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Portfolio Diversification Opportunities On The Asean 5 Stock Market And Sectoral Stock Indexes On The Indonesian Stock Exchange

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Abstract. *This study aims to examine portfolio diversification opportunities on the stock markets of Indonesia, Singapore, Malaysia, Thailand, and the Philippines, as well as sectoral stock price indices on the Indonesian Stock Exchange. The data used is the closing daily price index for the period January 2021 – October 2023. The analysis method uses principal component analysis. The results show that the first forming component includes the Indonesian stock market and its sectoral stock price index. The second component is filled by the stock markets of Singapore, Malaysia, Thailand, and the Philippines. The third component is the consumer goods cyclical and technology sector, then the fourth component is the consumer goods non-cyclical and healthcare sector. Based on the research results, it shows that there are differences in return variance between the five stock markets on ASEAN 5 and the sectoral stock price index on the Indonesia Stock Exchange. Investors can diversify their portfolios into other countries stock markets that have a low correlation with the domestic stock market. This also helps investors outside Indonesia to look for opportunities to diversify into various stock sectors on the Indonesian stock exchange, even though the opportunities are limited.*

Keywords *Diversification Portfolio; Stock Market Integration; ASEAN 5; IDX Industrial Classification*

INTRODUCTION

This study aims to examine stock market integration, as well as sectoral stock integration. Although the domestic stock market is integrated with the international stock market, the stock sectors within it may not necessarily have the same integration with the international stock market. Knowing the stock market integration is a good step towards finding portfolio diversification opportunities. Finding out the integration or co-movement of several stock markets can be done by finding the correlation of returns in different stock markets (Patev et al., 2006). However, high integration between stock markets will reduce portfolio diversification opportunities (Majid & Kassim, 2009). Therefore, it is necessary to find out more about the integration between stock markets and integration between stock sectors to find more specific portfolio diversification opportunities.

Stock market integration is a situation where two or more stock markets have the same direction of movement in a certain period (Muharam et al., 2019). Each stock has distinctive characteristics, but they still have similarities or similarities in their movements. This is due to the similarity of factors that influence its movement (Atahau et al., 2022). According to (Carausu & Lupu, 2022) events that impact the economy will affect the joint movement between stock markets.

Research that discusses the integration or co-movement between stock markets has been conducted. Research by (Girard & Rahman, 2002) examined the integration of the US stock

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market and nine stock markets in East and Southeast Asia, while (Chatterjee et al., 2003) only examined the integration of several stock markets in East and Southeast Asia. Research by (Click & Plummer, 2005) examined the integration of five stock markets in ASEAN. Research by (Brailsford et al., 2006) examined the level of stock market integration of three countries in East Asia and three countries in Southeast Asia. Research by (Majid & Kassim, 2009) examined the integration of five stock markets in Southeast Asia. Research by (Huyghebaert & Wang, 2010) examined the integration of 7 stock markets in East Asia. Research by (Robiyanto, 2017) examines the stock market integration of five countries in Southeast Asia. Research by (Muharam et al., 2020) examines stock market integration in East Asia and Southeast Asia.

Many studies discuss integration or co-movement between stock markets, especially in the East Asia and Southeast Asia regions. Previous research has not conducted research that discusses the integration or co-movement between the stock market index and the sectoral stock price index, especially in the sectoral stock price index on the Indonesia Stock Exchange. Previous research is only limited to integration between stock markets, so it still confuses investors in choosing company shares. This research at least helps investors to choose stocks based on industrial sectors by looking for sectors that have low correlation. The analysis technique used is Orthogonal Generalized Autoregressive Conditional Heteroscedasticity combined with Principal Component Analysis to find similarities in return variance and reduce it into several components as done by (Robiyanto, 2017) and (Muharam et al., 2020) in their research.

METHOD

The data used is the daily stock price index closing return. The indices used are the Indonesia (Id), Singapore (Sg), Malaysia (My), Thailand (Th) and Philippines (Fp) stock market indices, while the sectoral stock price indices used refer to the IDX Industrial Classification, namely Energy (En), Basic Materials (Bm), Industrials (In), Consumer Goods Non-Cyclical (Cn), Consumer Goods Cyclical (Cc), Healthcare (Hc), Financials (Fn), Property and Real Estate (Pr), Technology (Tc), Infrastructure (If), with Transportation and Logistics (Tl). The research period used is 26 January 2021 - 31 October 2023. The data used is sourced from www.investing.com (accessed on 4 November 2023). The analysis technique used is using Orthogonal Generalized Autoregressive Conditional Heteroscedasticity introduced by (Alexander, 2002) combined with Principal Component Analysis.

RESULTS AND DISCUSSION

Descriptive Statistics

The descriptive statistics of the data used in this research are described in Table 1. as follows:

Table 1. Descriptive statistics

	Mean	Max	Min	Std. Dev.	Skewness	Kurtosis	Orbs
Id	0,000	0,035	-0,044	0,007	-0,356	2,724	675
Sg	0,000	0,020	-0,034	0,006	-0,247	1,104	675
My	0,000	0,040	-0,030	0,006	0,068	2,594	675
Th	0,000	0,026	-0,037	0,007	-0,478	2,357	675
Fp	0,000	0,075	-0,042	0,011	0,185	3,177	675
En	0,001	0,069	-0,054	0,014	0,298	1,677	675
Bm	0,000	0,082	-0,043	0,012	0,344	3,359	675
In	0,000	0,041	-0,036	0,011	0,093	1,034	675
Cn	0,000	0,030	-0,031	0,008	0,043	1,149	675
Cc	0,000	0,035	-0,031	0,008	0,207	1,166	675
Hc	0,000	0,088	-0,031	0,009	1,118	9,678	675
Fn	0,000	0,030	-0,044	0,009	-0,049	1,303	675
Pr	0,000	0,038	-0,032	0,009	0,482	1,600	675
Tc	0,001	0,152	-0,053	0,024	2,125	8,536	675
If	0,000	0,075	-0,041	0,011	0,909	5,042	675
Tl	0,000	0,064	-0,049	0,014	0,448	1,430	675

Source: Output EViews 10 (2023)

Stationary Test

The stationary test results of the data used in this study are described in Table 2. as follows:

Table 2. Stationary Test

Variable	t-Statistic	Prob.
Id	-28,064	0,0000**
Sg	-16,294	0,0000**
My	-27,109	0,0000**
Th	-25,126	0,0000**
Fp	-21,031	0,0000**
En	-23,955	0,0000**
Bm	-25,891	0,0000**
In	-28,550	0,0000**
Cn	-26,826	0,0000**
Cc	-22,251	0,0000**
Hc	-27,962	0,0000**
Fn	-27,409	0,0000**
Pr	-25,332	0,0000**
Tc	-8,7663	0,0000**
If	-11,865	0,0000**
Tl	-24,002	0,0000**

**: Significant at 1%, *: Significant at 5%

Source: Output EViews 10 (2023)

All data on the variables used in this study have a probability of <0.01 means that the data is stationary or does not have a particular pattern, so the data is suitable for use and can be continued for further data processing.

Stock Market Integration

The results of the correlation analysis between the stock markets of Indonesia, Singapore, Malaysia, Thailand, and the Philippines are shown in Table 3. as follows:

Table 3. Correlation of ASEAN 5 Stock Market

	Id	Sg	My	Th	Fp
Id	1				
Sg	0,306	1			
My	0,355	0,317	1		
Th	0,337	0,389	0,392	1	
Fp	0,252	0,231	0,339	0,291	1

Source: Output EViews 10 (2023)

Based on Table 3. shows that the stock market index returns of five countries in Southeast Asia tend to have a correlation between stock markets, but the correlation is still low. Detailed research results can be seen in Table 4. and Table 5. as follows:

Table 4. Principal Component Analysis Result

Number	Eigenvalue	Difference	Proportion	Cummulative Value	Cummulative Proportion
1	2,2941	1,4998	0,4588	2,2941	0,4588

Source: Output EViews 10 (2023)

Table 5. Eigenvector (Loadings)

Variable	PC 1
Id	**0,438**
Sg	**0,437**
My	**0,477**
Th	**0,480**
Fp	**0,397**

Source: Output EViews 10 (2023)

Based on Table 4. and Table 5. shows that there is only one principal component formed, meaning that the stock markets of Indonesia, Singapore, Malaysia, Thailand, and the Philippines have similar return variances. The results show that the eigenvalue is 2.2941 and the proportion value is 0.4588. These results concluded that the stock markets of the five countries have a similar return variance of 45.88%, while the remaining 54.12% is explained by other variables outside the model.

In addition, based on Figure 1. Scree Plot (Ordered Eigenvalues) shows that there is only one component that has an eigenvalue >1, so it is concluded that it only consists of one forming component.

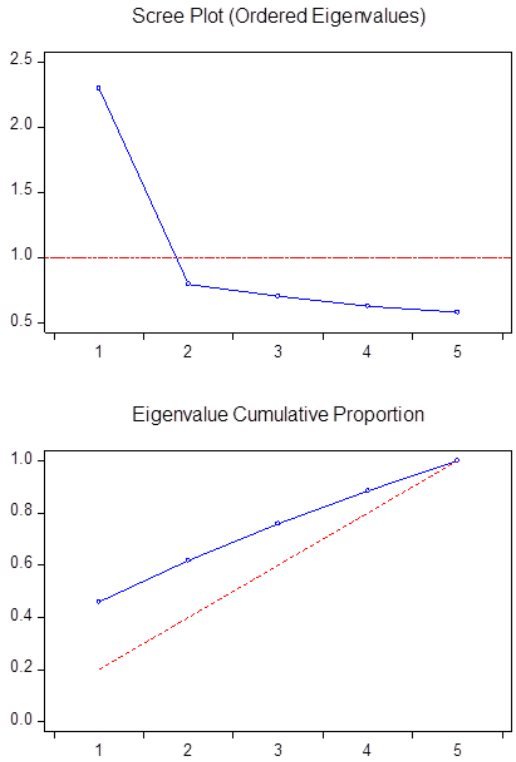

Figure 1. Ordered Eigenvalue and Eigenvalue Cumulative Proportion

IDX Industrial Classification

The results of the correlation analysis between the IDX Industrial Classification sectoral stock price index on the Indonesia Stock Exchange are shown in Table 6. as follows:

Table 6. Correlation of IDX Industrial Classification

	En	Bm	In	Cn	Cc	Hc	Fn	Pr	Tc	If	Tl
En	1										
Bm	0,450	1									
In	0,515	0,450	1								
Cn	0,264	0,423	0,382	1							
Cc	0,284	0,434	0,347	0,382	1						
Hc	0,096	0,216	0,157	0,323	0,192	1					
Fn	0,271	0,488	0,445	0,441	0,437	0,230	1				
Pr	0,323	0,466	0,409	0,349	0,443	0,170	0,495	1			
Tc	0,083	0,195	0,088	0,075	0,271	0,045	0,221	0,166	1		
If	0,267	0,459	0,370	0,336	0,332	0,178	0,431	0,417	0,133	1	
Tl	0,236	0,352	0,316	0,226	0,342	0,141	0,326	0,317	0,112	0,264	1

Source: Output EViews 10 (2023)

Based on Table 6. shows that the IDX Industrial Classification sectoral stock price index returns have varying correlations between one sector and another. The stock price indexes of the Energy, Basic Materials, Industrials, Consumer Goods Non-Cyclical, Consumer Goods Cyclical, Financials, Property and Real Estate, Infrastructure, and Transportation and Logistics sectors have a medium level of correlation, but the Healthcare and Technology sectors have a

correlation that tends to be low and even does not correlate with each other sectors. The detailed research results can be seen in Table 7. and Table 8. as follows:

Table 7. Principal Component Analysis Result

Number	Eigenvalue	Difference	Proportion	Cummulative Value	Cummulative Proportion
1	4,2062	3,1604	0,3824	4,2062	0,3824
2	1,0458	0,0200	0,0951	5,2521	0,4775
3	1,0258	0,2294	0,0933	6,2779	0,5707

Source: Output EViews 10 (2023)

Table 8. Eigenvector (Loadings)

Variable	PC 1	PC 2	PC 3
En	**0,280**	-0,330	-0,425
Bm	**0,371**	-0,034	-0,082
In	**0,338**	-0,291	-0,251
Cn	0,311	-0,167	**0,362**
Cc	**0,328**	0,280	0,032
Hc	0,176	-0,132	**0,764**
Fn	**0,359**	0,112	0,097
Pr	**0,343**	0,065	-0,065
Tc	0,141	**0,812**	-0,079
If	**0,312**	-0,012	0,011
Tl	**0,261**	0,052	-0,106

Source: Output EViews 10 (2023)

Based on Table 7. and Table 8. shows that there are three principal components formed. The results show that the eigenvalue of the first component is 4.206 and the proportion value is 0.3824. The second component has an eigenvalue of 1.0458 and a proportion value of 0.0951, while the third component has an eigenvalue of 1.0258 and a proportion value of 0.0933. These results concluded that the first component contributed to the similarity of variance by 38.24%, the second component by 9.51% and the third component by 9.33%. The total proportion is 57.07, which means that the three components are only able to explain 57.07% of the return variance of the sectoral stock price index, while the remaining 42.93% is explained by other variables outside the model.

In addition, based on Figure 2. Scree Plot (Ordered Eigenvalues) shows that there is three component that has an eigenvalue >1, so it is concluded that it consists of three forming component.

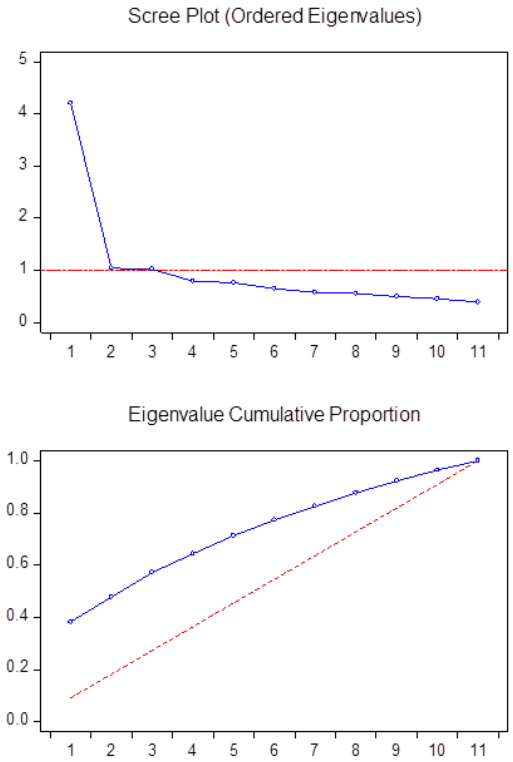

Figure 2. Ordered Eigenvalue and Eigenvalue Cumulative Proportion

ASEAN 5 Stock Market and IDX Industrial Classification

The results of the correlation analysis between the stock market indices of Indonesia, Singapore, Malaysia, Thailand, and the Philippines, as well as the IDX Industrial Classification sectoral stock price index on the Indonesia Stock Exchange are shown in Table 9. as follows:

Table 9. Correlation of ASEAN 5 Stock Market and IDX Industrial Classification

	Id	Sg	My	Th	Fp	En	Bm	In	Cn	Cc	Hc	Fn	Pr	Tc	If	Tl
Id	1															
Sg	0,306	1														
My	0,355	0,317	1													
Th	0,337	0,389	0,392	1												
Fp	0,252	0,231	0,339	0,291	1											
En	0,511	0,094	0,171	0,098	0,117	1										
Bm	0,693	0,249	0,279	0,270	0,232	0,450	1									
In	0,628	0,217	0,252	0,177	0,149	0,515	0,450	1								
Cn	0,598	0,230	0,284	0,271	0,176	0,264	0,423	0,382	1							
Cc	0,539	0,260	0,194	0,264	0,125	0,284	0,434	0,347	0,382	1						
Hc	0,316	0,060	0,094	0,118	0,081	0,096	0,216	0,157	0,323	0,192	1					
Fn	0,834	0,306	0,307	0,297	0,221	0,271	0,488	0,445	0,441	0,437	0,230	1				
Pr	0,560	0,220	0,207	0,237	0,159	0,323	0,466	0,409	0,349	0,443	0,170	0,495	1			
Tc	0,320	0,070	0,082	0,133	0,082	0,083	0,195	0,088	0,075	0,271	0,045	0,221	0,166	1		
If	0,585	0,146	0,199	0,235	0,140	0,267	0,459	0,370	0,336	0,332	0,178	0,431	0,417	0,133	1	
Tl	0,388	0,217	0,176	0,209	0,091	0,236	0,352	0,316	0,226	0,342	0,141	0,326	0,317	0,112	0,264	1

Source: Output EViews 10 (2023)

Based on Table 9. shows that the stock market index returns of Indonesia,

Singapore, Malaysia, Thailand, and the Philippines have varying degrees of correlation with the IDX Industrial Classification sectoral stock price index. Detailed research results can be seen in Table 10. and Table 11. as follows:

Table 10. Principal Component Analysis Result

Number	Eigenvalue	Difference	Proportion	Cummulative Value	Cummulative Proportion
1	5,6322	4,1711	0,3520	5,6322	0,3520
2	1,4611	0,4030	0,0913	7,0934	0,4433
3	1,0580	0,0328	0,0661	8,1515	0,5095
4	1,0252	0,1263	0,0641	9,1767	0,5735

Source: Output EViews 10 (2023)

Table 11. Eigenvector (Loadings)

Variable	PC 1	PC 2	PC 3	PC 4
Id	**0,389**	-0,118	0,031	0,032
Sg	0,184	**0,431**	0,021	-0,095
My	0,199	**0,444**	-0,182	-0,072
Th	0,201	**0,478**	0,081	0,031
Fp	0,148	**0,439**	-0,145	-0,069
En	**0,226**	-0,276	-0,327	-0,367
Bm	**0,315**	-0,106	-0,044	-0,076
In	**0,282**	-0,194	-0,287	-0,221
Cn	0,270	-0,011	-0,164	**0,358**
Cc	0,271	-0,079	**0,300**	0,016
Hc	0,144	-0,082	-0,088	**0,788**
Fn	**0,323**	-0,023	0,103	0,078
Pr	**0,281**	-0,129	0,078	-0,063
Tc	0,124	-0,022	**0,772**	-0,106
If	**0,261**	-0,140	0,004	0,036
Tl	**0,213**	-0,059	0,080	-0,121

Source: Output EViews 10 (2023)

Based on Table 10. and Table 11. shows that there are four principal components formed. The results show that the first component has an eigenvalue of 5.6322 and a proportion value of 0.3520. The second component has an eigenvalue of 1.4611 and a proportion value of 0.0913. The third component has an eigenvalue of 1.0580 and a proportion value of 0.0661, while the fourth component has an eigenvalue of 1.0252 and a proportion value of 0.0641. The overall proportion value is 0.5735, which means that the four components are only able to explain 57.35% of the return variance of the Indonesia, Singapore, Malaysia, Thailand, and Philippines stock market indices, as well as the IDX Industrial Classification sectoral stock price index.

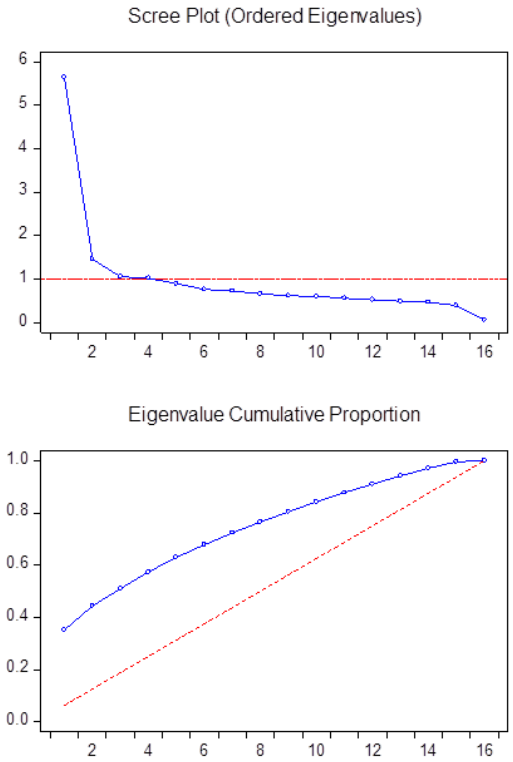

Figure 3. Ordered Eigenvalue and Eigenvalue Cumulative Proportion

Discussion

The results showed that the stock markets of Indonesia, Singapore, Malaysia, Thailand, and the Philippines have integration, because the five stock markets have similar variance returns and have a joint movement correlation. The research results are in line with those conducted by (Robiyanto, 2017) and (Muharam et al., 2020) that the ASEAN 5 stock markets have similar movements or integration. Therefore, opportunities in international portfolio diversification can still be done, although high integration will reduce the benefits of diversification itself.

The results further show that there are sectoral stock price indices in the Indonesian stock market that are segmented. The stock price indices of Energy, Basic Materials, Industrials, Consumer Goods Cyclical, Financials, Property and Real Estate, Infrastructure, and Transportation and Logistics sectors have similar variance returns, while the stock price indices of Technology, Consumer Goods Non-Cyclical and Healthcare sectors are segmented with other sectors. Investors who own shares of companies in integrated sectors can diversify their portfolios in segmented sectors.

The last result shows that the first component is filled by the Indonesian stock market index and the seven sectoral stock price indices of the IDX Industrial Classification, meaning that they have similar movements or similar variance returns. The Singapore, Malaysia, Thailand, and Philippines stock markets are in the second component. The third component

consists of the Consumer Goods Cyclical and Technology sectors, while the fourth component consists of the Consumer Goods Non-Cyclical and Healthcare sectors. However, investors outside Indonesia can diversify their portfolios in segmented sectors.

CONCLUSION

This study aims to determine portfolio diversification opportunities in the ASEAN 5 stock market and in the IDX Industrial Classification sector. The methods used are Orthogonal Generalized Autoregressive Conditional Heteroscedasticity and Principal Component Analysis. The results show that the stock markets of Indonesia, Singapore, Malaysia, Thailand, and the Philippines are integrated.

Other results concluded that the Technology, Consumer Goods Non-Cyclical and Healthcare sectors are segmented with other stock sectors. Finally, the Singapore, Malaysia, Thailand, and Philippines stock markets have different return variances from the entire IDX Industrial Classification sectoral stock price index, therefore overseas investors can diversify their portfolios in the Indonesian stock market across all sectors.

Future research can find out the factors that influence the movement of the IDX Industrial Classification sectoral stock price index, because the results show that there are segmented sectors.

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