Analysis of LQ45 and ESG Stock Return Volatility on the Indonesia Stock Exchange

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ABSTRACT

The Covid-19 pandemic created significant turmoil in global financial markets, including the Indonesia Stock Exchange, where liquidity and stability were severely disrupted by widespread panic and economic uncertainty. Investors faced heightened risks as stock prices fluctuated sharply in response to rapidly changing market conditions. This study examines the impact of the Covid-19 pandemic on stock volatility and performance by comparing conventional liquid stocks from the LQ45 index with sustainable stocks from the ESG (Environmental, Social, and Governance) indices. Using daily closing prices from January 1, 2016, to December 31, 2023, the analysis employs the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model to capture volatility patterns. The findings reveal that LQ45 stocks consistently exhibit higher volatility than ESG stocks, yet deliver superior returns across all periods. Conversely, ESG stocks show greater resilience during the pandemic, maintaining relatively stable performance despite lower returns compared to LQ45. These results underscore the value of incorporating sustainable investment strategies, particularly when combined with liquidity considerations, as a means to balance risk and return while enhancing portfolio stability during periods of market uncertainty.

Keywords: *Covid-19 Pandemic, ESG, GARCH, Indonesia Stock Exchange, LQ45, Stock Return, Volatility Modelling, Sustainable Finance.*

ABSTRAK

Pandemi Covid-19 menciptakan gejolak signifikan di pasar keuangan global, termasuk Bursa Efek Indonesia, di mana likuiditas dan stabilitas sangat terganggu oleh kepanikan dan ketidakpastian ekonomi yang meluas. Investor menghadapi risiko yang meningkat karena harga saham berfluktuasi tajam sebagai respons terhadap kondisi pasar yang berubah dengan cepat. Studi ini menganalisis dampak pandemi Covid-19 terhadap volatilitas dan kinerja saham di Bursa Efek Indonesia, membandingkan saham dari indeks LQ45 dan saham indeks ESG (Environmental, Social, Governance) berkelanjutan. Data yang digunakan meliputi harga penutupan harian saham LQ45 dan ESG untuk periode 1 Januari 2016 hingga 31 Desember 2023. Metode yang digunakan untuk menganalisis volatilitas pengembalian saham adalah model Generalized Autoregressive Conditional Heteroskedasticity (GARCH). Hasil penelitian menunjukkan bahwa saham LQ45 memiliki volatilitas yang lebih tinggi dibandingkan dengan saham ESG namun memberikan pengembalian yang lebih tinggi di semua periode. Saham ESG menunjukkan ketahanan yang lebih baik selama pandemi, meskipun dengan pengembalian yang lebih rendah dibandingkan dengan LQ45. Studi ini memberikan wawasan tentang kinerja saham dan dinamika volatilitas selama

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pandemi dan menyoroti pentingnya memilih saham berkelanjutan yang selaras dengan saham likuid untuk mengurangi risiko.

***Kata kunci**: Pandemi Covid-19, ESG, GARCH, Bursa Efek Indonesia, LQ45, Pengembalian Saham, Pemodelan Volatilitas, Keuangan Berkelanjutan.*

INTRODUCTION

The COVID-19 pandemic disrupted global markets as restrictions and fear of losses triggered panic selling, price crashes, and bankruptcies, driving volatility far above normal levels (Baker et al., 2020; He et al., 2020; Chaudhary et al., 2020; Jebabli et al., 2022). Stock returns fluctuated sharply across industries, with some sectors gaining while others declined (Dharani et al., 2023). Liquidity and stability also weakened, affecting both large and small firms, as profitability and financial performance came under pressure (Baig et al., 2020; Alaoui et al., 2021; Marlina & Anggraini, 2022). ESG investments helped cushion these shocks, with high-ESG firms showing stronger resilience through higher returns, lower volatility, and faster recovery (Broadstock et al., 2021; Kanamura, 2021; Chen et al., 2022; Zhou & Zhou, 2022; Beloskar & Rao, 2023; Savio et al., 2023). In Indonesia, studies found lower IHSG predictability after the stock exchange merger and showed ESG stocks (Tanjung et al., 2014).

A deeper understanding of the differences between the risk and return dynamics of sustainable indexes (ESG) and traditional indexes (LQ45) is needed. Therefore, this study aims to analyze stock returns, stock return fluctuations, and stock performance on the Indonesia Stock Exchange during the period before Covid-19, during Covid-19, after Covid-19, and the period from before to after Covid-19, focusing on LQ45 stocks and ESG stocks. The method used to analyze stock return fluctuations is Generalized Autoregressive Conditional Heteroskedasticity (GARCH).

The COVID-19 pandemic had a major impact on global capital markets. Studies in Indonesia and Hungary found significant negative effects on abnormal returns and volatility compared to pre-pandemic periods (Setiawan et al., 2021). Stock price volatility reflects market reactions, which investors may exploit, though in efficient markets, prices should reflect all available information (Fama, 1970). Returns declined alongside rising cases, with sectoral differences in impact, while markets also showed time-lagged responses through lower returns, higher volatility, and reduced trading volumes (Harjoto et al., 2020; Mazur et al., 2021). Both large- and small-cap stocks suffered losses (Alshaikhmubarek et al., 2024), as lockdowns, rising cases, and global financial interconnectedness intensified economic shocks (Khatatbeh et al., 2020). Panic among investors amplified the downturn more severely than in past pandemics (Baker et al., 2020), with reactions differing across regions and influenced strongly by investor fear (Al-Qudah & Houcine, 2022).

There is growing recognition of sustainable finance, which integrates financial performance with non-financial dimensions through the Environmental, Social, and Governance (ESG) framework. Strong ESG performance positively influences stock prices, mitigates price volatility, protects against price declines, and enhances firm value and returns (Broadstock et al., 2021; Kanamura, 2021; D. Zhou & Zhou, 2022; Zhou et al., 2022; Beloskar & Rao, 2023; Savio et al., 2023)

Firms with higher ESG scores tend to recover faster from market shocks, making ESG a defensive tool during crises like Covid-19. Stock return volatility differs across markets and reacts differently to crises (Awalludin et al., 2018; Muguto & Muzindutsi, 2022). During the pandemic, ESG investments supported stock stability and reduced volatility without harming performance (Ferriani & Natoli, 2021; Beloskar & Rao, 2023), as high-ESG firms-maintained investor confidence and rebounded more quickly (Yoo et al., 2021; Zhou & Zhou, 2022; Sharma et al., 2024). Still, ESG is not always a guarantee of better outcomes, as shown by Abedifar et al. (2023), who showed mixed results, while Folger-Laronde et al. (2022) found that sustainable ETFs did not fully shield investors from

losses. Liquidity, often measured by trading volume, also shapes stock performance, with higher volume signaling greater liquidity (Budhathoki et al., 2020). While studies disagree on whether liquidity boosts returns, illiquid assets generally face higher costs and risks (Datar et al., 1998; Shrestha, 2018). Notably, ESG performance can enhance stock liquidity (Chen et al., 2023).

While many global studies have explored COVID-19's impact on market volatility and the defensive role of ESG, most focus on developed economies, leaving limited evidence from emerging markets like Indonesia. Previous Indonesian research also rarely compares ESG and LQ45 indices across different phases of the pandemic or examines how return, volatility, and liquidity interact. This study aims to analyze the volatility and performance of ESG and LQ45 stocks on the Indonesia Stock Exchange before, during, and after COVID-19, highlighting differences in risk and return dynamics between the two.

LITERATURE REVIEW

Stock volatility is a central concept in finance that describes the extent to which stock prices change over time. This level of volatility reflects market dynamics and plays a crucial role in risk management, portfolio allocation planning, and estimating expected investment returns (Bali & Hovakimian 2007). Therefore, understanding volatility cannot be separated from making wise financial decisions. In practice, stock volatility can be classified into several main types. First, there is realized volatility, calculated based on historical price movements, and implied volatility, derived from option prices and reflects market expectations of future price fluctuations. Interestingly, the difference between these two types of volatility can often be used to predict stock returns. In general, there is a negative relationship between expected returns and the difference between implied and realized volatility (Bollerslev & Zhao 2018). Conversely, the difference between call and put option volatility shows a positive relationship, reflecting market expectations of the risk of price spikes.

French et al. (1987) and Bu et al. (2019) volatility can also be distinguished into good and bad volatility, which refers to positive and negative price changes. Research shows that portfolios constructed based on the difference between good and bad volatility show significant variations in future returns, even after considering other risk factors. Another type that is gaining increasing attention is the Volatility of Volatility (VOV), which is the sensitivity of a stock to changes in the level of volatility itself. Stocks more responsive to changes in VOV, especially as measured by an index such as the VIX, tend to generate higher returns in the short term. The relationship between volatility and stock returns is complex. Theoretically, expected returns are positively related to predictable volatility, as investors demand higher compensation for taking on greater risk. However, when volatility increases unexpectedly, its effect on returns tends to be negative. Interestingly, these dynamics differ depending on the context.

Roh (2006) found that the relationship between volatility and returns is positive at the firm level, especially for small or low-leverage firms. However, at the aggregate market level, the opposite relationship is genuine. In addition, market reactions to changes in volatility are also asymmetric. Increases in volatility tend to have a greater impact than decreases, and not all changes in volatility are rooted in major economic news. This suggests that markets react to non-fundamental factors like sentiment and trading dynamics. Researchers and practitioners have developed various approaches to address the challenges of volatility forecasting. Hybrid models combining neural networks with time series analysis techniques have been shown to improve prediction accuracy. This approach is practical in risk management and supporting portfolio strategies that are more adaptive to market dynamics (Quaye & Tunaru 2021).

On the other hand, structural aspects of the market also play an important role. For example, the opening procedure at the New York Stock Exchange (NYSE) triggers high volatility, mainly due to private information and market participant behaviour, rather than solely due to public news. This suggests that market design itself can be a source of volatility. Stock volatility is also inseparable from macroeconomic influences. Economic

indicators such as GDP, inflation, and exchange rates influence the implied volatility of stock indices and future dividends. This information can be used in developing volatility-based trading strategies, allowing investors to take advantage of changes in market expectations about economic conditions more strategically.

In the analysis, the data is classified into four periods, namely: pre-covid 19 period (2016-2019), during COVID-19 (2020-2021), post-COVID-19 (2022-2023), and the entire period (2016-2023), which is modeled using the GARCH approach. The research framework is presented in Figure 1:

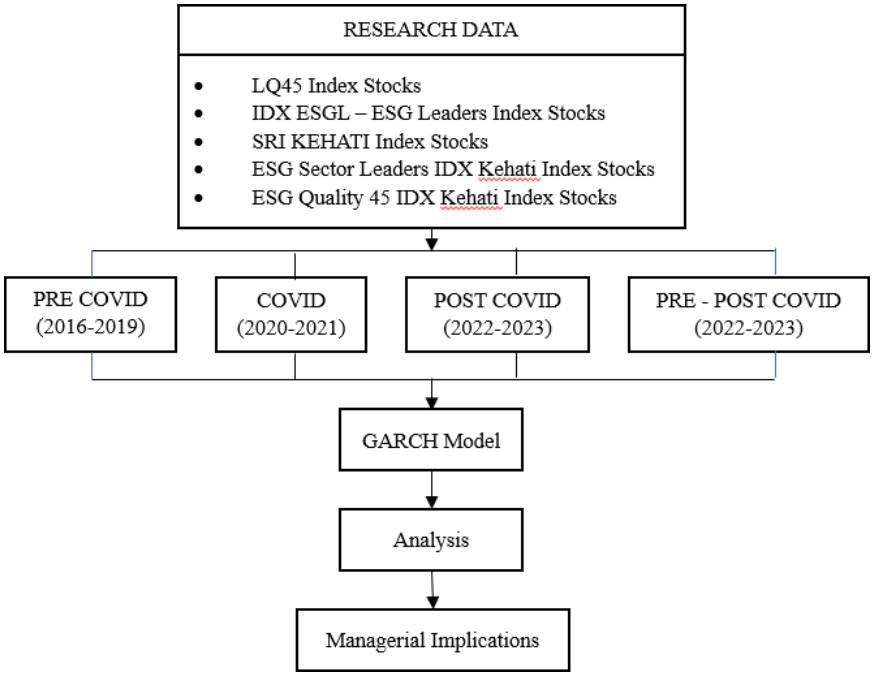

Figure 1. Research Framework

The collected data is then processed and analyzed with the Autoregressive Conditional Heteroscedastic (ARCH) Model to model volatility by characterizing several possible conditional variances of the error predictions (Engle, 1982). Bollerslev (1986) was developing it with the Generalized Autoregressive Conditional Heteroskedastic (GARCH) Model.

RESEARCH METHODS

This study uses time series data of daily closing prices of LQ45 stocks and ESG stocks, consisting of ESG Leaders Index stocks, SRI KEHATI Index, ESG Sector Leaders Index IDX Kehati, and ESG Quality 45 Index IDX Kehati that have existed since January 1, 2016, to December 31, 2023. The combination of LQ45 stocks and ESG stocks is 72 stocks, processed with Python. Stocks originating from the LQ45 Index and ESG Index are classified into three groups, namely LQ45 group stocks (LQ45 stocks), ESG group stocks (ESG stocks), and LQ45 group stocks that are also members of the ESG group (ESGLQ45 Stocks). Volatility is defined as the variance of stock returns, so the data is transformed into daily stock returns using:

$$r_t = \log\left(\frac{P_t}{P_{t-1}}\right)$$

Where r t is the stock return at time t, P t and P t-1 are the daily closing stock prices of today and the previous day. This is the GARCH Model:

$$h_t = a_0 + \sum_{i=1}^{q} a_i \varepsilon_{t-1}^2 + \sum_{i=1}^{p} \beta_i h_{t-1}$$

Which $p \geq 0$; $q > 0$; $\alpha_0 > 0$; $\alpha_i \geq 0$, $= 1, \ldots\ldots q$; and $\beta i \geq 0$, $i = 1, \ldots\ldots, p$

In this study, the models formed include the pre-COVID-19 model, during COVID-19 model, post-COVID-19 model, and post-COVID-19 model.

$$Sharpe\ Ratio\ p = \frac{R_P - R_f}{\delta_p}$$

Where R_p is the return, R_f is the risk-free rate of return, and σ_p is the standard deviation.

RESULTS

Basically, to find out the volatility and performance of stocks, it must be managed gradually to get a complete and coherent description. Stock returns are one of the indicators in assessing investment performance in the capital market. A positive return reflects an increase in investment value, while a negative return indicates a potential loss.

Table 1. Statistical Difference Test of Stock Returns

Time	Test	ESG	ESG LQ45	LQ45
Pre-Covid 19	Mean	-0.00013	0.00036	0.00308
	p-value		0.467	
During Covid 19	Mean	-0.00010	-0.00054	0.00069
	p-value		0.025*	
Post Covid 19	Mean	-0.00068	-0.00032	-0.00023
	p-value		0.486	
Pre-Post Covid 19	Mean	-0.00019	-0.00014	0.00023
	p-value		0.129	

* indicate significance at the 5% level of significance.

Table 1 shows that before COVID-19, the order of mean returns from highest to lowest was LQ45 stocks at 0.00308, ESGLQ45 stocks at 0.00036, and ESG stocks at -0.00013. The ANOVA test produced a p-value of 0.67, indicating that there was no significant difference between the three groups of stocks at the 5% level. This shows that the average return in the pre-COVID-19 period did not differ between groups of stocks.

During COVID-19, the highest mean return was occupied by LQ45 stocks at 0.00069. Next in sequence were ESG stocks at -0.00010 and ESGLQ45 stocks at -0.0005. The ANOVA test produced a p-value of 0.025, indicating a significant difference at the 5% level. This means that during the pandemic, the average return between stock groups had a significant difference. Post-pandemic, the mean return of the three stock groups decreased compared to pre-COVID-19. The three stock groups experienced negative mean returns with different magnitudes, respectively, from the highest mean return were LQ45 stocks of -0.00023, ESGLQ45 stocks of -0.00032, and ESG stocks of -0.00068. The ANOVA test produced a p-value of 0.86, which indicated that there was no significant difference between the three stock groups at the 5% level. This shows that the average return in the post-COVID-19 period did not differ between stock groups. All Periods. The highest mean return for the entire period was occupied by LQ45 stocks at 0.00023. Followed by ESGLQ45 stocks at -0.0001 and ESG stocks at -0.00019. The ANOVA test produced a p-value of 0.129, indicating that there was no significant difference between the three groups of stocks at the 5% level. This shows that the average return in the pre- to post-COVID-19 period also did not differ between stock groups.

Stock volatility describes conditional volatility, that is volatility that adjusts over time based on the price moves of the stock in question. In the context of the GARCH (1,1) model, this volatility is calculated on historical data, which displays the extent of risk that takes place at a specific time. Before COVID-19, the suggested volatility of LQ45 shares, at 0.029, became the best in comparison to ESG shares at 0.02 and ESGLQ45 shares at 0.022. The ANOVA produced a p-value of 0.001, which suggests that there may be a

significant difference among the 3 companies of shares at the 5% level. This suggests that the suggested volatility differs drastically among corporations of shares.

During COVID-19, the suggested volatility of LQ45 stocks of 0.032 is the best in comparison to ESG stocks of 0.030 and ESGLQ45 stocks of 0.027. The ANOVA test produces a p-value of 0.09, which suggests that there may be a significant difference among the 3 companies of shares at the 5% level. This suggests that the suggested volatility differs drastically among corporations of shares. Post COVID-19, the best suggested volatility role became occupied via means of LQ45 shares at 0.027, observed via means of ESG shares at 0.023, and ESGLQ45 shares at 0.020. The ANOVA produced a p-value of 0.005, which suggests that there may be a significant difference among the 3 companies of shares at the 5% level. This suggests that the suggested volatility differs drastically among corporations of shares.

Throughout the period, the highest mean volatility remained in the LQ45 stock at 0.030. Meanwhile, the mean volatility of ESG stocks also remained in second place at 0.026. The lowest mean volatility was in the ESGLQ45 stock at 0.023. The ANOVA test produced a p-value of 0.001, indicating that there is a significant difference between the three groups of stocks at the 5% level. This shows that the mean volatility differs significantly between groups of stocks.

Table 2. Statistical Difference Test of Stock Return Volatility

Time	Test	ESG	ESG LQ45	LQ45
Pre-Covid 19	Mean	0.024	0.022	0.029
	p-value		0.001*	
During Covid 19	Mean	0.030	0.027	0.032
	p-value		0.049*	
Post Covid 19	Mean	0.023	0.020	0.027
	p-value		0.005*	
Pre-Post Covid 19	Mean	0.026	0.023	0.030
	p-value		0.001*	

* Significant at the 5% level.

Table 2 shows differences in risk-adjusted return performance between the ESG, ESGLQ45, and LQ45 indices over various periods, using the ANOVA test as a step to test the significance of the differences in the Sharpe Ratio calculated for each group of stocks. Pre-COVID-19, the mean Sharpe ratio of LQ45 stocks of 0.024 was the highest compared to ESGLQ45 stocks of 0.014, and ESG stocks of -0.005. The ANOVA test produced a p-value of 0.016, which indicates that there is a significant difference between the three groups of stocks at the 5% level. This shows that the risk-adjusted return performance in the period is indeed different between groups of stocks.

During COVID-19, the mean Sharpe ratio, in order from the highest, was LQ45 stocks at 0.022, ESG stocks at 0.001, and ESGLQ45 stocks at -0.009. The ANOVA test produced a p-value of 0.062, indicating a significant difference at the 10% level, although not significant enough at the 5% level. This shows that during the pandemic, although there were differences, the strength of the differences was not as strong as in the period before the pandemic. Post-COVID-19, the highest mean Sharpe ratio was again occupied by LQ45 stocks at 0.024, followed by ESG stocks at -0.005, and ESGLQ45 stocks at -0.014. The ANOVA test produced a p-value of 0.059, indicating that there was a significant difference at the 10% level, although not significant enough at the 5% level. This shows that post-pandemic, although there was a difference, the strength of the difference was not as strong as in the period before the pandemic.

Pre to post COVID-19, the highest mean Sharpe ratio remains LQ45 stocks at 0.024, then ESG stocks at -0.001, and ESGLQ45 stocks at -0.012. The ANOVA test produces a p-value of 0.061, indicating that there is a significant difference at the 10% level, although not significant enough at the 5% level. This indicates that the risk-adjusted return performance over the entire period varies between indices.

Table 3. Sharpe Ratio Statistical Difference Test

Time	Test	ESG	ESG LQ45	LQ45
Pre-Covid 19	Mean	-0.005	0.014	0.024
	p-value		0.016*	
During Covid 19	Mean	0.001	-0.009	0.022
	p-value		0.062*	
Post Covid 19	Mean	-0.005	-0.014	0.024
	p-value		0.059*	
Pre-Post Covid 19	Mean	-0.001	-0.012	0.024
	p-value		0.061*	

* Significance at the 5% level.

Table 3 shows, in all periods, namely pre-Covid 19 (mean 0.00308), during Covid 19 (mean 0.00069), post-Covid 19 (mean -0.00023), and from pre to post-Covid 19 (mean 0.00023), the mean return of LQ45 stocks is always higher than the mean return of ESG stocks and the mean return of ESGLQ45 stocks. Meanwhile, the mean return of ESGLQ45 stocks is in the second-highest position after the mean return of LQ45 stocks. Meanwhile, the mean return of ESG stocks can outperform the mean return of ESGLQ45 stocks, only during COVID-19. Furthermore, the mean return of ESG stocks is always in the lowest position, after the mean return of LQ45 stocks and the mean return of ESGLQ45 stocks. There is no significant difference in the mean return of ESG, ESGLQ45, and LQ45 stocks in the pre-COVID-19 period (p-value 0.67), post-COVID-19 period (p-value 0.86), and the entire period (p-value 0.129). A significant difference in the mean return of ESG, ESGLQ45, and LQ45 stocks was found in the Covid 19 period (p-value 0.025), Stock return volatility analysis using the GARCH (1,1) model shows that LQ45 group stocks are more volatile than other stock groups in all periods, namely pre-Covid-19 (mean 0.029), during Covid 19 (0.032), post-Covid 19 (0.027), and from pre to post Covid 19 (mean 0.03). ESG stock return volatility in the four periods, namely pre-COVID-19, during COVID-19, post-COVID-19, and from pre to post-COVID-19. occupies the second position after LQ45 stock return volatility, outperforming ESGLQ45 stock return volatility. There is a significant difference at the 5% level in the four periods, namely pre-COVID-19 (p-value 0.001), during COVID-19 (p-value 0.09), post-COVID-19 (p-value 0.005), and pre- to post-COVID-19 (p-value 0.001).

Based on the return data collected for each different period, there are variations in the performance of the ESG, ESGLQ45, and LQ45 stock groups. In the analysis using the Sharpe Ratio, which measures risk-adjusted returns, stocks in the LQ45 stock group overall showed better performance compared to the ESG and ESGLQ45 stock groups. The pre-COVID-19 p-value 0.016) indicates that there is a significant difference between the ESG, ESGLQ45, and LQ45 stock groups at the 5% level. This supports the statement that risk-adjusted return performance does vary between stock groups. For the Covid 19 period (p-value 0.062), post-Covid 19 (p- value 0.059), and the overall period (p-value 0.061), all three showed not significant enough at the 5% level, meaning that during the pandemic, although there were differences, the strength of the differences was not as strong as in the period before the pandemic.

Based on Table 4, I, II, and III show the order of values from largest to smallest. Where I is the most significant average value and III is the smallest average value. This article compares LQ45 stocks and ESG stocks grouped into ESG stocks, ESGLQ45 stocks, and LQ45 stocks in terms of return, volatility with the GARCH (1,1) model, and risk- adjusted returns with the Sharpe Ratio. The mean return of the largest LQ45 stocks for the four periods. During COVID-19, it was proven that ESG stocks showed quite good resilience compared to ESGLQ45 stocks, although their returns were still lower than LQ45 stocks, which were consistently the largest. However, in pre-COVID-19, post-COVID-19, and pre- to post-COVID-19, it cannot be concluded that LQ45 stocks always have greater returns than ESG stocks or ESGLQ45 stocks.

Table 4. Return, Volatility, and Shape Ratio Matrix

Period	Return			Volatility			Sharpe Ratio		
	ESG	ESGLQ45	LQ45	ESG	ESGLQ45	LQ45	ESG	ESGLQ45	LQ45
Pre Covid 19	III	II	I	II*	III*	I*	III*	II*	I*
Covid 19	II*	III*	I*	II*	III*	I*	II	III	I
Post Covid 19	III	II	I	II*	III*	I*	II	III	I
Pre-Post Covid 19	III	II	I	II*	III*	I*	II	III	I

Note: *There is a significant difference

The mean volatility of LQ45 stocks is the highest for all four periods; it is known that this is a consistent volatility pattern. Followed by successive higher volatility of ESG stocks compared to ESGLQ45 stocks, indicating that ESG stocks are more vulnerable to market shocks than when they intersect with more liquid stocks and large market capitalization, such as LQ45. The Sharpe ratio of LQ45 stocks is the highest for all four periods, indicating that LQ45 provides better returns per unit of risk compared to ESG and ESGLQ45. The lower Sharpe ratio of ESG than LQ45 stocks indicates that the increase in ESG volatility is not offset by returns. The difference in Sharpe ratios between stock groups before COVID-19, but after that, the difference weakened.

For investors, the results of this study indicate that LQ45 stocks tend to provide more optimal returns even with higher volatility. Therefore, for investors who are oriented towards short-term returns, LQ45 stocks can be the main choice. However, for investors who prioritize sustainability and risk diversification, choosing ESG stocks that overlap with LQ45 stocks can be a good alternative, even with a higher level of volatility. For investment managers, a portfolio diversification strategy by including more liquid ESG stocks, such as ESGLQ45 stocks, can improve the balance between risk and return. On the other hand, regulators need to ensure stricter standards in assessing ESG stocks to increase their credibility as investment instruments that are not only environmentally friendly, but also stable and liquid. For investment managers, it is important to provide more in-depth education to investors regarding the risk characteristics of ESG stocks, given the higher volatility despite having good sustainability performance

DISCUSSION

The findings of this study contribute to the ongoing discourse on the resilience and performance of sustainable ESG versus traditional LQ45 stocks during market disruptions, particularly the Covid-19 pandemic. The results demonstrate that LQ45 stocks consistently yielded higher returns across all periods, pre-, during, and post-pandemic, albeit with significantly greater volatility. This aligns with prior research (Broadstock et al., 2021; Zhou & Zhou, 2022), which posits that liquid, large-cap stocks often outperform during crises due to investor preference for stability. LQ45 contains large-cap and highly liquid stocks, which respond faster to market sentiment. High liquidity makes it easier to get capital in and out, but it also makes prices more sensitive to shocks. However, the study uniquely highlights that while ESG stocks delivered lower returns, their volatility was markedly lower than LQ45 stocks, suggesting they may offer a trade-off between return and risk mitigation. ESG companies tend to have more conservative risk management and governance strategies, thereby reducing exposure to high-risk cyclical sectors. However, this strategy also limits the chances of making big profits when the market rises.

Notably, ESG stocks exhibited relative resilience during the pandemic, with their mean returns surpassing ESGLQ45 stocks (hybrid ESG-LQ45 stocks: stocks that have

two memberships, members of the LQ45 index and members of the ESG index) in 2020–2021. This supports the defensive role of ESG factors during crises, likely due to stronger stakeholder trust and operational sustainability (Chen et al., 2022; Beloskar & Rao, 2023). However, the Sharpe ratio analysis revealed that ESG stocks' risk-adjusted returns remained inferior to LQ45 stocks, indicating that their lower volatility was not sufficiently compensated by higher returns. This challenges the notion that ESG investments universally enhance risk-adjusted performance, suggesting contextual limitations in emerging markets like Indonesia (Ferriani & Natoli, 2021). The factor of stakeholder confidence and a focus on operational sustainability make investors reluctant to make massive sales, so that volatility is more controlled.

The volatility dynamics further illuminate market behavior. The GARCH (1,1) model confirmed that LQ45 stocks' volatility peaked during the pandemic, reflecting heightened sensitivity to systemic shocks (Baker et al., 2020). In contrast, ESG stocks' volatility was less pronounced, supporting their role as stabilizers (Zhou et al., 2022). However, the post-pandemic decline in ESG returns raises questions about their long-term performance once crisis-driven investor sentiment wanes. This echoes mixed findings in other studies where ESG advantages were contingent on sectoral and regional factors (Abedifar et al., 2023).

For investors, these results underscore the importance of diversification, such as LQ45 stocks, which may dominate short-term and long-term portfolios, while ESG stocks (particularly ESGLQ45) could serve as a hedge against volatility. For regulators, enhancing ESG disclosure standards is critical to improving their risk-return profile. A key limitation is the focus on Indonesian markets, which may not generalize to other emerging economies. Future research could expand the sample globally or incorporate sector-specific ESG performance to refine strategic insights. While ESG stocks demonstrated resilience during the pandemic, their suboptimal risk-adjusted returns suggest that their value lies more in risk diversification than outright performance. This study thus calls for nuanced investment strategies that balance liquidity, sustainability, and market conditions.

CONCLUSION

The results show that the highest volatility is found in LQ45 stocks, followed by ESG and ESGLQ45, both of which are part of JCI and thus contribute to its volatility. In contrast to previous findings that SRI/ESG excels in return and risk, this study found that ESG returns and volatility are still lower than LQ45, likely due to the use of four ESG indices, including SRI KEHATI. LQ45 consistently recorded the highest average return and Sharpe ratio in all periods, although its volatility was also the greatest. The difference in return between groups is significant only during COVID-19, when ESG outperforms ESGLQ45, while the difference in volatility is significant across all periods. Before the pandemic, the difference in risk-adjusted return between groups was significant, but during and after the pandemic, the difference was more moderate.

Theoretically, these findings enrich the literature on the performance of ESG and LQ45 stocks in emerging markets by showing that ESG does not always excel in return or risk, as opposed to results in developed markets, thus reinforcing the importance of market context in the analysis of index performance. In practical terms, these results provide input for investors to combine LQ45 as a return driver with ESG or ESGLQ45 as a volatility balancer, as well as for regulators to improve ESG reporting standards and transparency to make the risk-reward profile more competitive. He recommends that further research expand its scope to global markets or conduct sectoral analysis to identify conditions under which ESG stocks can maximize their defensive role and performance. This study has several limitations, especially related to the selection of samples that are limited to stocks listed on the Indonesia Stock Exchange and a limited time period between 2016 and 2023. This study also only uses the GARCH (1,1) and Sharpe Ratio models, which may not fully describe the complexity of broader market dynamics. Therefore, opportunities for further research development can be carried out by

expanding the sample, for example, by comparing ESG stocks on other countries' stock exchanges, and using more comprehensive analysis methods to measure risk and return. In addition, this study can be expanded by taking into account other external factors that can affect stock volatility and returns, such as government policies or global macroeconomic factors.

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