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Chapter

Behavior of Global Investors in Five ASEAN Stock Markets in the Industry Level

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Abstract

When the capital markets in ASEAN are integrated, global investors can still pursue the benefits of international diversification more than in the country level but in also in the industry level. The intended international diversification is diversification between industries. To implement this diversification between industries, measurement tools are needed to determine the benefits of international diversification directly. The intended instrument tool is a correlation which in this study uses country level correlation and industry level correlation. In order for these two correlations to be effective, it is necessary to make a hypothesis test to find if there is a difference in the level of integration between country and industry levels in ASEAN. To analyze industry level correlations, Equally Weighted and Value Weighted estimation procedures are required to test the construction of industry sector sample data according to GICS. The results show that there are differences in the level of integration between country and industry levels in ASEAN and the implication that the Indonesian capital market provide the greatest benefits and global investors could utilize all GICS industrial sectors as a reliable portfolio. The practical implications of these final result is choosing countries and industries are the best for the portfolios.

Keywords: inter-industry diversification benefit in ASEAN, country and industrial level correlation, Global Industry Classification Standard, global investors

1. Introduction

Until now ASEAN stock exchanges are still a mainstay of potential portfolios for global investors. The main consideration is due to the higher yield offered than other regional exchanges. The reason for this high yield offer is due to high banking interest rates in ASEAN. In the development of international diversification studies, it turns out that global investors are also concerned with aspects of the industry besides of course high returns. The classic study from Roll [1] states 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 stated that industrial factors are more non-systematic than state factors. Since the

classic study of Roll [1] states that industrial factors have an important role in the effectiveness of international diversification, many researchers such as Ratner and Leal [2], Richard [3], Hwang and Sitorus [4], Do et al. [5], and Chen et al. [6] began to use industry data such as Global Industry Classification Standard (GICS). According to Menchero and Morozov [7] GICS has been more globalized than other industry standards since it was handled by Morgan Stanley Capital International (MSCI).

This study intends to measure the benefits of international diversification on the ASEAN stock exchanges by using unconditional correlations of the return of the five market indices in ASEAN including KLCI (Malaysia), STI (Singapore), Thailand (SET), Philippines (PSI), and IHSG (Indonesia), respectively, with the return of MSCI. The type of unconditional correlation of each index with MSCI is seen to be stronger than the correlation between the indexes of each ASEAN country itself and the VAR and VECM cointegration analysis that has been used by Endri [8], Robiyanto and Ernayani [9], and other researchers. The advantage of this correlation is that it is able to regulate the magnitude of the correlation number lower than the correlation among ASEAN countries' own indexes. The low magnitude of correlation supports the potential benefits of international diversification in ASEAN. VAR and VECM cointegration analysis is only able to prove the presence or absence of capital market integration and is still unable to calculate the benefits of international diversification.

What is new in this study is the use of unconditional level industry correlations in each ASEAN country. The use of industry level correlations to reaffirm the argument of Click and Plummer [10] about international diversification between industries is more effective in ASEAN than international diversification between countries. This is because ASEAN capital markets have been integrated since the last 20 years. Industry unconditional level correlations are calculated in equally weighted (EW) and value-weighted (VW), both with local currency (LOC) and USD referring to the correlation estimation procedure from Kim [11]. The use of EW and VW will be able to produce different levels of correlation between industries in the five ASEAN exchanges and will further determine the level of benefit of diversification among different industries. The use of EW and VW is also in line with the research conducted by Vo et al. [12], which is based on the research of Nguyen [13].

Thus the main problem of this study is "there are still differences in the level of integration of capital markets at the country and industry levels in the five ASEAN capital markets." The different levels of integration show the different benefits of international diversification at the country and industry levels. This issue is representative of studies from Setyawan [14] and Setyawan and Wibowo [15] which emphasize the importance of correlation as a measure of capital market integration as well as the benefits of international diversification rather than cointegration analysis, namely, vector autoregression (VAR) and vector error correction model (VECM).

The reason for setting the observation period from 2006 to 2009 in this study is because it is related to my study period in a doctoral program several years ago, at which time I was asked by my supervisor to calculate the variable of level of intra-industry competition as measured by the entropy index of Ruefli [16]. The use of the entropy index in the study of capital market integration is to my knowledge that I have just done it and it must be admitted that it has made an extraordinary contribution because in empirical testing in Setyawan and Wibowo [15], the entropy index variable has a significant influence on the level of capital market integration both by using unconditional correlation by Pearson and dynamic conditional

correlation by Engle [17]. My study in this book chapter is actually the initial part of my dissertation research [14]. The calculation of correlations between industries by utilizing the GICS database is very useful for the calculation of the entropy index. The entropy index calculation requires creating a mock database in GICS to be effective (see Setyawan [14] and Setyawan and Wibowo [15]). So the time to calculate the entropy index will be very long and tiring.

2. Theoretical review

2.1 Benefits of international diversification with industrial level correlations

The benefits of international diversification for industry level correlations are measured by Pearson correlation referring to the studies of Vo et al. [12], Nguyen [13], Setyawan [14], Luzey and Zhang [18], and Dutt and Mihov [19]. They formulate the unconditional level industry correlations, namely:

$$\varrho(R_{ijt}, R_{wt}) = \frac{\text{Cov } R_{ijt}, R_{wt}}{\sigma R_{ijt} * \sigma R_{wt}} \quad (1)$$

where:
$\varrho(R_{ijt}, R_{wt})$ = R_{ijt} and R_{wt} correlation with unconditional correlation (Pearson)
Cov R_{ijt}, R_{wt} = R_{ijt} and R_{wt} covariance
σR_{ijt} = standard deviation of R_{ijt} (industrial return i in country j at time t)
σR_{wt} = R_{wt} standard (international index return (world) w at time t)
$*$ = multiplication symbol (sign)
Some steps to determine ϱ (R_{ijt}, R_{wt}) are as follows:

First, calculate R_{ijt}, which is the difference in the close price indices of industry i for each country j when t and t-1. Since the period t is monthly in 1 year, then it should also be the dividend factor of each company (1, 2, 3, 4, 5 ... n) incorporated in industry i also included in the calculation component of R_{ijt}.

Second, calculate R_{wt}, the difference between the MSCI international index at time t and t-1.

Third, do the correlation calculation process between R_{ijt} and R_{wt} with σ as the standard deviation or variant root for R_{ijt} and R_{wt}, respectively.

Technically measuring industrial level unconditional correlation (UCC) is used in the EW and VW categories. Kim's study [11] provides a measure of stock portfolio returns for one industry sector in the United States Industrial Classification (USIC) category. Determination of EW is done by utilizing the multiplier 1/N for $\sum$ Rij, while the determination of VW is done by using the multiplier factor Rijt $*$ Xi, where Xi is the proxy market capitalization of an industry.

This market capitalization calculation will have an impact as an industry effect on the determinant return model, whereas fixing the local and USD exchange rates at the industrial level UCC justifies whether the effect of exchange rates on international diversification between countries will also apply to diversification between industries. This is because a study from Eun and Rescnick [20] found that when the local exchange rate is converted to USD, the correlation between R_{ijt} and R_{wt} will weaken.

Based on formula 1 and Kim's [11] and Vo et al. [12] studies, the unconditional industry level correlations such as EW can be measured with this formula:

$$\varrho\left[E(R_{ijt})_{EW}, R_{wt}\right] = \frac{\text{Cov}\left[E(R_{ijt})_{EW}, R_{wt}\right]}{\sigma E(R_{ijt})_{EW} * \sigma R_{wt}} \quad (2)$$

will be obtained.

2.2 Benefits of international diversification with country level correlations

As suggested by Nguyen [13] and Vo et al. [12], when applied at the country level, the formulation ϱ (R_{ijt}, R_{wt}) in part 1 has been modified, namely, the component R_{ijt} to R_j (state market index return j at time t). The importance of estimation ϱ (R_{jt}, R_{wt}) is to prove the hypothesis of differences in the level of integration at the country level. Unlike the R_{ijt} which is composed of stock portfolios according to the EW and VW categories, it is not the case for R_{jt}, so it is formulated as follows:

$$\varrho(R_{jt}, R_{wt}) = \frac{\text{Cov } R_{jt}, R_{wt}}{\sigma R_{jt} * \sigma R_{wt}} \quad (3)$$

Based on formulas 1, 2, and 3, it can be concluded that the lower the value of covariance between R_{ijt} and R_{wt} as well as R_{jt} and R_{wt}, the lower the correlation between industry level and country level. Where this will mean the higher the benefits of international diversification that occurs both diversification between industries and between countries.

3. Research method

3.1 Unit of analysis and data

This study uses analysis units of several market indexes in five ASEAN stock exchanges consisting of KLCI (Malaysia), STI (Singapore), IHSG (Indonesia), SET (Thailand), and PSI (Philippines). From the five market indices, each return will be estimated which will be correlated with the MSCI return index to determine the degree of integration in the ASEAN capital market with the MSCI index. The type of correlation, the Pearson correlation, is unconditional because it can eliminate the pattern of volatility clustering between the indexes of five ASEAN countries and MSCI. The pattern of volatility clustering tends to lead to high levels of correlation which will actually reduce the benefits of international diversification.

The index data of the five ASEAN countries were taken from Bloomberg from January 1, 2006, to December 31, 2009, while the MSCI index data was taken from the MSCI website www.mscibarra.com for the period January 1, 2006, to December 31, 2009 as well. MSCI industry data consists of 10 industrial sectors, namely, oil and gas (OG), industrial goods (IG), basic materials (BM), consumer goods (CG), health care (HC), financial institution (FI), service goods (SG), technologies (TC), property and real estate (PR), and utilities and telecommunication (UT), which are taken from www.mscibarra.com, and an index of each industry is derived from the construction of company data as a member of the industry. As stated at the beginning of writing this book chapter, the selection of 2006–2009 data regarding my dissertation research period which has the main interest proves the effectiveness of the entropy index as the main determinant of the level of capital market integration in ASEAN. The study results will complement the various findings from the Hwang and Sitorus study (2014), namely, the consistency of the use of 10 types of industries in the GICS database by equally weighted and value-weighted for the estimation of industry level correlations.

3.2 Analysis tool

Referring to the problem that there are still differences in the level of integration of capital markets at the country and industry levels in the five ASEAN capital

markets, the analysis tool is the F-test (ANOVA) with specifications according to Setyawan [14] as follows:

1. H0 test at country level integration j = 1, 2, 3, 4, 5 for the five ASEAN countries, namely:

    a. H0: μ1 = μ2 = μ3 = μ4 = μ5 (μ is the average level of integration at country level).

    H1: one or more of the μ is different or not the same as the other μ.

    b. Level of significance: 1-α = 95%, and F-test is done with the inference process; if F-test > F-table or p-value <0.05, then H0 is rejected.

    c. If H1 is accepted, it means that there is a difference in the level of integration in the ASEAN exchange.

2. The H0 test at the industry level integration i = 1.2, up to 10 for the 10 GICS industries, namely:

    a. H0: μ1 = μ2 = μ3 = μ4 = μ5 ... .. = μ10 (average industrial level integration level).

    H1: one or more of the μ is different or not the same as the other μ.

    b. Level of significance: 1-α = 95%, and F-test is done with the inference process; if F-test > F-table or p-value <0.05, then H0 is rejected.

    c. If H1 is accepted, it means that there are differences in the level of sectoral integration of 10 GICS industries in 5 ASEAN countries.

4. Result analysis

4.1 Benefits of international diversification with country level correlations

In the section below, the unconditional correlation values vary between each index return of ASEAN countries and MSCI returns. The analysis in **Table 1** is done in local currencies and USD. Based on the observation in **Table 1**, it appears that Indonesia has the weakest negative correlation, which indicates the greatest benefit of international diversification. On the contrary, for the Philippines, even though it has a correlation of close to zero, it cannot be categorized as providing the benefit of a large international diversification considering that the Philippines capital market has the most isolated nature compared to 4 other ASEAN countries.

Based on **Table 1**, it can be stated generally that unconditional correlations in five ASEAN countries between the index returns of each country and MSCI returns are still much lower than the correlation returns between index pairs of each ASEAN country which confirm the potential gap of diversification benefits internationally in ASEAN that can be utilized by global investors. Based on the opinions of Piumsombun [21], Hwang and Sitorus [4], and Do et al. [5], the ASEAN countries which have smaller values of standard deviations than that of the mean for each unconditional correlation will have the potential benefits of international diversification. If you see **Table 1**, the ASEAN countries are Singapore (LOC and

ASEAN countries (pair of correlation: R_{jt}, R_{wt})	Unconditional (local)		Unconditional (USD)	
	Mean	Std. dev	Mean	Std. dev
Singapura $\varrho(R_{STI}, R_{MSCI})$	0.325	0.215	0.316	0.224
Malaysia $\varrho(R_{KLCI}, R_{MSCI})$	0.181	0.250	0.105	0.256
Indonesia $\varrho(R_{IHSG}, R_{MSCI})$	−0.132	0.252	−0.259	0.235
Thailand $\varrho(R_{SET}, R_{MSCI})$	0.280	0.237	0.230	0.253
Philippines $\varrho(R_{PSI}, R_{MSCI})$	0.078	0.230	0.008	0.238

Source: Setyawan [14]; R_{jt}, market index return of each country; R_{wt}, return *MSCI.*

Table 1.
Unconditional correlation country level (2006–2009: weekly).

USD), Indonesia (USD), and Thailand (LOC). The comparison between standard deviations and the mean of each pair of correlations is actually identical to the Sharpe ratio formula used to measure portfolio performance [see Chen et al. [6]]. One form of practical implication is the comparison between mean and standard deviation which refers to Sharpe ratio as the benchmark for benefits of international diversification [see Piumsombun [21], Hwang and Sitorus [4], and Do et al. [5]].

4.2 Benefits of international diversification with industrial level correlations

As seen in **Table 2**, all the standard deviations for each type of correlation EW-LOC, VW-LOC, EW-USD, and VW-USD have values below the mean related to the 10 GICS industry sectors. These results confirm the argumentation that diversification between industries in ASEAN is more effective than diversification between countries and supports the study of Ratner and Leal [2], Richard [3], Hwang and Sitorus [4], and Do et al. [5] that for the 2006–2009 period, the correlation between the index returns of each ASEAN country and MSCI's high returns will lead to the more important industry effects than the country effect for global investors. But what's interesting in **Table 2** is the higher unconditional correlation of some sectors such as basic materials, financial institution, and property and real estate.

According to Kim [11] referred to by Piumsombun [21], Hwang and Sitorus [4], and Chen et al. [6], the cause of the high correlation of the three sectors is the specification of the EW-LOC, VW-LOC, EW-USD, and VW-USD, as follows:

- EW-LOC = R_{ijt} correlation (industry return i in country j at t) and R_{wt} [MSCI return (w) on t] equally weighted; local exchange rate with the formula ϱ [E (R_{ijt}) EW-LOC, R_{wt}] = Cov [E (R_{ijt}) EW-LOC, R_{wt}]/σ E (R_{ijt}) EW-LOC x σR_{wt}

- VW-LOC = R_{ijt} correlation (industry return i in country j in t) and R_{wt} [MSCI return (w) on t] in a value-weighted manner; local exchange rate with the formula ϱ [E (R_{ijt}) VW-LOC, R_{wt}] = Cov [E (R_{ijt}) VW-LOC, R_{wt}]/σ E (R_{ijt}) VW-LOC x σR_{wt}.

- EW-USD = R_{ijt} correlation (industry return i in country j to t) and R_{wt} [MSCI return (w) on t] equally weighted; USD exchange rate with the formula ϱ [E (R_{ijt}) EW-USD, R_{wt}] = Cov [E (R_{ijt}) EW-USD, R_{wt}]/σ E (R_{ijt}) EW-USD x σR_{wt}

- VW-USD = R_{ijt} correlation (industry return i in country j in t) and R_{wt} [MSCI return (w) on t] in a value-weighted manner; the USD exchange rate with the formula ϱ [E (R_{ijt}) VW-USD, R_{wt}] = Cov [E (R_{ijt}) VW-USD, R_{wt}]/σ E (R_{ijt}) VW-USD x σR_{wt}

Industry sector (GICS code)	EW-LOC		VW-LOC		EW-USD		VW-USD	
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
Oil and gas (code 10)	0.46	0.09	0.41	0.11	0.50	0.11	0.43	0.09
Basic material (code 15)	0.57	0.06	0.56	0.03	0.61	0.08	0.58	0.03
Industrial goods (code 20)	0.54	0.05	0.57	0.04	0.54	0.06	0.59	0.05
Service goods (code 25)	0.33	0.15	0.34	0.11	0.38	0.14	0.38	0.10
Consumer goods (code 30)	0.38	0.09	0.34	0.09	0.43	0.07	0.39	0.11
Health care (code 35)	0.43	0.06	0.41	0.07	0.44	0.08	0.43	0.07
Financial institution (code 40a)	0.58	0.07	0.55	0.09	0.56	0.08	0.57	0.08
Property and real estate (code 40b)	0.52	0.04	0.49	0.09	0.57	0.06	0.55	0.06
Technology (code 45)	0.43	0.05	0.39	0.08	0.53	0.05	0.41	0.08
Utilities (code 50)	0.41	0.10	0.35	0.10	0.41	0.09	0.39	0.10

Sources: Adaption from Setyawan [14].

Table 2.
Unconditional correlation *for industry level (five ASEAN countries).*

According to Menchero and Morozov [7], market capitalization of the three sectors also contributed to the high correlation in addition to the number of industry members in GICS. Referring to **Table 2**, the practical implication is that global investors can choose the basic material industry (code 15) and industrial goods (code 20) because both have very low standard deviation values among other industries. The basis of this selection method refers to study from Hwang and Sitorus [4] and Do et al. [5], Nguyen [13], and Vo et al. [12].

4.3 Comparing benefits of international diversification (country level correlation)

Table 3 shows the results of the F-test to prove whether there are differences in the level of integration at the country level in ASEAN, which at the same time prove the presence or absence of differences in the benefits of international diversification between countries. After calculating the F-test (ANOVA), the F-calculated value of 28.643 is greater than the F-table of 2381. The F-test results showed H1 was accepted, namely, there were still differences in the level of integration in ASEAN.

The test results above support the study findings of Ratner and Leal [2], Richard [3], Hwang and Sitorus [4], and Do et al. [5] about the still relevant differences in the level of integration in ASEAN which proves the potential benefits of international diversification for global investors. Furthermore, when testing with USD currency conversion, the F-calculated value is 41.905 which is greater than the F-count when using the local currency which is 28.643.

In addition to reaffirming H1's acceptance in Section 3.2.1, it also supports the argument of Eun and Rescnick [20] that the USD value factor also plays an additional contribution to the benefits of international diversification if global investors are able to carry out a good hedging strategy, namely, entry to countries in ASEAN

Pair of correlation	Mean	Std. dev	F-test
Panel A: local currency			
STI and MSCI	0.325	0.215	28.643***
KLCI and MSCI	0.181	0.250	
IHSG and MSCI	−0.132	0.252	
SET and MSCI	0.280	0.237	
PSI and MSCI	0.078	0.230	
Panel B: USD currency			
STI and MSCI	0.316	0.224	41.905***
KLCI and MSCI	0.105	0.256	
IHSG and MSCI	-0.259	0.235	
SET and MSCI	0.230	0.253	
PSI and MSCI	0.008	0.238	

****Significant at the 1% level.*
Source: Adaptation from Setyawan [14] and Setyawan and Wibowo [15].

Table 3.
F-test for comparison of international diversification benefit at country level.

that are experiencing a strengthening (appreciation) of their local currency against the USD. Instead, this global investor will opt out of countries in ASEAN which are currently experiencing a depreciation of their local currency against the USD. This hedging pattern is recommended by Samsi [22] and Omay and Iren [23].

Returning to **Table 3**, global investors continue to target Indonesia as their portfolio target. This is because Indonesia has a negative correlation when using local currency and USD. The nature of the correlation is negative because Indonesia has the highest yields in ASEAN (see Aggarwal et al. [24]). The Malaysian stock exchange is not a global investor portfolio target because the standard deviation is higher than the mean. The results of this test support the findings of Omay and Iren [23]. Malaysia is still not a mainstay portfolio since local authorities are still so restrictive.

4.4 Comparing benefits of international diversification (industry level correlation)

The purpose of the analysis in **Tables 4** and **5** is to find out whether there are differences in the level of integration at the industry level in ASEAN. The difference in the level of integration determines the benefits of diversification between industries referring to Roll [1], Hwang and Sitorus [4], Do et al. [5], Setyawan [14], and Setyawan and Wibowo [15].

Based on the F-test results in **Table 4** panel A, it is evident that there are differences in the level of integration of the industry level in ASEAN. These results support the findings of Roll [1], Hwang and Sitorus [4], Do et al. [5], Setyawan [14], and Setyawan and Wibowo [15]. If considered in panel A, all industries have the potential benefits of diversification, referring to Chen et al. [6], namely, the value of standard deviation is smaller than that of the mean.

When analyzing the currency to the USD, H1 is still accepted, that is, there are still differences in the level of integration of the industrial level in ASEAN, with an F-count value of 1.578, significant at the 5% level. These results again support

Industry sector	Mean	Std. dev	F-test
Panel A: correlation model of EW-LOC			
Oil and gas	0.459	0.091	1.980***
Basic material	0.568	0.062	
Industrial goods	0.541	0.051	
Service goods	0.332	0.149	
Consumer goods	0.377	0.090	
Health care	0.431	0.063	
Financial institution	0.576	0.072	
Property and real estate	0.519	0.043	
Technology	0.430	0.049	
Utilities	0.414	0.101	
Panel B: correlation model of EW-USD			
Oil and gas	0.507	0.106	1.578**
Basic material	0.609	0.078	
Industrial goods	0.541	0.056	
Services goods	0.382	0.137	
Consumer goods	0.427	0.075	
Health care	0.442	0.082	
Financial institution	0.556	0.077	
Property and real estate	0.575	0.065	
Technology	0.531	0.055	
Utilities	0.412	0.089	

Source: Adaptation from Setyawan [14] and Setyawan and Wibowo [15].

Table 4.
F-test for comparison of international diversification benefit at industry level (correlation model EW).

Roll [1], Hwang and Sitorus [4], Do et al. [5], Setyawan [14], and Setyawan and Wibowo [15].

The next analysis is to change the EW proxy to VW, which includes the market capitalization factor of each industry in calculating the correlation according to Kim [11]. Based on **Table 5** panels A and B, the results of the F-test still receive H1 in Section 3.2.2, namely, F-arithmetic of 1.571 and 1.591, which is significant at the 5% level. These results reaffirm support for Roll [1], Hwang and Sitorus [4], Do et al. [5], Setyawan [14], and Setyawan and Wibowo [15], namely, the wide availability of the potential benefits of industrial diversification in ASEAN.

Referring to the study of Ratner and Leal [2] and Hwang and Sitorus [4], if a comparison of panels A and B of **Table 6** is done above, then the entire industry has a standard deviation value smaller than that of the mean. In addition, it can be seen that the industrial sector which has the biggest contribution is in industry diversification. When referring to panels A and B, the basic material industry shows the biggest contribution. This can be seen from the value of the smallest standard deviation. If it is discussed that the industrial sector is not contributing, it can be seen in panel A that is Goods Services and in panel B is Consumer Goods.

Industry sector	Mean	Std. dev	F-test
Panel A: correlation model of VW-LOC			
Oil and gas	0.412	0.107	1.571**
Basic material	0.561	0.026	
Industrial goods	0.570	0.043	
Services goods	0.338	0.113	
Consumer goods	0.340	0.096	
Health care	0.415	0.068	
Financial institution	0.553	0.087	
Property and real estate	0.487	0.089	
Technology	0.392	0.080	
Utilities	0.353	0.105	
Panel B: correlation model of VW USD			
Oil and gas	0.422	0.096	1.591**
Basic material	0.584	0.029	
Industrial goods	0.595	0.052	
Services goods	0.381	0.103	
Consumer goods	0.399	0.116	
Health care	0.428	0.073	
Financial institution	0.566	0.083	
Property and real estate	0.549	0.060	
Technology	0.418	0.083	
Utilities	0.389	0.108	

Sources: Adaptation from Setyawan [14] and Setyawan and Wibowo [15]

Table 5.
F-test for comparison of international diversification benefit at industry level (correlation model EW).

Country level correlation		Industry level correlation			
LOC	**USD**	**EW-LOC**	**EW-USD**	**VW-LOC**	**VW-USD**
Indonesia	Indonesia	Industrial goods	Industrial goods	Basic material	Basic material
Philippines	Philippines	Property and real estate	Property and real estate	Industrial goods	Industrial goods
Malaysia	Malaysia	Technology	Technology	Health care	Health care

Table 6.
The names of countries and industries that should be selected in this study portfolio.

Then overall I can show the practical implications, namely, which industry sector and which countries will be the mainstay portfolio in **Table 6** (sourced from **Tables 3**–**5** previously). The number of countries and industries in the mainstay portfolio is at least two, confirming Hwang and Sitorus [4], Do et al. [5], Nguyen [13], and also Vo et al. [12]. In **Table 6** I set three of them.

The portfolio above is arranged from top to bottom as a priority portfolio. Thus the best portfolio by country is Indonesia while for the industrial sector; we can look for industrial goods and basic material.

5. Conclusion

This study succeeded in proving the difference in the level of integration between country and industry levels in ASEAN with unconditional correlation (Pearson). In testing the differences in the level of integration at the country level, Indonesia shows the nature of negative correlations that ensure there are potential benefits of international diversification for global investors. Furthermore, in testing differences in the level of integration at the industry level by using the correlation of EW-LOC, EW-USD, VW-LOC, and VW-USD, it has been found that the potential benefits of international diversification between industries have a smaller value of standard deviation than that of the mean. Both of these test results prove the importance of correlation as a measure of capital market integration as well as international diversification.

This study also yields practical implications that by distinguishing the benefits of international diversification between countries and industries, which countries and industries can be found as a mainstay portfolio. Although this study has not succeeded in determining the name of one industry in one country. This is due to the limitations of the GICS database. Estimation only of one industry in one country is still rarely done.

Besides the limitation above, this study has the disadvantage of not using correlation for integration models such as the VAR and VECM cointegration models. Future research can use unconditional and conditional correlations as endogenous variables in the integration equation model in ASEAN with the SUR (Seemingly Unrelated Regression) technique with the data from 2012–2020. This is for capturing some structural break data that occurred, namely, the continued impact of the US subprime mortgage global financial crisis, the emergence of Bitcoin and many kinds of crypto currencies, and impacts of the US and China trade war.

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