







“Dynamics of Indonesian stock market interconnection: Insights from selected ASEAN countries and global players during and after the COVID-19 pandemic”

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DYNAMICS OF INDONESIAN STOCK MARKET INTERCONNECTION: INSIGHTS FROM SELECTED ASEAN COUNTRIES AND GLOBAL PLAYERS DURING AND AFTER THE COVID-19 PANDEMIC

Abstract

This study investigates the evolving dynamics of the Indonesian stock market in relation to selected ASEAN countries (Malaysia, Singapore, Thailand, and the Philippines) and global economic players (the US, Japan, and China) during and after the COVID-19 pandemic. Utilizing weekly data for the pandemic era (January 2020 – December 2021) and the post-pandemic period (January 2022 – December 2023), the ARDL technique reveals intricate relationships among these capital markets. Long-term analyses indicate that Singapore and the Philippines positively influenced Indonesia's market during the pandemic. At the same time, China had a negative impact, highlighting heightened sensitivity and interconnectedness during crises. Since the pandemic, Malaysia, Singapore, the US, China, and Japan emerged as key positive influencers, with other countries showing insignificance. In the short term, during the pandemic, Malaysia, Thailand, and China had a significant positive impact on Indonesia's capital market. However, only Malaysia continued to exert a significant influence on Indonesia after the pandemic. These findings provide valuable insights into the dynamic interactions shaping Indonesia's stock market performance amidst global economic fluctuations and crises.

Keywords

capital market integration, Indonesia, ASEAN, ARDL, composite stock price index, COVID-19 pandemic

JEL Classification

C01, O19, O53

INTRODUCTION

In the past twenty years, there has been a growing interest among economists and finance professionals in exploring the link between regional and international capital markets. By examining the connection between regional and international capital markets, investors can identify opportunities for cross-border investments and capital flows. As an emerging market, the Indonesian capital market has also received much attention from researchers (Caporale et al., 2021), including how it broadly cointegrates with regional and global capital markets.

This study is focused on the Indonesian capital market for two main reasons. Firstly, Indonesia is Southeast Asia's largest economy and a G20 member. However, compared to other G20 members such as India, China, South Korea, and Australia, which have the top five largest capital markets in the Asia Pacific region, the Indonesian stock exchange market capitalization is still below that of Singapore, which

is the largest in the ASEAN region. Nevertheless, Indonesia has enormous potential for future growth due to the vast opportunities of its economy and its sizable population. These conditions reflect that Indonesia is rising but still has some catching up (Sharma et al., 2019). Secondly, the Indonesian capital market is unique in many ways. These include the growing participation of local and foreign investors in the last ten years and its stable growth despite the economic decline caused by COVID-19.

1. LITERATURE REVIEW

Systematic investigations to understand how capital markets integrate at regional and international levels have attracted the attention of researchers in the last two decades. Regional capital markets integration is believed to be able to create a larger and more liquid market for investors, offering a broader range of investment opportunities. Consequently, investors can diversify their portfolios across different markets, asset classes, and currencies, potentially reducing risk and enhancing returns. ASEAN capital market integration has been a significant area of research interest, with studies focusing on various forms of financial integration within the region (Wolff, 2022). These forms include information sharing, direct borrowing and fundraising, and direct investment in international capital markets. Research has particularly examined the integration of equity markets in the ASEAN-5 countries (Indonesia, Malaysia, Singapore, Thailand, and the Philippines). Findings from these studies suggest the presence of co-integration relationships among ASEAN stock indices, indicating a certain level of market integration. However, there is a consensus that this integration must be further strengthened to realize its full potential, as the benefits of international portfolio diversification remain limited within the region (Le et al., 2022; Robiyanto et al., 2021, 2023).

Additionally, spillover effects from major financial centers like the US, Japan, and the UK have been observed in ASEAN stock markets, especially during financial crises. Efforts to enhance market integration in ASEAN, such as initiatives under the ASEAN Economic Community (AEC), have shown some impact. However, these initiatives have not fully achieved their objectives, highlighting the ongoing challenges in achieving deeper regional capital market integration. Further research and policy measures may be necessary to address these challenges and promote greater financial integration and stability in ASEAN capital markets (Chien et

al., 2015; Click & Plummer, 2005; Do et al., 2016; Lee & Jeong, 2016; Li & Zeng, 2018; Muharam et al., 2020; Nguyen & Elisabeta, 2016; Robiyanto, 2018; Robiyanto et al., 2021).

The purpose of this study is to address two gaps in existing research. Firstly, previous studies have mainly focused on crises like the 1997 monetary crisis and the 2008 global financial crisis (Chien et al., 2015; Click & Plummer, 2005; Do et al., 2016; Lee & Jeong, 2016; Li & Zeng, 2018; Muharam et al., 2020; Nguyen & Elisabeta, 2016; Robiyanto, 2018; Robiyanto et al., 2021), while more recent research has concentrated solely on the impact of the pandemic on the ASEAN capital market (Priscilla et al., 2022; Sadiq et al., 2021; Suriawinata et al., 2023). In contrast, this study aims to compare the dynamics of the interconnection of the Indonesian capital market with regional and international capital markets during two significant periods: the COVID-19 period (2020–2022) and the post-COVID-19 period (2022–2023). By analyzing the co-integration among these markets during these periods, the study offers valuable insights for investors, regulators, and government officials to make informed decisions and develop effective strategies for navigating the complexities of the global financial system.

Second, this study investigates the impact of Chinese, Japanese, and American markets on ASEAN, particularly in Indonesia. Although current literature has focused on China's influence on ASEAN countries (Chien et al., 2015; Lee & Jeong, 2016; Li & Zeng, 2018; Nguyen & Elisabeta, 2016), including Indonesia (Caporale et al., 2021), there needs to be more research on how the US, Japan, and China affect Indonesia, particularly during and after the COVID-19 pandemic. The study examines Indonesia's dependence on the US, Japanese, and Chinese capital markets during and post-COVID-19 periods to bridge this gap. Ultimately, the study intends to enhance understanding of the external factors influencing Indonesia's financial markets, providing valuable insights for investors, policymakers,

and other stakeholders navigating the complex global financial landscape.

In sum, this study provides new insights into the interconnections between the Indonesian capital market and other countries during two observation periods (during and post-COVID-19). The present study covers a gap in this area that previously focused more on the monetary crisis of 1997 and the global financial crisis of 2008 (Click & Plummer, 2005; Do et al., 2016; Muharam et al., 2020; Robiyanto, 2018; Robiyanto et al., 2021). Moreover, this study also adds insights into the dynamics of the influence of the three large international capital markets (US, China, and Japan) on Indonesia, especially during the crisis (Chien et al., 2015; Lee & Jeong, 2016; Li & Zeng, 2018; Nguyen & Elisabeta, 2016). A thorough study of the co-integration between these markets can provide valuable insights for investors, regulators, and government officials at various levels. It can help them make informed decisions and develop effective strategies to navigate the complexities of the global financial system.

2. RESEARCH METHODOLOGY

2.1. Data collection procedures

This study examines the weekly stock market indices of five emerging stock markets in the ASEAN region: Indonesia, Singapore, Malaysia, the Philippines, and Thailand. Additionally, the US, Japan, and China stock markets are included due to their global significance and substantial impact on their respective economies and their strong economic ties with ASEAN countries. The analysis encompasses the weekly composite stock price index from January 2020 to December 2023, divided into two periods: during COVID-19 (January 2020 – December 2021) and after COVID-19 (January 2022 – December 2023). Data were obtained from various sources, including Yahoo Finance and official stock exchange websites.

2.2. Data analysis techniques and procedures

The study investigates the integration of Indonesian stock markets with five ASEAN countries, the US, Japan, and China, utilizing the autoregressive dis-

tributed lag (ARDL) approach. The decision to employ the ARDL technique is based on several considerations. Firstly, ARDL is more effective in handling limited time series data than alternative methods like the Vector Error Correction Model (VECM). This preference stems from ARDL's capability to manage short-period datasets. In contrast, VECM requires a larger dataset for reliable parameter estimation. Secondly, ARDL allows the model to incorporate both stationary and non-stationary variables. In contrast, VECM mandates that all variables in the model be integrated of order 1 (I(1)) or possess the same level of integration (Appiah, 2018; Narayan, 2005; Pesaran et al., 2001; Pesaran & Shin, 1996; Shrestha & Bhatta, 2018).

3. RESULTS

The optimal lag length is initially determined by conducting estimations across multiple regressions. Subsequently, long-run and short-run causality are evaluated to grasp the dynamics between the variables. Pesaran et al. (2001) have defined two sets of asymptotic critical values for assessing the null hypothesis concerning the absence of a cointegration relationship among variables. Ultimately, estimating the long-run coefficient of the equation and the corresponding ARDL error correction models aids in obtaining a more profound comprehension of the relationship between the variables. This methodology empowers researchers to scrutinize a model's long-term dynamics and equilibrium relationships among variables (Banerjee et al., 1998; Kremers et al., 1992; Narayan, 2005; Pesaran et al., 2001).

3.1. Descriptive statistics and correlation

During the COVID-19 pandemic, the US capital market had the highest average value of 9,435. In contrast, Japan had the lowest average value of 4,412. The standard deviation, a measure of market volatility, showed that the US had greater fluctuations, whereas Malaysia had lower levels of volatility. Indonesia had a mean value of 8.680 and a standard deviation of 0.107, indicating good performance and moderate levels of volatility. The strong positive correlation between many coun-

tries, such as Singapore and Malaysia (0.622), suggests that both markets move together. Conversely, the relatively strong negative correlation between the US and Japan (-0.868) indicates that the movements of their markets tend to be in opposite directions. Additionally, there is a high correlation among Southeast Asian countries, including the

Philippines, Thailand, and Malaysia, indicating strong linkages between them (Table 1).

After the pandemic, the mean score of capital markets in different countries was analyzed. The highest average value was observed in Japan, with a value of 10,270, while Singapore had the lowest av-

Table 1. Descriptive and correlation analysis

| Country | Mean | SD | LNINA | LNMAL | LNSING | LNPHI | LNTHA | LNUSA | LNCHN | LNJPN |
|------------------------|--------|-------|----------|----------|----------|----------|----------|----------|----------|-------|
| During COVID-19 | | | | | | | | | | |
| Indonesia | 8.680 | 0.107 | 1 | | | | | | | |
| Malaysia | 7.339 | 0.052 | 0.739 | 1 | | | | | | |
| Singapore | 8.000 | 0.085 | 0.864 | 0.622 | 1 | | | | | |
| Philippines | 8.813 | 0.093 | 0.779 | 0.630 | 0.643 | 1 | | | | |
| Thailand | 7.305 | 0.106 | 0.921 | 0.697 | 0.935 | 0.671 | 1 | | | |
| US | 9.435 | 0.218 | 0.796 | 0.613 | 0.659 | 0.411 | 0.781 | 1 | | |
| China | 8.120 | 0.084 | 0.781 | 0.670 | 0.592 | 0.442 | 0.736 | 0.958 | 1 | |
| Japan | 4.412 | 0.090 | -0.460 | -0.469 | -0.306 | -0.091 | -0.437 | -0.868 | -0.871 | 1 |
| Post COVID-19 | | | | | | | | | | |
| Indonesia | 8.841 | 0.025 | 1 | | | | | | | |
| Malaysia | 7.294 | 0.041 | 0.351 | 1 | | | | | | |
| Singapore | 5.827 | 0.026 | 0.369 | -0.025 | 1 | | | | | |
| Philippines | 8.788 | 0.056 | 0.218 | -0.252 | 0.683 | 1 | | | | |
| Thailand | 7.364 | 0.056 | 0.058 | -0.576 | 0.519 | 0.645 | 1 | | | |
| US | 9.436 | 0.101 | 0.256 | 0.405 | 0.232 | 0.253 | -0.378 | 1 | | |
| China | 8.074 | 0.045 | 0.283 | -0.451 | 0.436 | 0.631 | 0.530 | 0.155 | 1 | |
| Japan | 10.270 | 0.084 | 0.181 | 0.670 | -0.121 | -0.370 | -0.772 | 0.662 | -0.369 | 1 |

Table 2. Augmented Dickey-Fuller and Phillips-Perron root test

| Country | ADF statistics | | PP statistics | |
|------------------------|----------------|-----------------|---------------|-----------------|
| | Level | 1st Difference | Level | 1st Difference |
| During COVID-19 | | | | |
| Indonesia | -1.289 | -8.585^{***} | -1.401 | -8.583^{***} |
| Malaysia | -2.062 | -8.763^{***} | -2.062 | -8.764^{***} |
| Singapore | -1.601 | -8.069^{***} | -1.830 | -8.125^{***} |
| Philippines | -2.455 | -9.003^{***} | -2.627 | -9.010^{***} |
| Thailand | -1.262 | -8.116^{***} | -1.559 | -8.200^{***} |
| US | -1.188 | -8.430^{***} | -1.188 | -8.430^{***} |
| China | -1.383 | -9.857^{***} | -1.300 | -9.910^{***} |
| Japan | -2.252 | -9.863^{***} | -2.252 | -9.860^{***} |
| After COVID-19 | | | | |
| Indonesia | -3.263^{**} | -11.602^{***} | -3.203^{**} | -12.308^{***} |
| Malaysia | -1.870 | -9.662^{***} | -1.911 | -9.676^{***} |
| Singapore | -4.783^{**} | -7.752^{***} | -2.918^{**} | -7.617^{***} |
| Philippines | -1.591 | -10.223^{***} | -1.610 | -10.233^{***} |
| Thailand | -1.884 | -10.279^{***} | -1.812 | -10.362^{***} |
| US | -1.715 | -10.573^{***} | -1.736 | -10.567^{***} |
| China | -1.921 | -10.850^{***} | -1.882 | -10.926^{***} |
| Japan | -1.981 | -10.858^{***} | -1.912 | -11.041^{***} |

Note: *** and ** indicate significance at 1% and 5% confidence levels, respectively.

erage of 5,827. Singapore's low standard deviation of the mean suggests that the market is relatively stable. In contrast, Japan's standard deviation of 0.084 indicates higher volatility. Indonesia's mean was observed to be 8.841, and its standard deviation was 0.025, implying stability and relatively low fluctuation. From the correlation analysis, it can be observed that the correlation between the capital markets of different countries varies. For instance, the correlation between Singapore and Malaysia is 0.369, which suggests a relatively weak positive relationship. In contrast, the correlation between Japan and the US of -0.378 indicates a fairly strong negative relationship, indicating that market movements in both countries tend to be in opposite directions. Positive correlations were also observed between China and several countries, such as the Philippines and the US, indicating a positive relationship between them.

3.2. Unit root test

Before conducting the ARDL analysis, the stationary nature of the variables was evaluated using the Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) root test. This assessment aimed to ascertain whether the variables exhibited characteristics of being $I(0)$ or $I(1)$ and to detect the presence of a unit root in all model variables at a specific time (t). According to the data presented in Table 2, it was observed that during the COVID-19 period, all countries had a stationary first difference, denoted as $I(1)$. However, after COVID-19, Indonesia and Singapore showed an integrated order of zero $I(0)$ at a 5% significance level. These findings indicate that none of the series fall under $I(2)$ or higher orders, which suggests that the ARDL approach is suitable for analyzing this data.

3.3. ARDL bound test

In the initial analysis stage, the optimal lag structure of the regression on first differences was determined using the Akaike Information Criterion (AIC), with a maximum lag length not exceeding 2, as Pesaran et al. (2001) recommended to ensure that the model is simple (overfitting) and achieves the best adjustment. AIC selects the model with the lowest AIC value, indicating the best balance between model complexity

and goodness of fit. Table 4 presents the ARDL bound testing, which compares F-statistics and critical values obtained from Pesaran et al. (2001) to establish cointegration. Table 4 shows the estimated F-statistics for Indonesia as the dependent variable. The results indicate that all F-statistics during COVID-19 and after COVID-19 are 11,623 and 19,478, respectively. It is worth noting that all F-statistics exceeded the upper bound value at the 1% significance level.

During the COVID-19 pandemic, this study revealed the significant effect of the Singapore, Philippines, and China stock exchanges on Indonesia. The findings suggest a positive relationship between the Singapore Stock Exchange and the Indonesian composite stock price index. Specifically, for every 1% increase in the Singapore Stock Exchange, there is a corresponding 0.742% increase in the Indonesian composite stock price index, indicating a strong correlation between the performance of the Singapore Stock Exchange and the Indonesian stock market. Similarly, the study also found that the Philippines and China stock exchanges impact the Indonesian stock exchange. The coefficients of 0.369 for the Philippines and -0.338 for China suggest an increase in the Philippines' stock market performance positively influences the Indonesian stock market. In contrast, an increase in China's stock market performance has a negative impact on the Indonesian stock market.

The results in Table 3 indicate the varying influences of capital market movements in different countries on the Indonesian capital market post-COVID-19. Specifically, the study found that capital market movements in Malaysia (0.466), Singapore (0.251), the United States (0.079), China (0.126), and Japan (0.101) had a positive impact on the Indonesian capital market. In other words, a one-unit change in the capital markets of these countries was associated with a significant increase in the Indonesian capital markets, highlighting the interconnectedness and influence of these markets on each other. Conversely, the study did not find a significant relationship between the movements of the Philippine and Thai capital markets and the Indonesian capital market.

Table 3. ARDL bound testing

| Variable | Coefficient | Std. Error | t-Statistic | Prob. | F-statistic |
|--|-------------|------------|-------------|-------|------------------|
| During COVID-19, ARDL(2, 1, 0, 0, 1, 1, 1, 0) | | | | | 11,632*** |
| Malaysia | -0.389 | 0.388 | -1.002 | 0.317 | |
| Singapore | 0.742 | 0.344 | 2.154 | 0.033 | |
| Philippines | 0.369 | 0.178 | 2.074 | 0.039 | |
| Thailand | 0.370 | 0.308 | 1.203 | 0.230 | |
| US | -0.001 | 0.132 | -0.010 | 0.992 | |
| China | -0.338 | 0.171 | -1.974 | 0.050 | |
| Japan | -0.166 | 0.202 | -0.820 | 0.413 | |
| C | 3.062 | 2.195 | 1.395 | 0.165 | |
| Post COVID-19 ARDL(2, 1, 0, 0, 1, 1, 1, 0) | | | | | 32.138*** |
| Malaysia | 0.466 | 0.120 | 3.896 | 0.000 | |
| Singapore | 0.251 | 0.085 | 2.967 | 0.003 | |
| Philippines | 0.007 | 0.046 | 0.160 | 0.873 | |
| Thailand | 0.108 | 0.070 | 1.539 | 0.125 | |
| US | 0.079 | 0.038 | 2.078 | 0.039 | |
| China | 0.126 | 0.059 | 2.118 | 0.036 | |
| Japan | 0.101 | 0.033 | 3.012 | 0.003 | |
| C | 0.001 | 0.001 | 0.690 | 0.491 | |

Note: ***, **, and * indicate significance at 1%, 5%, and 10% confidence levels, respectively.

3.4. Short-run relationship and causality tests

Once cointegration has been established, the next step involves retaining the lagged levels of variables. A causality test is then conducted using the lagged error correction term (ECT) to assess the significance of independent variables. In this study, the ECT signifies the adjustment rate towards long-run equilibrium following any shock from the previous week. For short-term assessment, the ECT is expected to demonstrate a negative sign and be statistically significant. During the COVID-19 pandemic, the ECT analysis indicated that the movements in the capital markets of Malaysia, Thailand, and China had a signifi-

cant short-term impact on the Indonesian capital market. Specifically, the positive coefficient associated with changes in the Malaysian capital market (0.379) suggests that an increase in the Malaysian capital market in the preceding period positively influenced the Indonesian capital market. Similarly, the noteworthy positive coefficients for changes in the capital markets of Thailand (0.288) and China (0.108) indicate that upticks in these countries' capital markets also positively affected changes in the Indonesian capital markets. However, after the COVID-19 pandemic, the analysis revealed that only the movements in the Malaysian capital market had a significant short-term impact on the Indonesian capital market, as illustrated in Table 4.

Table 4. Short-run estimation under error correction (Indonesia as a dependent variable)

| During COVID-19 | | Post-COVID-19 | |
|-----------------------------|-----------|---------------|-----------|
| Variable | b | Variable | b |
| LNINA(-1) | -0.123** | LNINA(-1), 2 | 0.061* |
| LNMAL | 0.379*** | LNMAL, 2 | 0.324*** |
| LNTHA | 0.288*** | LNSING, 2 | 0.007 |
| LNUSA | -0.088 | LNJPN, 2 | 0.004 |
| LNCHN | 0.108** | CointEq(-1)* | -0.745*** |
| CointEq(-1)* | -0.634*** | | |
| R-squared | 0.321 | | 0.726 |
| Adjusted R-squared | 0.304 | | 0.721 |
| Durbin-Watson stat | 2.088 | | 1.967 |
| Serial Correlation LM Test: | 0.321 | | 0.435 |
| Heteroskedasticity Test | 0.451 | | 0.128 |

Note: *** and ** indicate significance at 1% and 5% confidence levels, respectively.

During the COVID-19 pandemic, a negative ECT coefficient of -0.634 suggests that the Indonesian capital market was adjusting toward long-term equilibrium at a speed of 63.4% after experiencing a shock or deviation caused by the pandemic and related market movements. Similarly, after the COVID-19 pandemic, a negative ECT coefficient of -0.745 signifies that the Indonesian capital market continued to adjust towards long-term equilibrium at a speed of 74.5% following the pandemic period and subsequent market changes. The ECT coefficient of -0.634 (during COVID-19) and -0.745 (after COVID-19) shows a moderate convergence towards the long-run equilibrium of the ASEAN and international markets with the Indonesian capital market for both periods. In the context of the Indonesian capital market and its relationship with the capital markets of various countries during and after the COVID-19 pandemic, the ECT coefficients of -0.634 (during COVID-19) and -0.745 (after COVID-19) hold significance in understanding the dynamics of market interactions. A negative ECT coefficient of -0.634 during the COVID-19 pandemic suggests that the Indonesian capital market was adjusting toward long-term equilibrium at a speed of 63.4% after experiencing a shock or deviation caused by the pandemic and related market movements. Similarly, a negative ECT coefficient of -0.745 after the COVID-19 pandemic signifies that the Indonesian capital market continued to adjust towards long-term equilibrium at a speed of 74.5% following the pandemic period and subsequent market changes.

The adjusted R^2 values were 0.304 (during the pandemic) and 0.721 (post-pandemic), respectively, indicating that the independent variables explained

30% and 72% of the variations in the dependent variable. An adjusted R-squared value of .304 during the pandemic period suggests that the independent variables in the regression model explained approximately 30.4% of the variance in the dependent variable during this time. Meanwhile, after the pandemic, around 72.1% of the fluctuations or changes in the Indonesian capital market could be attributed to the factors included as independent variables in the model, such as capital market movements in other countries.

The Durbin-Watson statistical values of 2.088 and 1.967 for the two data sets suggest no correlation between the variables in both groups. A value close to 2 indicates that the residuals are not correlated, which supports the independence of observations in the regression models during and after COVID-19. Furthermore, the LM Test results support no serial correlation for both models (p -value > 0.05), which further confirms the absence of serial correlation in the residuals of the regression models. In addition, the models were also tested for heteroscedasticity issues, and the results showed no evidence of heteroscedasticity (p -value > 0.05). A p -value greater than 0.05 indicates that the variance of the errors is constant across different levels of the independent variables, ensuring the reliability of the regression models.

3.5. Residual diagnostic and stability test

The study tested serial correlation and homoscedasticity to ensure the model's reliability. The F-statistic p -value from the Breusch-Godfrey

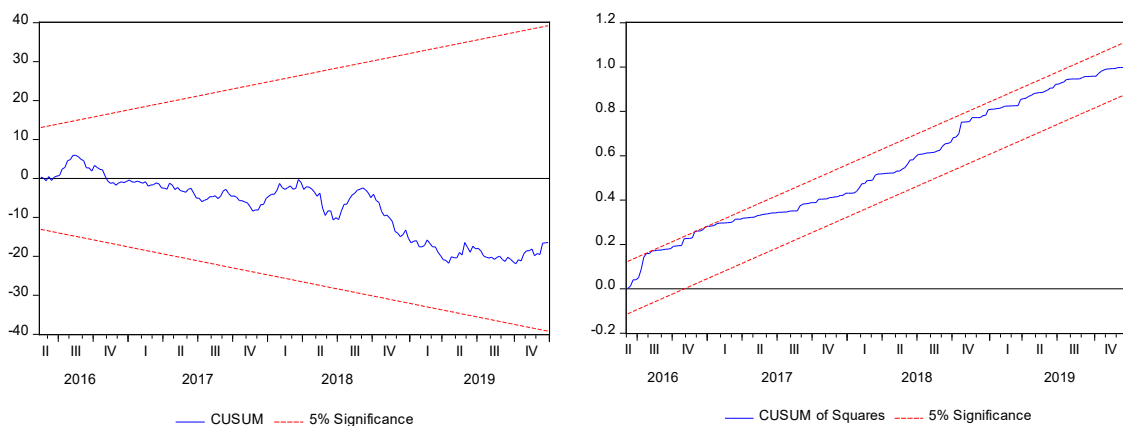


Figure 1. Plot of CUSUM model during COVID-19

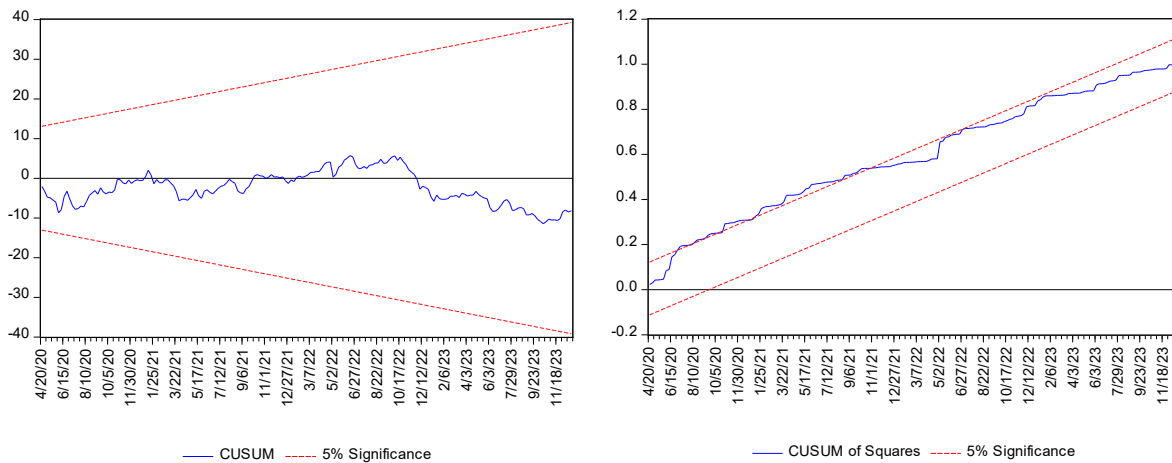


Figure 2. Plot of CUSUM and CUSUMSQR after COVID-19

Serial Correlation LM Test indicated the absence of serial correlation issues (F-statistic p-value > 0.05). Similarly, the Breusch-Pagan-Godfrey test for homoscedasticity revealed that all models were free from heteroscedasticity problems (F-statistic p-value > 0.05). To assess the stability of both long-term parameters and short-term movements, cumulative sum (CUSUM) and cumulative sum squares (CUSUMSQR) tests were utilized. Figures 1 and 2, applied to the ECM residuals, confirmed the coefficients' stability and long-term relationships among financial variables. The CUSUM plot remained within the critical 5% bound for all equations, and the CUSUMSQR statistics did not surpass the critical boundaries, indicating the consistency of the model's parameters and relationships over time.

4. DISCUSSION

This study aims to compare the dynamics of the interconnection of the Indonesian capital market with regional and international capital markets during two periods: the COVID-19 period (2020–2022) and the post-COVID-19 period (2022–2023). During the pandemic, the capital market movements in Singapore and the Philippines impacted Indonesia positively, offering benefits during the crisis period. However, in the post-pandemic period, Malaysia and Singapore were recognized as maintaining a substantial and lasting influence on the Indonesian capital market. These results highlight the interconnectedness and interdependence of capital markets within ASEAN countries, where the dynamics of one market can have ripple effects on others, shap-

ing investment trends and market performance across the region. The present study supports the idea that ASEAN capital market integration is still limited and sensitive to global financial conditions (Boubakri & Guillaumin, 2015; Click & Plummer, 2005; Muharam et al., 2020; Puspitasari et al., 2018; Robiyanto, 2018; Robiyanto et al., 2021).

The recent study has highlighted the close relationship between the Indonesian capital market and those of Singapore and Malaysia, especially in the post-COVID-19 period. This phenomenon can be attributed to two main reasons. Firstly, Malaysia and Singapore are Indonesia's major trading partners. Among the ASEAN countries, Malaysia is Indonesia's primary trading partner. In 2020, 2021, and 2022, Indonesia exported commodities worth USD 8.10 billion, USD 12.00 billion, and USD 15.43 billion to Malaysia, respectively. During the same period, Indonesia imported goods worth USD 6.93 billion, USD 9.45 billion, and USD 12.48 billion from Malaysia. Indonesia and Malaysia share similarities in their plantation export commodities like rubber and palm oil and mining activities like tin, which facilitate an integrated market, strengthening the relationship between the two countries. On the other hand, Singapore dominates foreign direct investment or foreign investment (PMA) in Indonesia. Singapore has been the largest investor in Indonesia for the past five years. In 2019, their investment amounted to USD 6.5 billion, increasing to USD 9.8 billion in 2020, USD 9.4 billion in 2021, USD 13.3 billion in 2022, and USD 15.4 billion in 2023. Therefore, it is natural that the two countries' capital markets have a relatively close relationship with each other.

The present study also highlights the role of international stock markets, particularly those of the US, Japan, and China, in shaping the Indonesian market before and after the COVID-19 crisis. The results show that the United States, Japanese, and Chinese stock markets significantly impacted the Indonesian markets in the long run, especially in the post-COVID-19 period. However, during the COVID-19 crisis, only China significantly influenced the Indonesian capital market. The findings suggest that after the COVID-19 crisis, the US, Japanese, and Chinese stock markets had a long-term effect on the Indonesian market, whereas, during the crisis, only China significantly affected the Indonesian capital market. These differences in the impact of international stock markets on the Indonesian markets before and after the COVID-19 crisis demonstrate the changing dynamics and interconnectedness of global financial markets in times of crisis. The results of this study support differences in the dynamics of the Indonesian capital market when a crisis occurs (Boubakri & Guillaumin, 2015; Click & Plummer, 2005; Muharam et al., 2020; Puspitasari et al., 2018; Robiyanto, 2018; Robiyanto et al., 2021).

Particularly noteworthy is the change in the Chinese capital market's effect on Indonesia, transitioning from negative to positive in the post-COVID period, signifying a significant shift in the relationship between these two markets. These changes demonstrate the complex dynamics between international and Indonesian capital markets during and after the COVID-19 crisis. A negative impact during COVID-19 may reflect the uncertainty and volatility markets faced during the crisis. At the same time, a positive turn after COVID-19 may indicate market recovery and stability after a period of intense crisis. Furthermore, the study highlights that China has emerged as the predominant influencer in the Indonesian capital market during and after the COVID-19 pandemic. In contrast, the impact of the United States and Japan has been more short-lived and noticeable only after the pandemic. This result indicates China's consistent and significant influence on the Indonesian capital market over the entire study period, while the effects of the United States and Japan have been more apparent in the aftermath of the pandemic and for a limited duration. The results of this study present compelling evidence that China's capital market is exerting a growing influence on regional markets, most notably Indonesian.

This assertion is substantiated by a plethora of research studies, including those conducted by Chen and Wang (2021), Chien et al. (2015), Glick and Hutchison (2013), Kang et al. (2019), Shu et al. (2018), Yousaf et al. (2023), and Caporale et al. (2021).

This study has significant policy implications. First, the finding that the capital market movements of Singapore and the Philippines significantly positively impacted Indonesia during the pandemic shows the importance of regional cooperation and linkages between capital markets in Southeast Asia. In addition, the sensitivity of the Indonesian capital market to changes in the Chinese capital market underscores the importance of monitoring and understanding the economic and financial conditions of neighboring countries. These results show that Indonesia is vulnerable to economic fluctuations in its surroundings and needs to take appropriate steps to manage the related risks. Additionally, shifts in the influence of certain countries following the pandemic highlight the importance of adapting and responding quickly to changing global market conditions. Indonesia needs to pay attention to the role of various countries in shaping the performance of its capital markets and take strategic steps to exploit opportunities and overcome challenges that arise from changing market dynamics.

Second, the findings show the positive impact of Singapore and the Philippines' capital markets on Indonesia during the pandemic, highlighting the potential for cross-border collaboration and investment in Southeast Asia. Moreover, investors must be aware of the Indonesian capital market's sensitivity to changes in the Chinese capital market to mitigate the risks associated with economic fluctuations in neighboring countries. After the pandemic subsides, investors should continue to monitor changes in the influence of specific countries on the Indonesian capital market and adjust their investment strategies, such as modifying foreign asset allocation, selecting appropriate investment instruments, and implementing risk management plans that align with changing market conditions. In summary, investors must remain vigilant about the relationship between the Indonesian capital market and other countries' markets, identify opportunities and risks arising from global market dynamics, and take necessary steps to optimize their investment portfolios in fluctuating market conditions.

CONCLUSION

This study examines the interconnection of the Indonesian stock market with selected ASEAN countries (Malaysia, Singapore, Thailand, and the Philippines) and the US, Japan, and China. The data is divided into two periods: during COVID-19 (January 2020 – December 2021) and post-COVID-19 (January 2022 – December 2023). This study highlights the changing dynamics of ASEAN and international capital markets and their impact on Indonesia, with different countries playing varying roles in shaping Indonesia's market performance during and after the COVID-19 pandemic. These dynamics illustrate the complexity of the relationship between these countries' capital markets and Indonesia's capital market, as well as changes in their relative influence during and after the COVID-19 crisis. First, in the long term, Singapore and the Philippines positively influenced Indonesia's market during the pandemic. At the same time, China had a negative effect, showing heightened sensitivity and interconnectivity during crises. After the pandemic, Malaysia, Singapore, the US, China, and Japan were identified as positively impacting Indonesia's market, with other countries' insignificance. Second, in the short term, during the pandemic, the capital market movements in Malaysia, Thailand, and China positively and significantly impacted the Indonesian capital market. After the pandemic, the results revealed that only the capital market movements in Malaysia significantly impacted the Indonesian capital market. In sum, the findings of this study provide valuable insights for investors and policymakers to make informed decisions and implement appropriate strategies in the face of market fluctuations and uncertainty.

The study's limitations and suggestions for future research are twofold. First, the study solely examines the Indonesian capital market as the dependent variable, excluding other ASEAN member states from the cointegration analysis. This results in a one-way relationship analysis between ASEAN and Indonesia and the US, Japan, and China with Indonesia. Future studies should include all ASEAN member states in the cointegration analysis, incorporating data on exports and imports among these countries. Additionally, exploring the cointegration of all ASEAN member states as dependents, along with illustrating manufacturing-industry performance linked to comprehensive economic macro indicators, is recommended. Second, the study's use of the Autoregressive Distributed Lag (ARDL) model primarily emphasizes short-term relationships between variables. Future research could benefit from employing other techniques like the Vector Error Correction Model (VECM), specifically designed to address long-term equilibrium relationships between variables. VECM can offer insights into long-term equilibrium shifts and data length, providing a more comprehensive understanding of variable dynamics over extended periods.

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REFERENCES

1. Appiah, M. O. (2018). Investigating the multivariate Granger causality between energy consumption, economic growth and CO 2 emissions in Ghana. *Energy Policy*, 112, 198-208. <https://doi.org/10.1016/j.enpol.2017.10.017>
2. Banerjee, A., Dolado, J., & Mestre, R. (1998). Error-correction Mechanism Tests for Cointegration in a Single-equation Framework. *Journal of Time Series Analysis*, 19(3), 267-283. <https://doi.org/10.1111/1467-9892.00091>
3. Boubakri, S., & Guillaumin, C. (2015). Regional integration of the East Asian stock markets: An empirical assessment. *Journal of International Money and Finance*, 57, 136-160. <https://doi.org/10.1016/j.jimonfin.2015.07.011>
4. Caporale, G. M., Gil-Alana, L. A., & You, K. (2021). Stock Market Linkages between the Asean Countries, China and the US: A Fractional Integration/cointegration Approach. *Emerging Markets Finance and Trade*, 58(5), 502-1514. <https://doi.org/10.1080/1540496X.2021.1898366>
5. Chien, M.-S., Lee, C.-C., Hu, T.-C., & Hu, H.-T. (2015). Dynamic Asian stock market convergence: Evidence from dynamic cointegration analysis among China and ASEAN-5. *Economic Modelling*, 51, 84-98. <https://doi.org/10.1016/j.econmod.2015.06.024>
6. Click, R. W., & Plummer, M. G. (2005). Stock market integration in ASEAN after the Asian financial crisis. *Journal of Asian Economics*, 16(1), 5-28. <https://doi.org/10.1016/j.asieco.2004.11.018>
7. Kremers, J. J. M., Ericsson, N. R., & Dolado, J. J. (1992). The Power Of Cointegration Tests. *Oxford Bulletin of Economics and Statistics*, 54(3), 325-348. <https://doi.org/10.1111/j.1468-0084.1992.tb00005.x>
8. Le, T.-H., Vo, L. H., & Taghizadeh-Hesary, F. (2022). A study on the nonlinear dynamics of ASEAN financial integration. *Journal of Asian Business and Economic Studies*. <https://doi.org/10.1108/JABES-03-2022-0040>
9. Lee, G., & Jeong, J. (2016). An Investigation of Global and Regional Integration of ASEAN Economic Community Stock Market: Dynamic Risk Decomposition Approach. *Emerging Markets Finance and Trade*, 52(9), 2069-2086. <https://doi.org/10.1080/1540496X.2016.1156528>
10. Li, B., & Zeng, Z. (2018). Time-varying dependence structures of equity markets of China, ASEAN and the USA. *Applied Economics Letters*, 25(2), 87-91. <https://doi.org/10.1080/13504851.2017.1296545>
11. Muharam, H., Robiyanto, R., Pangestuti, I., & Mawardi, W. (2020). Measuring Asian Stock Market Integration by Using Orthogonal Generalized Autoregressive Conditional Heteroscedasticity. *Montenegrin Journal of Economics*, 16(1), 121-137. <https://doi.org/10.14254/1800-5845/2020.16-1.8>
12. Narayan, P. K. (2005). The saving and investment nexus for China: evidence from cointegration tests. *Applied Economics*, 37(17), 1979-1990. <https://doi.org/10.1080/00036840500278103>
13. Nguyen, T. D., & Elisabeta, P. (2016). Financial integration and diversification benefits: China and ASEAN4 countries. *Managerial Finance*, 42(5), 496-514. <https://doi.org/10.1108/MF-12-2014-0300>
14. Pesaran, M. H., & Shin, Y. (1996). Cointegration and speed of convergence to equilibrium. *Journal of Econometrics*, 71(1-2), 117-143. [https://doi.org/10.1016/0304-4076\(94\)01697-6](https://doi.org/10.1016/0304-4076(94)01697-6)
15. Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289-326. <https://doi.org/10.1002/jae.616>
16. Priscilla, S., Hatane, S. E., & Tarigan, J. (2022). COVID-19 catastrophes and stock market liquidity: evidence from technology industry of four biggest ASEAN capital market. *Asia-Pacific Journal of Business Administration*. <https://doi.org/10.1108/APJBA-10-2021-0504>
17. Puspitasari, A., Siregar, H., & Andati, T. (2018). Analisis Integrasi Bursa Saham Asean 5 [Asean Stock Exchange Integration Analysis 5]. *Jurnal Ekonomi Dan Kebijakan Pembangunan*, 4(2), 187-206. (In Indonesian). <https://doi.org/10.29244/jekp.4.2.2015.187-206>
18. Robiyanto, R. (2018). Capital Market Integration In Some Asean Countries Revisited. *Jurnal Manajemen*, 22(2), 205. <https://doi.org/10.24912/jm.v22i2.359>
19. Robiyanto, R., Frensidy, B., Setyanawan, I. R., & Huruta, A. D. (2021). A Different View on ASEAN Capital Market Integration. *Economies*, 9(4), 141. <https://doi.org/10.3390/economies9040141>
20. Robiyanto, R., Nugroho, B. A., Handriani, E., & Frensidy, B. (2023). Measuring the effectiveness of ASEAN-5 initiatives from emerging market portfolio's perspective. *Cogent Business & Management*, 10(1). <https://doi.org/10.1080/23311975.2023.2167292>
21. Sadiq, M., Hsu, C.-C., Zhang, Y., & Chien, F. (2021). COVID-19 fear and volatility index movements: empirical insights from ASEAN stock markets. *Environmental Science and Pollution Research*, 28(47), 67167-67184. <https://doi.org/10.1007/s11356-021-15064-1>
22. Sharma, S. S., Narayan, P. K., Thuraishamy, K., & Laila, N. (2019). Is Indonesia's stock market different when it comes to predictability? *Emerging Markets Review*, 40, 100623. <https://doi.org/10.1016/j.ememar.2019.100623>
23. Shrestha, M. B., & Bhatta, G. R. (2018). Selecting appropriate methodological framework for time series data analysis. *The Journal of Finance and Data Science*, 4(2), 71-89. <https://doi.org/10.1016/j.jfds.2017.11.001>
24. Suriawinata, I. S., Setianingrum, P. H., Prastuti, D., Rusli, D., & Pranitasari, D. (2023). Covid-19, structural breaks, and capital market integration: Indonesian evidence. *Jurnal STEI Ekonomi*, 32(1), 1-15. Retrieved from <https://journals.indexpopernicus.com/search/article?articleId=3855851>
25. Wolff, P. (2022). The 2030 Agenda and Capital Market Integration in ASEAN. In *Sustainable Development Goals and Pandemic Planning* (pp. 543-565). Springer Nature Singapore. https://doi.org/10.1007/978-981-16-6734-3_13