

Integration of Indonesian Stock Market With Stock Market of The Highest Economic Countries

Sahdan Saputra¹, Wira Hendri²

¹Ilmu Komputer, Universitas Bumigora, Mataram, Indonesia

²Manajemen, Universitas Bumigora, Mataram, Indonesia

Kata Kunci

Kata kunci: Integrasi, Gerakan bersama, pasar saham

Abstrak

Penelitian ini bertujuan untuk menganalisis integrasi antara pasar saham Indonesia dan pasar saham negara-negara dengan perekonomian tertinggi, seperti Amerika Serikat, China, Jepang, Jerman, Prancis, India, dan Brasil. Pendekatan yang digunakan adalah pendekatan kuantitatif, dengan data mingguan dari 2016-2023 yang mencakup 418 observasi. Metode analisis yang digunakan adalah ko-integrasi Johansen dan Juselius untuk menganalisis integrasi jangka panjang, serta Granger causality secara pair-wise untuk integrasi jangka pendek. Hasil penelitian menunjukkan tidak adanya integrasi jangka panjang antara pasar saham Indonesia dan pasar saham negara-negara ekonomi tertinggi. Namun, dalam jangka pendek, pasar saham India menunjukkan adanya integrasi dengan pasar saham Indonesia, sedangkan pasar saham negara lainnya tidak menunjukkan integrasi. Penelitian ini melengkapi literatur sebelumnya mengenai integrasi pasar saham. Kajian tentang integrasi pasar saham Indonesia dengan negara-negara ekonomi tertinggi masih terbatas, sehingga penelitian ini dapat menjadi rujukan penting. Temuan ini bermanfaat bagi investor, baik dari Indonesia maupun dari negara-negara dengan ekonomi tertinggi, dalam merancang strategi diversifikasi portofolio secara internasional.

Keywords

Keywords: Co-Integration, Co-movement, stock market

Abstract

This study aims to analyze the integration between the Indonesian stock market and the stock markets of the world's leading economies, including the United States, China, Japan, Germany, France, India, and Brazil. The approach employed is a quantitative one, using weekly data from 2016 to 2023, with a total of 418 observations. The analytical methods utilized are Johansen and Juselius co-integration to examine long-term integration and pair-wise Granger causality to assess short-term integration. The findings reveal no long-term integration between the Indonesian stock market and the stock markets of the world's leading economies. However, in the short term, the Indian stock market shows some degree of integration with the Indonesian stock market, while the stock markets of other countries do not exhibit such integration. This study contributes to the existing literature on stock market integration. Research on the integration of the Indonesian stock market with those of leading global economies remains limited, making this study an important reference. The findings provide valuable insights for both Indonesian investors and those from leading economies in formulating strategies for international portfolio diversification.

*Corresponding Author: **Sahdan Saputra**, Universitas Bumigora, Mataram, Indonesia
Email: sahdan@universitasbumigora.ac.id

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INTRODUCTION

Developing countries like Indonesia have the main goal of achieving economic growth and development. Investment, according to Modern Economist Lord J. Keynes, has a strategic role in achieving economic growth. Financial integration facilitates the flow of capital between countries and increases the specialization of production, which in turn can lead to greater amounts of investment and thereby increase the rate of economic growth (Obstfeld, 1994). Savings are considered to always be in line with investment, with the capital market being the best place to optimize investment and mobilize effective savings for portfolio development. On an international scale, investors can allocate their funds through Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) which are usually done to diversify their assets with the aim of reducing risk and increasing profits (Bodie et al., 2014). The concept of portfolio diversification, which aims to reduce risks and increase returns, has long been the focus of investors' attention. However, co-movement of stock markets may limit the diversification benefits for foreign investors in the long term. Therefore, knowledge of international financial market settings is essential for investors and portfolio managers to make informed decisions.

To gain the benefits of diversification, investors actively seek opportunities in global markets that offer maximum profit potential with minimal risk. According to the diversification model put forward by Markowitz, (1952) investors can minimize risk by maintaining a diversified portfolio investing in different or the same equity markets. Stable foreign capital markets attract foreign investors to invest their capital in developed countries, despite concerns about political instability, legal uncertainty and other threats in the domestic market.

On the other hand, developing countries offer new opportunities with reduced economic barriers and more open policies, luring foreign investors to invest to support their economic growth (Irandoost, 2021). The movement of capital between countries strengthens the interconnectedness of global stock markets, which was exacerbated by major financial crises such as the 1997 Asian crisis and the global financial crisis in 2007. Responses to these crises show how economic and financial integration has strengthened the interconnection of stock markets around the world, driving interest in researchers to understand more deeply the movements of global equity markets (Lee et al., 2024).

Global economic developments have stimulated deeper and more efficient integration in national and international stock markets. A World Bank report in 1997 noted how global stock markets were rapidly

transforming into a single global entity, attracting investors to explore opportunities in emerging markets for higher returns and reduced risk through diversification. Bekaert & Harvey, (1997) explain that commercial strategies and financial arrangements at the national level play an important role in shaping markets, whether they are globally integrated or segmented. Financial economic theory emphasizes the importance of strong financial integration in advancing financial development and stability. This integration is considered to increase the efficiency of capital allocation, reduce the impact of shocks, strengthen market structures, and expand portfolio diversification (Paurer, 2005). The interrelationships between stock markets are also highlighted in this theory, with the Efficient Market Hypothesis (EMH) explaining that new information will quickly be reflected in market prices. However, if there is mutual movement between markets, the EMH is reduced because information from one market can influence other markets.

Globalization, financial liberalization and technological advancement are the main drivers behind the integration of local and global financial markets. Bekaert & Harvey, (1997) suggests that financial liberalization promotes interconnectedness between equity markets, while policymakers claim that financial integration brings benefits such as economic growth, increased investment, and a healthier competitive environment. Easier access to global equity markets provides investors with the opportunity to diversify their portfolios and seek returns commensurate with their desired level of risk. study conducted by Bekaert & Mehl, (2019) proves that from a financial perspective, markets that benefit from portfolio diversification have lower investment risks.

After the global financial crisis, theorists, academics, and practitioners began to pay greater attention to integration in international stock markets (Mobarek et al., 2016). In the financial literature, several previous studies examined the integration between capital markets in developing countries and capital markets in developed countries such as Alvi & Chughtai, (2014) dan Lee et al. (2024) investigates the integration and co-movement of the stock market of Pakistan and the country with the capital market of the country with the highest economy. Wu, (2020) in his study, stock market integration in East and Southeast Asia is not as strong as it seems. Gupta, (2019) identified dependencies among ten market indices spread across Asia, Europe and America. The findings in the study reveal strong interdependence across markets, but the Shanghai capital market shows low interdependence across geographic regions. Al Nasser & Hajilee, (2016) in his study, he found integration in the short term between the stock markets of developing countries such as Brazil,

China, Mexico, Russia and Turkey, and the markets of developed countries in the US, UK and Germany.

This study investigates the integration between the Indonesian stock market and the stock markets of top economies such as the United States, China, Japan, Germany, India, France, Brazil and Canada. study on integration between the Indonesian stock market and other countries is currently still very limited. Previous study still focuses on the causal relationship between macroeconomic conditions both globally and domestically. Therefore, it is hoped that this study can contribute significantly to investors in understanding the integration between the Indonesian stock market and other developed countries. Thus, investors can better make decisions in diversifying their portfolios in the Indonesian stock market. In addition, this study is expected to provide a new understanding of stock market integration, so that it can be used as a reference in both the academic and practitioner worlds.

LITERATURE REVIEW

Global finance is a phenomenon in which a country's financial markets are increasingly integrated with financial markets in other countries or regions. Economic theory and empirical evidence confirm that financial integration and the development of financial markets have the potential to reduce trade barriers, promote more efficient capital allocation, and ultimately, make a significant contribution to economic growth (Calvi, 2010). Market integration has spread to many countries, enabling growth and increased opportunities (Haddad, 2023). In economics and finance literature, stock market integration is presented by Mishra, (2022) and Wang & You, (2023) observing the influence of market integration on developed and developing countries. Boamah, (2022) observes stock markets in developing countries and world markets. The inclusion of assets from emerging markets in global portfolios is considered to provide benefits for overall economic growth and market diversification (Boamah, 2022; and Fabian, 2022). Study conducted by Barus, (1997), (Palac-McMiken, 1997), and Ibrahim, (2000) shows that the Asian region's stock markets are segmented and provide diversification benefits to investors. However, post-2000 empirical studies reveal that Central Asia and South Asia (Taiwan, Korea, India, and China) as well as Southeast Asia (Malaysia, the Philippines, and Indonesia), show segmentation and integration (Dunis & Shanon, 2005). Meanwhile, Nguyen and Elisabeta, (2016) show that investors obtain higher diversification benefits from cross-industry investment strategies compared to cross-border investment strategies in the China and ASEAN regions.

Latest study by Qian et al. (2023) investigates how the Chinese market depends on eleven international stock markets. The results show that the magnitude of interdependence between Chinese stock markets and international markets varies by region. Moreover, this dependence is negatively driven by differences in economic policy uncertainty and interest rate differences, while it is positively influenced by the global financial crisis and trade interdependence. The study of market integration continues to produce new ideas and evidence that help enrich the understanding of growth stocks. For example, study by Lukanima et al. (2024) explores the impact of Mercados Integrados Latino americanos (MILA) on stock market integration. They examined the period between before the global financial crisis (GFC) in 2008 and the COVID-19 pandemic in 2023. Global emerging market countries have increased their investment opportunities, but historical stock market data cannot always predict future performance. Bekaert & Harvey, (1997) noted that returns in capital markets in developing countries are different from returns in developed countries. Understanding this is important before making any investment decisions.

The extent to which domestic stock markets are connected to global markets has direct and profound implications for several key issues in international financial market theory. From cost of capital to portfolio diversification, as well as other criteria for capital allocation decisions, all produce different results depending on pricing at the domestic and international levels (Chen et al., 2023; Singh et al., 2022; Stehle, 1997). The evolution of market integration, as investigated by Arouri and Foulquier (2012), is influenced by complex institutional and behavioral factors. First, financial market integration is closely related to economic, institutional and political policy reforms. Successful economic integration depends on global investors' ability to find portfolio diversification opportunities and access to domestic securities. Other factors include the increased exposure of domestic assets to global factors, which in turn strengthens global stock market integration. Second, behavioral factors such as risk uncertainty and information perception play an important role in the desire to invest internationally.

Market integration, in concept, not only broadens the international outlook, but also opens up new investment opportunities, allowing investors to take advantage of diverse stock markets around the world. To gain the benefits of diversification, investors actively seek opportunities in global markets that offer maximum profit potential with minimal risk. According to the diversification theory put forward by Markowitz, (1952) investors can minimize risk by maintaining a diversified portfolio investing in different or the same equity markets. In

other words, by putting their eggs into several baskets, investors can protect their portfolios from significant losses that may arise from a decline in the value of one particular asset. This concept views diversification not only as a way to maximize potential profits, but also as a tool to manage risk. By adopting this approach, investors can achieve a greater level of stability in their portfolio, achieve long-term financial goals, and reduce the uncertainty associated with market fluctuations.

Stock market integration refers to the process by which the stock markets of different countries or regions become increasingly linked to each other. This occurs when share prices of the same companies tend to move together across different stock markets (Lee et al., 2024). Stock market integration can be caused by factors such as advances in information technology, financial liberalization, and globalization of trade (Haddad, 2023). The signal dependency model assumes that investors in one market will respond to information emerging in another market. So, when there is an important event that affects stock prices in one country, the effects can also be felt in other countries' stock markets (Tesar, 1991). Additionally, the Capital Flow-Based Stock Market Integration Theory focuses on cross-country capital flows and how they influence stock market integration. Stock market integration is seen as a result of greater cross-border investment (Errunza & Losq, 1995).

Stock market integration has a positive impact in the form of risk diversification and greater access to global capital sources for companies. However, there are also negative impacts that need to be considered. One significant negative impact is increased market volatility and associated financial risks. When stock markets are integrated, events or conditions that affect one market can quickly spread to other markets through contagion effects. This can cause sharp and unstable share price fluctuations in various markets, increasing risks for investors and companies (Baele et al., 2004). In addition, stock market integration can also increase the range of speculative influences that strengthen the tendency for excessive market behavior (overreaction) and make the market more vulnerable to price bubbles and sharp corrections. For example, global financial crises such as the one in 2008 showed how instability in one market can quickly spread to stock markets around the world, causing huge losses for investors and threatening the stability of the global financial system as a whole (Forbes & Rigobon, 2002).

METHODOLOGY

This study aims to conduct a comprehensive analysis of the integration between the Indonesian stock market and the stock markets of the world's

leading economies. To achieve this, we will utilize stock price index data from Indonesia alongside those from the countries with the largest economies, including the United States, China, Japan, Germany, India, France, and Brazil. This data is meticulously presented in Table 1, which serves as a foundation for understanding the interconnections and dynamics between these markets. Through this analysis, we seek to uncover the extent of correlation and influence among these stock markets, providing valuable insights for investors and policymakers alike.

Table 1. Description of stock market indices

Country	Pengukuran	Stock Market	Index
Indonesia	(Ln) of stock market index	Indonesia Stock Exchange	JKSE Index
USA	(Ln) of stock market index	New York Stock Exchange	NDX100 Index
China	(Ln) of stock market index	Shanghai Stock Exchange	SSE Index
Japan	(Ln) of stock market index	Tokyo Stock Exchange	NIKKEI225 Index
Germany	(Ln) of stock market index	German Stock Exchange	GDAXI Index
India	(Ln) of stock market index	National Stock Exchange	NIFTY50 Index
France	(Ln) of stock market index	French Stock Exchange	FCHI40 Index
Brazil	(Ln) of stock market index	Brazil Stock Exchange	BVSPIndex

The data in this study were taken from the Yahoo Finance website. The data in this study has been adjusted to rupiah units based on the exchange rates of each currency of each country used as a sample in this study, in addition, the stock price data was then performed on a natural logarithm (Ln). The data in this study is stock index data for each country in weekly form, so the total observations in this study are 418. study variables in the form of time series data tend to be non-stationary; therefore, If the data are not stationary, the study results can be unreliable and the interpretation can be wrong. Non-stationary data tends to show trends or fluctuations that continue to change over time, which can produce biased and inconsistent estimates. Data stationarity is an important prerequisite for cointegration. Therefore, Philips-Perron and Augmented Dickey-Fuller (ADF) tests are used to determine whether the series is stationary or non-stationary.

Unit root test

This study chose the Augmented Dickey and Fuller (ADF) test because it is considered the best and most reliable for time series data with an autoregressive structure (Dickey & Fuller, 1979). The unit root test will be accepted based on the null hypothesis if the series is not stationary at all levels of significance (1%, 5%, and 10%). Next, to

determine the most appropriate number of lags, this study uses the Schwarz Information Criterion (SIC), a standard tool for selecting lag structures (Schwarz, 1978). The appropriate lag length to use is SIC with the minimum value. The following is a simple AR(1) model as follows:

$$Y_t = a + bt + byt - 1 \quad (1)$$

If there is a non-stationary series at the level, then the data needs to be made stationary using the equation below:

Multivariate Johansen co-integration

$$\Delta y_t = a + bt + cyt - 1 + d\Delta y_t - 1 + ut \quad (2)$$

Cointegration is the study of how two or more data sets move together, without considering the cause and effect between them. This is based on empirical evidence, and it is important to note that sometimes there is no economic explanation underlying this association. This approach does not demonstrate any cause and effect relationship. Johansen and Juselius recommend two likelihood ratio tests to determine the number of cointegrating vectors. The trace test is used as the basis for the first test, which tests the null hypothesis that there are r cointegrating vectors or routes against the alternative that there are r or more cointegrating vectors. Here is the statistical formula:

$$\lambda_{\text{trace}} = -T \sum \ln(1 - \lambda_i) \quad (3)$$

The maximum Eigenvalue test is the second test that evaluates the null hypothesis that there are r cointegrating vectors against the alternative that there are $r + 1$ cointegrating vectors. The maximum Eigenvalue statistics are expressed as follows:

$$\lambda_{\text{max}} = -T \ln(1 - \lambda_{r+1}) \quad (4)$$

Granger causality

A lead-lag relationship can occur when there is a long-term relationship between two data sets. Granger causality can be tested using three variations: pairwise Granger causality using the vector error correction model (VECM) approach, standard Granger causality, and Hsiao's version of Granger causality. The last two Granger causality approaches can only be applied if there is no equilibrium relationship between the variables, while the first approach is suitable for the case of cointegration. Granger causality can be tested in a vector autoregressive (VAR) framework as expressed in equations 5 and 6 as follows:

$$y_t = x_1 + \sum_{j=1}^m B_{1j}y_{t-j} + \sum_{j=1}^m \delta_{1j}x_{t-j} + \varepsilon_{1t} \quad (5)$$

$$x_t = x_2 + \sum_{j=1}^m B_{2j}x_{t-j} + \sum_{j=1}^m \delta_{2j}y_{t-j} + \varepsilon_{2t} \quad (6)$$

RESULTS AND DISCUSSION

This study utilizes graphical and statistical methods to examine the temporal and stochastic properties of the data. As can be seen in the illustration in Figure 1, all stock markets showed downward movements throughout 2020, but the NDX100 showed relatively low shocks when compared with stock markets in other countries. In 2022, NDX100, NIKEI250, GDAXI, FCHI40, and SSE will experience a fairly sharp downward trend, but JKSE, NIFTY50, and BVSP will tend to experience a stable trend. Moreover, in 2023, all stock markets show upward movement except SSE. This means that all stock markets based on price history do not have a perfect trend together.

Table 2 in this study provides a detailed overview of the descriptive statistical results concerning the stock market values of all observed variables. Throughout the observation period, GDAXI emerged as the index with the highest average value, followed by BVSP and NDX100, highlighting its strong performance in comparison to other markets. In contrast, NIKKEI250 and JKSE exhibited the lowest average values, indicating weaker market performance during the same timeframe. When examining market volatility, NDX100 stands out with the highest standard deviation, reflecting substantial price fluctuations and indicating a more dynamic trading environment. This is closely followed by NIFTY50 and BVSP, which also showed notable volatility. On the other hand, SSE and JKSE displayed the lowest levels of volatility, suggesting a more stable market behavior. Additionally, the analysis of skewness reveals interesting patterns in market movements. NIFTY50 is the only index with a positive skewness value, which indicates a tendency for its prices to experience upward movements more frequently than downward shifts. In contrast, the other markets exhibit negative skewness, suggesting a higher likelihood of downward movements occurring more often than upward ones. This study is based on a robust dataset comprising 418 observations, collected weekly over a seven-year period from 2016 to 2023. This comprehensive analysis aims to provide valuable insights into the behavior and characteristics of these stock markets, enhancing our understanding of their dynamics and interrelationships.

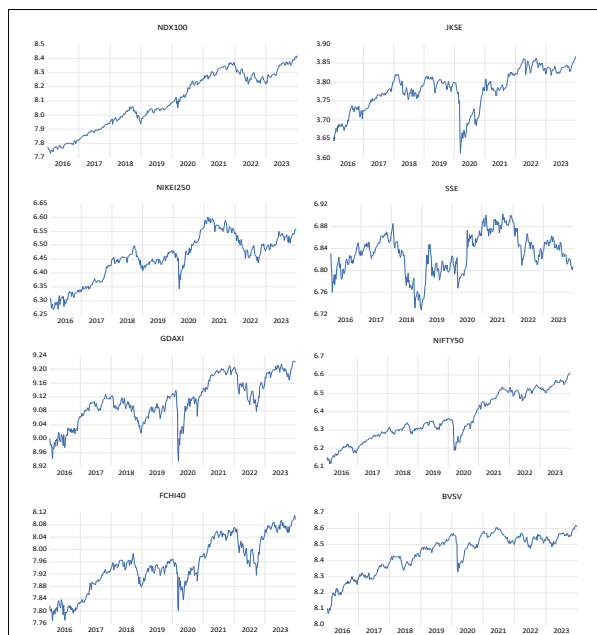


Figure 1.
 History of the Indonesian Stock Market and The Stock Market of the highest economic countries

Table II Result Deskriptive Statistic

	JKS E	NDX1 00	SSE	NIKK EI	GDA XI	NIFTY 50	FCHI 40	BVS V
Mean	3.77	8.099	6.83	6.454	9.110	6.364	7.950	8.44
Maximu m	9	8.419	1	6.601	9.224	6.609	8.110	7
Minimu m	3.61	3.107	6.72	6.268	8.935	6.115	7.769	8.07
Std. Dev	0.05	0.000	0.03	0.081	0.063	0.127	0.084	0.12
Skewnes s	0.63	-0.194	0.37	-	-	0.134	0.153	0.90
Kurtosis	4	1.721	3	-0.415	0.226	0.134	0.153	8
Jarque- Bera	29.5	10.2	18.10	2.410	2.425	1.787	2.187	57.0
Probabili ty	0.00	0.000	0.00	0.000	0.009	0.000	0.000	0.00
N	418	418	418	418	418	418	418	418

Table 3 illustrates the correlation matrix values among the indices JKSE, NDX100, SSE, NIKKEI225, GDAXI, NIFTY50, FCHI40, and BVSP. Notably, the correlation between FCHI40 and GDAXI stands out as the highest, with a value of 0.941, indicating a strong relationship between these two markets. Following closely is the correlation between FCHI40 and NIFTY50, which also suggests a significant connection. These findings are further corroborated by the visual representation in Figure 1, which displays both descriptive statistics and the correlations between the time series. In this figure, it is evident that FCHI40 and NIFTY50 exhibit similar movements throughout the observation period, reinforcing the notion of their interconnectedness. This analysis underscores the importance of understanding these correlations, as they provide valuable insights into the dynamics of the stock markets being studied.

Table III Stationer test

Variable	Level		First Difference	
	ADF Statistic	Critical Value	ADF Statistic	Critical Value
JKSE	-0.117.560	-2.868.252	-2.243.067	-2.868.268
NDX 100	-1.912.873	-2.868.252	-1.928.030	-2.868.268
SSE	-2.739.977	-2.868.252	-2.245.424	-2.868.268
NIKKEI 225	-1.837.301	-2.868.302	-1.768.926	-2.868.302
GDAXI	-1.740.576	-2.868.252	-2.072.916	-2.868.268
NIFTY 50	-0.589.508	-2.868.252	-1.949.800	-2.868.268
FCHI 40	-1.564.943	-2.868.302	-1.780.031	-2.868.302
BVSP	-1.796.451	-2.868.252	-2.067.612	-2.868.268

Table 4 presents the results of the stationary data analysis conducted in this study, detailing the values at both the level and first difference levels. At the level level, the Augmented Dickey-Fuller (ADF) statistical value is found to be greater than the critical value at the 0.05 significance level, indicating that the data is non-stationary at this level. In contrast, when assessing the first difference level, all variables—namely JKSE, NDX100, SSE, NIKKEI225, GDAXI, NIFTY50, FCHI40, and BVSP—exhibit ADF statistical values that surpass their respective critical values. This result confirms that the data becomes stationary at the first difference level. Such findings are crucial for ensuring the reliability of subsequent analyses, as stationary data is essential for valid econometric modeling and inference.

Table IV Matrix correlation

Variable	JKS E	NDX 100	SSE	NIKEI 250	GDA XI	NIFTY 50	FCHI 40	BVS V
JKSE	1							
NDX 100	0.62 38	1						
SSE	0.26 31	0.4333	1					
NIKKEI 250	0.60 05	0.9196	0.46 20	1				
GDAXI	0.72 26	0.8481	0.60 32	0.7278	1			
NIFTY5 0	0.81 90	0.9319	0.41 85	0.7271	0.888 3	1		
FCHI40	0.77 27	0.8980	0.42 92	0.8888	0.941 9	0.9324	1	
BVSV	0.71 30	0.8980	0.34 06	0.7711	0.798	0.8572	0.740 2	1

VAR Lag Order Selection Criteria is a series of methods used to determine the optimal number of lags in a VAR (Vector Autoregression) model. Choosing the right amount of lag is critical in building an accurate and efficient VAR model. Akaike Information Criterion (AIC): This criterion takes into account the number of parameters in the model and the amount of data used. AIC selects the model that provides the lowest AIC value. Therefore, before cointegration analysis, this study tested the lag criteria used in the study. Based on table 5 in this study, the Akaike value (AIC) shows that the lag length is at number 1.

Table V VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	10748.20	NA	2.14e-33	52.51933	52.44082*	52.48826
1	10871.66	241.4805	1.60e-33*	52.81007*	52.10350	52.53050*
2	10916.08	85.14919*	1.77e-33	52.71433	51.37969	52.18626
3	10946.75	57.59993	2.08e-33	52.55137	50.58867	51.77480
4	10982.31	65.36930	2.39e-33	52.41227	49.82151	51.38719
5	11025.40	77.54041	2.66e-33	52.31001	49.09119	51.03644
6	11065.12	69.92063	3.00e-33	52.19128	48.34439	50.66920
7	11099.53	59.24301	3.49e-33	52.04663	47.57168	50.27605
8	11143.19	73.44008	3.88e-33	51.94716	56.84414	49.92807

Note: *denotes the appropriate lag length (AIC).

This study aims to evaluate the integration of the Indonesian stock market with the 7 stock markets of countries with the highest economies in the world. Based on the results of trace statistics and maximum eigenvalue statistics in tables 6 and 7, the findings in this study indicate a lack of long-term integration between JKSE, NDX100, SSE, NIKKEI225, GDAXI, NIFTY50, FCHI40, and BVSP at the 5% significance level. This can be seen from the trace statistics and max-eigen statistics values which are below the critical value. Apart from that, if you look at the overall probability value it is above 0.05, so it is concluded that JKSE does not have long-term integration with the stock markets of these countries. This finding is in line with the findings of Lee et al. (2024) which found that there was no long-term integration between the stock markets of developing countries and the stock markets of the highest economies in the world. This study is also in line with Boubakri and Guillaumin, (2015) who found that capital markets in the Asian region have been partially segmented. This shows that the Indonesian stock market (JKSE) can provide opportunities for investors in the United States, China, Japan, Germany, India, France and Brazil to diversify their portfolios in the Indonesian stock market. Likewise, in the long term, Indonesian investors can minimize their investment risk by diversifying their portfolio internationally in the stock markets of these countries.

Table VI Co-integration test maximum eigenvalue statistics.

Hyphotesis	Eigenvalue	Trace Statistic	Critical Value (0.05)	Prob.**
None	0.090195	149.8312	159.5297	0.1490
At Most 1	0.078686	110.5090	125.6154	0.2859
At Most 2	0.066479	76.41575	95.75366	0.4912
At Most 3	0.041483	47.79825	69.81889	0.7299
At Most 4	0.035316	30.17298	47.85613	0.7101
At Most 5	0.025568	15.21583	29.79707	0.7659
At Most 6	0.010032	5.720122	15.49471	0.7283
At Most 7	0.003661	1.525896	3.841465	0.2167

Note: Trace Statistics indicate there is no co-integrating equation at the 5% significance level.

* Denotes rejection of the null hypothesis at the 5% significance level.

** MccKinnon-Haug-Michelis (1999) P-values.

Table VII Co-integration test maximum eigenvalue statistics.

Hyphotesis	Eigenvalue	Max-Eigen Stat	Critical Value (0.05)	Prob.**
None	0.090195	39.32225	52.36261	0.5375
At Most 1	0.078686	34.09323	46.23142	0.5188
At Most 2	0.066479	28.61750	40.07757	0.5181
At Most 3	0.041483	17.62527	33.87687	0.8955
At Most 4	0.035316	14.95714	27.58434	0.7516
At Most 5	0.025568	9.495711	21.13162	0.7905
At Most 6	0.010032	4.194226	14.26460	0.8383
At Most 7	0.003661	1.525896	3.841465	0.2167

Note: Maximum eigenvalue test indicates there is no co-integrating equation at 5% significance level.

* Denotes rejection of the null hypothesis at the 5% significance level.

** MccKinnon-Haug-Michelis (1999) P-values.

Table 8 in this study shows the integration of the Indonesian stock market (JKSE) with the stock markets of countries with the highest economies. The findings show that the Indonesian stock market does not have integration in the short term with NDX100, SSE, NIKKEI250, GDAXI, FCHI40, and BVSP. However, NIFTY50 shows one-way integration of JKSE. This shows that the Indonesian stock market (JKSE) can provide opportunities for diversification of investor portfolios in these countries except NIFTY50, this is because NIFTY50 has short-term integration with the JKSE, meaning that turmoil in that country can have an impact on the Indonesian stock market (JKSE). However, Indonesian investors have the opportunity to diversify their portfolios in the stock markets of these countries.

The finding that the Indonesian stock market is not integrated with the stock markets of countries with the highest economies has important implications in the context of the portfolio diversification theory proposed by Harry Markowitz. Theory Markowitz, (1952) emphasizes the importance of portfolio diversification to reduce investment risk without reducing the expected rate of return. In other words, by allocating investment funds to various uncorrelated or negatively correlated assets, investors can achieve a lower level of risk for the same or even higher level of return. In the context of the finding that the Indonesian stock market is not integrated with the stock markets of countries with the highest economies, this shows that stock price fluctuations in Indonesia are not strongly related to stock price fluctuations in developed country stock

markets. Therefore, investors who have a well-diversified portfolio can benefit from investing in the Indonesian stock market without being too much affected by share price movements in the stock markets of these countries.

Table VIII Pair-wise Granger causality test

Null Hypothesis	F-statistic	Prob
NDX100 doesn not Granger Cause JKSE	2.32790	0.1278
JKSE does not Granger Cause NDX100	1.17226	0.2796
SSE does not Granger Cause JKSE	0.05428	0.8159
JKSE does not Granger Cause SSE	0.05939	0.8076
NIKKEI250 does not Granger Cause JKSE	1.42732	0.2329
JKSE does not Granger Cause NIKKEI250	0.95249	0.3297
GDAXI does not Granger Cause JKSE	3.37349	0.0670
JKSE does not Granger Cause GDAXI	0.06856	0.7936
NIFTY50 does not Granger Cause JKSE	5.12201	**0.024 1
JKSE does not Granger Cause NIFTY50	3.52772	0.0611
FCHI40 does not Granger Cause JKSE	3.46848	0.0633
JKSE does not Granger Cause FCHI40	0.00640	0.9363
BVSP does not Granger Cause JKSE	0.97062	0.3251
JKSE does not Granger Cause BVSP	0.20834	0.6483

Note: ** Shows significance at 5%.

In the absence of cointegration between the Indonesian stock market and the stock markets of countries with high economies, investors can take advantage of portfolio diversification opportunities by allocating a portion of their investment funds to the Indonesian stock market. Thus, although share prices in developed country stock markets may experience volatility or decline, a well-diversified investment portfolio can help reduce the impact of such fluctuations. Meanwhile, the finding that the Indian stock market is integrated in the short term with the Indonesian stock market provides important understanding for investors in the context of the portfolio diversification theory proposed by Harry Markowitz. Short-term integration between these two stock markets shows that stock price fluctuations in one market can directly affect stock prices in the other market in a short time. In this case, investors should consider the relationship that exists between the two stock markets when planning their investment portfolio.

CONCLUSION

This study aims to analyze the integration between the Indonesian stock market and the stock markets of countries with the highest economies such as the United States, China, Japan, Germany, India, France and Brazil. In analyzing the stock market integration of these countries, this study uses Johansen and Juselius co-integration in analyzing long-term integration, while in analyzing short-term integration it uses pair-wise Granger causality. The findings in this study show that there is no long-term integration between the Indonesian stock market and the stock

markets of countries with the highest economies. However, in the short term, the Indian stock market shows integration with the Indonesian stock market. This means that Indonesian investors and investors from countries with the highest economies can have the opportunity to diversify their portfolio internationally in the stock markets of these countries in the long term. However, if we look at short-term integration. Based on the findings in this study, Indian investors show that there is integration with the Indonesian stock market, so they cannot optimally diversify their portfolios towards the Indonesian stock market. Meanwhile, investors from countries except India have the opportunity to diversify their portfolios in Indonesia.

This study only considers the Indonesian stock market and stock markets from countries with top economies such as the United States, China, Japan, Germany, India, France and Brazil. The study does not consider stock markets from other countries that also have integration, such as the capital market of the country with the largest investment in Indonesia. This study does not consider external factors that may influence stock market integration, such as political events, economic policy changes, or significant global events. Apart from that, this study uses weekly data from the stock market index of the countries analyzed in this study, future study would be better off using more detailed data such as daily data. By considering these limitations, future study could address or improve upon these issues to gain a more comprehensive understanding of cross-country stock.

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