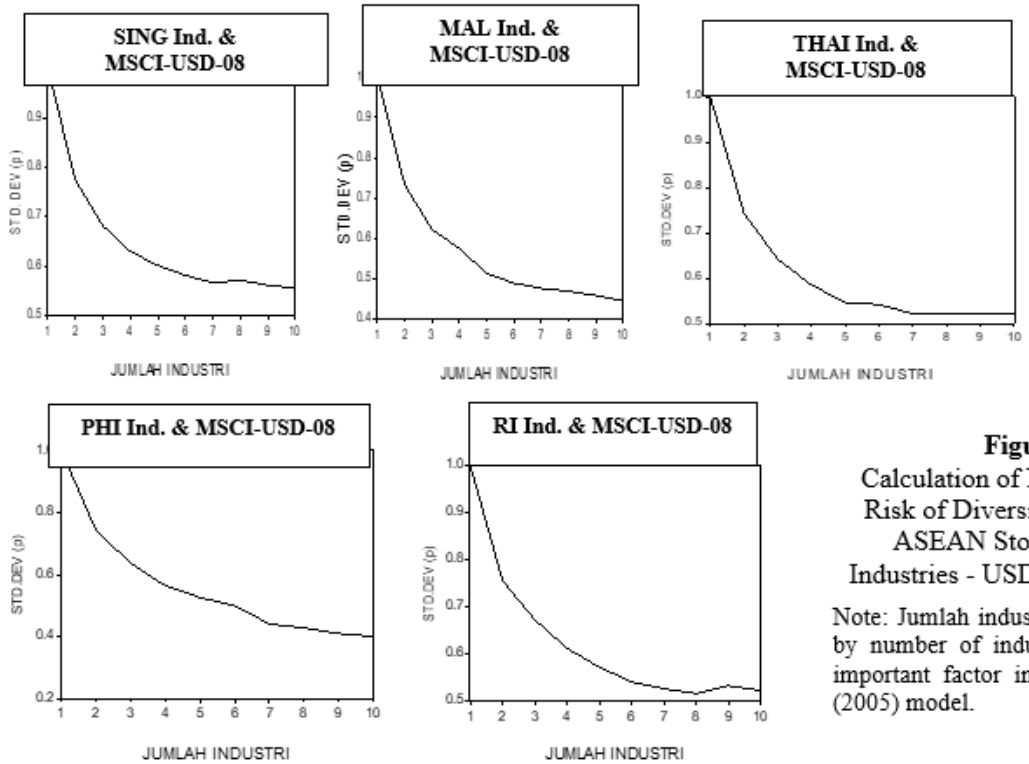

Figure 2
Calculation of Non-Systematic Risk of Diversification among ASEAN Stock Exchange Industries - USD Currency 2008.

Note: Jumlah industri can be translated by number of industries, which is an important factor in Goetzmann, et al. (2005) model.

Likewise, when analyzing the USD exchange-rate, the pattern of non-systematic risk reduction has the same decreasing pattern in each stock exchange. However, when checking on Figure 2, the Indonesia Stock exchange experienced the sharpest decline in non-systematic risk followed by the stock exchanges of Thailand, Malaysia, Singapore, and the Philippines. These results confirm Bai, et.al. (2008), Baele, L. and K. Inghelbrecht (2009) and Bai and Green (2010), that the Indonesian capital market was the best for global investors during the period of 2008. The largest contribution to non-systematic risk reduction in the industrial sector was Property & Real Estate (PR). In the correlation analysis in the previous section, this sector was among the lowest in value.

5. CONCLUSIONS

Based on the discussion on two types of analysis namely the benefits of international diversification by using unconditional level industry correlations and the non-systematic risk calculations from Goetzmann, et al. (2005), it can be concluded that the ASEAN capital market still has an extraordinary appeal for global investors. Evidenced by the results of unconditional level industry correlation calculations, almost all correlations averagely below 0.8 are good for each country. This also shows the high benefits of diversification in various industries ranging from Oil & Gas (OG), Industrial Goods (IG), Basic Materials (BM), Consumer Goods (CG), Health Care (HC), and Utilities & Telecommunication (UT), and then followed by the order of the country's portfolio pairs i.e. PHI-MAL, PHI-THAI, THAI-PHI, PHI-THAI, PHI-RI, PHI-MAL, THAI-PHI, RI-MAL, SIN-PHI, and MAL-THAI in all GICS industrial sectors. The most surprising result was the dominance of the Philippines as the most reliable portfolio for global investors. The best of the best sector was Consumer Goods (ρ = - 0.0317) in The Philippines.

The use of non-systematic risk models from Goetzmann, et. al. (2005) also showed an exponential downward trend in all ASEAN capital markets. However, there will certainly be a different order of industry priorities based on the character of economic progress in each ASEAN country. The period of global financial crisis was apparently not able to reduce the form of international diversification benefits that was sparked by Goetzmann, et al. (2005). Because of only using the 2008 data, Indonesia was selected as the most reliable portfolio. If all of the 2006-2009 data were used, it is very likely that the Philippines would remember the Goeztmann, et.al (2005) method and the Pearson's correlation would actually be consistent in providing the test results.

This indicates the maturity of global investors in ASEAN region which are more concerned on the yield component or return from the characteristics of the progress of each exchange, not on the external factors such as negative sentiment and asymmetrical information that is often overtaken by speculators. The next challenge is to apply this industry correlation in intra-day stock and bitcoin data.

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