The effect of ESG performance on stock price volatility: A study of emerging markets in Asia

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Abstract
This study aims to investigate the influence of Environmental, Social, and Governance (ESG) on the volatility of stock prices for public firms in emerging Asia. This study uses the selection of ESG score data from Refinitiv Eikon by employing multiple regression, dummy variables, and difference-in-differences (DID) models using COVID-19, an exogenous event. This study uses two periods to compare the volatility of stock prices before and after COVID-19, which are 2020 and 2021. Meanwhile, this study examines the volatility of a firm based on its ESG performance over one year. Therefore, this study uses the ESG score in 2019 and 2020. There are three findings from this study. First, this study indicates that firms with higher ESG performance have less volatility than firms with lower ESG performance. Second, the findings indicate that higher ESG performance, as opposed to lower ESG performance, mitigates the increase in stock price volatility caused by the COVID-19 shock. Third, ESG performance helps to stabilize stock prices. The analysis of the effect of ESG performance on the volatility of stock prices in this article is supported by new empirical data, which also includes suggestions for businesses and investors.

Keywords:
ESG; Volatility; Stock Price; COVID-19; Emerging Markets.

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Introduction

The COVID-19 pandemic is a coronavirus outbreak caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus (World Health Organization, 2020a). The virus is rapidly spreading to countries throughout the globe. On January 30, 2020, the World Health Organization declared a Public Health Emergency of International Concern and a pandemic on March 11, 2020 (World et al., 2020b). All nations employ isolation, regional quarantine, and large-scale social restrictions (PSBB) to prevent or suppress the spread of COVID-19.

COVID-19 significantly negatively influences firm value (Ramadhan et al., 2023). Consequently, numerous businesses have implemented massive layoffs, reduced investment and other capital expenditures, and even shut down entire industrial divisions. This resulted in a panic in the financial markets, a significant decline in stock and other security prices, and a further decrease in economic activity (Rababah et al., 2020). During economic downturns, investors pay particular attention to the types of firm equities that perform better or reduce systemic risk (Zhou & Zhou, 2021). Investors will seek out firm equities that are believed to be able to withstand the Covid-19 pandemic's crisis period.

Research has been conducted on the capital market and state responses to COVID-19 (Phan & Narayan, 2020). They anticipate that the market will react to unexpected news. COVID-19-related news affects the capital market (Haldar & Sethi, 2021). In this instance, news concerning the COVID-19 pandemic has caused the stock market to react.

As the stock market transforms, the risk associated with stock market investments increases. The volatility of securities presents investors with a substantial risk. According to Lim & Sek (2013), volatility is a measurement of risk, with greater volatility causing more significant variations in returns and increasing risk. Danielsson (2011) also identifies volatility as the most common indicator of market uncertainty. Thus, investors can use this volatility to evaluate the performance of a firm's stock's performance and determine the risk associated with the stock.

Currently, the firm analyzes the firm based on financial statements and sustainability reports, also known as Environmental, Social, and Governance (ESG) reports. According to research by Aydoğmuş et al. (2022), ESG scores positively correlate with firm value. This suggests that firms with a high ESG score may be able to enhance their performance. ESG performance can considerably reduce corporate risk-taking and lead to a more stable corporate environment (He et al., 2023).

Environmental, Social, and Governance (ESG) consists of three main criteria:(1) Environmental, which considers the impact of business operations on the operating environment and how the firm can play a role as an

environmental steward; (2) Social, which considers the relationship and reputation of the firm with its stakeholders and how the firm fosters its stakeholders (community, community, suppliers, consumers, employees, and related parties of the Firm), (3) Governance, which evaluates the principles of self-regulating corporate governance (Bursa Efek Indonesia, 2022).

ESG is one of the methods used to enhance firm performance and reduce volatility. The public firm has increased its ESG disclosures in recent years as it seeks to engage with stakeholders, respond to investor requests, establish credibility, and respond to crises and competition within its industry (Olsen et al., 2021).

ESG investing emphasizes investment strategies that consider the environmental, social, and governance impacts of firms, and ESG investment strategy may entail investing in firms with an emphasis on investing in firms that rank in the top quartile based on ESG factors (Sabbaghi, 2022). ESG investment is an investment strategy considering ESG performance when making financial market investment decisions (Liu et al., 2023). Many businesses have invested in ESG, but leaders must recognize that choosing a sustainable business model is integral to attaining profits and business growth (Polman & Winston, 2022). In this instance, they continue to perceive ESG-related expenditures as costs and expenses, not investments. Investment decisions positively impact the firm's value (Sumiati et al., 2022). It implies that the firm's value will increase if the management makes the right investments, including locating excellent ESG investments.

Investing in ESG requires the firm to spend money, but multiple studies have shown that investing in ESG is one of the worthwhile investments and benefits the firm. ESG has a positive relationship with ROA and Tobin's Q, and these findings also support the positive impact of sustainability strategies and management's commitment to enhancing ESG, which positively impacts firm performance (Rahman et al., 2023). ESG is also believed to increase firm productivity in addition to enhancing firm performance. ESG scores positively correlate with firm productivity (Deng et al., 2023). This can mean that the firm's productivity will increase proportionately to its ESG score.

Numerous studies have demonstrated that ESG can enhance firm performance, but fewer have examined the effect of ESG on firm volatility. Zhou & Zhou (2021) demonstrated in their study that the higher the ESG score of a firm, the lower its volatility. They also discovered that firms with higher ESG scores are more resilient and can recover from the effects of COVID-19 more quickly.

This research is an extension of previous Zhou & Zhou (2021) research by adding samples to Asia's emerging markets nations: China, India, Indonesia, Malaysia, Philippines, and Thailand. The emerging market was chosen in this research since Feng et al. (2022) found that developed countries have

incorporated Environmental, Social, and Governance (ESG) valuation into their portfolio management, while investors in emergent markets continue to rely solely on speculation. In addition, emerging markets are more volatile and less liquid, have poor corporate governance, are subject to greater political risk, are more segregated from the global market, and, most importantly, share socioeconomic characteristics with gambling investors (Hsin & Peng, 2023). This study aimed to investigate the influence of ESG (Environmental et al.) performance on the volatility of stock prices. Thus, this research will likely contribute to the literature on the relationship between Environmental, Social, and Governance (ESG) performance and stock price volatility.

The findings of this study indicate that ESG performance is negatively related to stock price volatility and demonstrate that firms with higher ESG performance are more stable than those with low ESG performance. In addition, firms with a higher ESG score are more stable than those with a lower ESG score. Therefore, even though firms must invest money to implement ESG, the results of ESG performance are worthwhile for the firm.

This study uses Garman Klass and Yang-zhang to calculate the volatility. Garman and Klass combined open and close volatility calculations and claimed that this estimate was 7.4 times more precise than the conventional variance based on closing prices (Todorova, 2012). Moreover, GK is anticipated to outperform Parkinson's disease regarding bias and efficacy in the presence of drift. Yang & Zhang (2000) present a new volatility estimator based on multiple historical Open, Close, High, and Low periods. This estimator is impartial within continuous limits, independent of drift, and consistent when dealing with open prices that experience price surges. We also use a regression model with OLS estimation methods and a difference-in-difference (DID) method.

In addition, this study has three stages: First, we will use a regression model with OLS estimation methods to examine the influence of ESG performance on the volatility of stock prices during the COVID-19 pandemic. Second, the sample will be classified based on ESG scores, with the group of firms with higher ESG scores and those with lower ESG scores selected. Using dummy variables, it will determine whether firms with a higher ESG score will experience less volatility than those with a lower ESG score. By doing this, we will use regression with the OLS estimation method to examine whether firms with higher ESG scores are less volatile than firms with lower ESG scores. Third, the difference in different methods will be utilized to investigate the impact of the COVID-19 pandemic.

ESG Performance on Stock Price Volatility

Previous research shows the relationship between ESG and a firm's risk. Hoepner et al. (2016) demonstrate that activities related to ESG issues, particularly environmental issues, can reduce a firm's adverse risk. In addition, firms with a higher ESG score have a reduced insolvency risk (Li et al., 2022). As the term structure of default risk increases, the mitigating effect increases. From this research, ESG can help firms to reduce their risks.

ESG equity portfolios in emerging markets also offer investors higher returns and lower downside risk than non-ESG equity portfolios (Sherwood & Pollard, 2018). Broadstock et al. (2021) conducted a study on the role of ESG scores during the global financial crisis triggered by the COVID-19 pandemic, and the results of the research found that, on average, high ESG portfolios outperform low ESG portfolios and ESG scores can reduce financial risk during financial crises. Furthermore, corporate ESG performance has also been shown to considerably lower stock price volatility (Xu, 2023).

The first hypothesis to be tested, based on the explanation above, is as follows:
H1: There is a negative effect between ESG performance and firm stock price volatility.

The Influence of ESG Performance on the Volatility of Stock Prices

According to research conducted by Feng et al. (2022), there is a negative correlation between ESG scores and the danger of a stock price crash. This demonstrates the validity of the Stakeholder theory, which states that the higher the ESG score of a firm, the lower the risk of a stock price collapse. Cerqueti et al. (2021) reveal that firms with a high ESG score experience less market value loss than firms with a low ESG score during periods of reduced volatility.

Zhou & Zhou (2021) also discovered that firms with a higher ESG score experience less stock price volatility than firms with a lower ESG score. His research also noted that the COVID-19 pandemic exacerbated the stock price volatility; however, the share price volatility of firms with a higher ESG score is minimal.

The study conducted by Dinh (2023) also determined the impact of ESG on stock returns and risks and found that after having an ESG score, short-term ESG portfolios have the same stock returns but lower risks compared to ESG portfolios that do not have an ESG score. In addition, Wang et al. (2023) also found that there is a negative correlation between stock price fragility and ESG performance and that more robust ESG performance lowers stock price fragility.

The second hypothesis to be tested, based on the explanation above, is as follows:

H2: There is a difference between firms with high ESG performance and those with low ESG performance regarding stock price volatility.

The Influence of ESG Performance on Firms' Stability

The COVID-19 pandemic has had a tremendous effect on the entire nation. Salistia (2020) stated that the COVID-19 pandemic has affected all nations. The Covid-19 pandemic is also believed to exacerbate the effects of the nationwide economic contraction.

Covid-19 has also affected the S&P 500, the leading stock market index in the United States. The S&P index closed down 1.01 percent on April 13, 2020, while the Dow Jones Industrial Average index fell 1.39 percent. This also indicates that investors in stocks of public firms in Indonesia feel the effects of the COVID-19 pandemic. The decline in the stock price is another obstacle for the firm (Bisnis Indonesia, 2020).

ESG is believed to mitigate the COVID-19-induced increase in stock price volatility. Liu et al. (2023) reveal that we simultaneously stabilize the financial market system by pursuing a more sustainable social and economic development via ESG investments. Zhou & Zhou (2021) reveal that a high ESG score improves "resilience" and stabilizes stock prices.

During the COVID-19 pandemic in Japan, ESG performance enhanced stock market stability and boosted market liquidity (Liu et al., 2023). As a result, adhering to ethical investing standards, like those for ESG stocks, will make the Indonesian stock market more stable and prudent in the long run (Gunawan et al., 2022). In addition, investors who made purchasing ESG stocks a top priority understood these businesses' resiliency and kept making investments in them even during the pandemic crisis (Cardillo et al., 2023).
The third hypothesis to be tested, based on the explanation above, is as follows:
H3: Following the COVID-19 pandemic, firms with high ESG performance and firms with low ESG performance have varying degrees of stability and recovery.

METHODS
Scope of Study

This study focuses on public firms in Asia's emerging markets: China, India, Indonesia, Malaysia, Philippines, and Thailand, since it is essential to determine whether ESG can affect volatility in Asia's emerging markets.

The data period for stock prices is divided into two periods to compare the volatility of stock prices before and after COVID-19. The first period is COVID-19's covered period, from January 1, 2020, to December 31, 2020. The second period is when it began to operate the new normal from January 1, 2021, to December 31, 2021. Meanwhile, since this study will investigate the influence on ESG performance, this research will examine the volatility of a

firm based on its ESG performance in a one-year lagged. Therefore, this study uses ESG scores in 2019 and 2020. Characteristics of the sample in this study were as follows: (1) public firm that has listed in its home country prior to 2020, (2) public firm that has already an ESG score, (3) data were available for all variables required in the financial statements for 2020-2021 period.

The type of data utilized in this study was secondary data, as it was obtained from Refinitiv Eikon. The total collected data is 957 firms for the period before COVID-19 and 1,213 firms for a period after COVID-19.

Data preprocessing

This paper will utilize the volatility of Garman Klass and Yangzhang to discuss the volatility of stock prices. Garman & Klass was chosen for this study since it combined high, low, open, and close to reduce bias and increase productivity (Yang & Zhang, 2000).

$$\sigma GK = \sqrt{\frac{1}{2}(\ln(\frac{ht}{lt}))^2 - (2ln2 - 1)(\ln(\frac{ct}{ot}))^2} \ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Yang-Zhang was also chosen for this study since the Yang-zhang estimator is objective, independent of drift, and consistent as open prices fluctuate, resulting in minimal error in the results (Yang & Zhang, 2000).

$$\sigma Yang - Zhang = \sqrt{\sigma^2 o + k\sigma^2 c + (1 - k)\sigma^2 rs} \ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where:

$$k = \frac{0,34}{1,34 + \frac{n+1}{n-1}}$$

$$\sigma^2 o = (\ln\frac{Ot}{Ct-1})^2$$

$$\sigma^2 c = (\ln\frac{Ct}{Ot})^2$$

$$\sigma^2 = Rogers - Satchell\ volatility$$

This study will employ cross-sectional data for which the regression model estimation can be specified using Ordinary Least Square (OLS). The initial data is cleansed, filtered, and formatted using Microsoft Excel, and regression analysis is performed using Stata software. After cleansing data, the collected data is 854 firms for the period before COVID-19 and 1,075 firms for the period after COVID-19.

Data Analysis

The ESG score is the independent variable, while volatility is the dependent variable. This study uses size, leverage, Tobin's Q, and cash as control variables. Following the findings of Broadstock et al. (2021) as cited in

Zhou & Zhou (2021), the following enterprise characteristic variables are selected for control: enterprise Size (Size), financial leverage (Lev), Tobin's Q, and Cash holding ratio (Cash).

The three stages of this research model are as follows:

1. The following research paradigm is utilized to analyze the influence of ESG performance on stock price volatility. We will use a regression model with OLS estimation methods with Stata:

$$Volatility_i = \alpha_0 + \alpha_1 ESG_i + \alpha_2 Size_i + \alpha_3 Lev_i + \alpha_4 TobinQ_i + \alpha_5 Cash_i + \in_i$$

2. Firms are divided into two groups: those with high ESG scores and those with low ESG scores. This model will employ a dummy variable, ESGf, in which 25% of firms with high ESG scores will be categorized as 1, and 25% of firms with low ESG scores will be categorized as 0. We will also use a regression model with OLS estimation methods with Stata:

$$Volatility_i = \alpha_0 + \alpha_1 ESGf_i + \alpha_2 Size_i + \alpha_3 Lev_i + \alpha_4 TobinQ_i + \alpha_5 Cash_i + \in_i$$

3. Comparing the stability of firms with high ESG scores and low ESG scores is the objective of the following research model. We use the difference-in-difference (DID) method with Stata:

$$Volatility_i = \beta_0 + \beta_1 ESGf_{it} + \beta_2 Post_{it} + \beta_3 ESGf_{it} \, x \, Post_{it} + \beta_4 Size_{it} + \beta_5 Lev_{it} + \beta_6 TobinQ_{it} + \beta_7 Cash_{it} + \in_{it}$$

In this model, the difference in difference method will be used to determine whether firms with high ESG performance have greater stability and can recover from COVID-19 more rapidly than firms with low ESG performance.

RESULT AND DISCUSSION

Table 1 provides descriptive statistics before COVID-19; the total number of samples is 854. Table 2 provides descriptive statistics for after COVID-19; the total number of samples is 1,075. The mean volatility presented in both tables indicates that the mean volatility after COVID-19 is declining. In addition, the mean ESG score increases from 36.965 to 37.916. Because the total number of samples and the mean ESG score increased from 2020 to 2021, we can conclude that more firms are becoming aware of ESG and achieving higher ESG scores.

Table 1.

Descriptive Statistics on Stock Prices 2020 and ESG Score 2019

Variable	Obs	Mean	Std. dev.	Min.	Max.
Garman Klass	854	0.035	0.0099	0.01	0.1
Yang-zhang	854	0.031	0.0087	0.01	0.09
ESG	854	36.965	17.924	1.23	87.73
Size	854	25.064	1.843	19.2	33.42
Leverage	854	0.544	0.238	0.01	2.68
Tobin's Q	854	3.135	6.604	0	85.07
Cash	854	0.105	0.113	0	0.77

Table 2.

Descriptive Statistics on Stock Prices for 2021 and ESG Score 2020

Variable	Obs	Mean	Std. dev.	Min.	Max.
Garman Klass	1,075	0.032	0.010	0.01	0.07
Yang-zhang	1,075	0.027	0.008	0.01	0.06
ESG	1,075	37.916	17.616	1.11	91.17
Size	1,075	24.939	1.835	19	33.62
Leverage	1,075	0.534	0.220	0.05	2.13
Tobin's Q	1,075	2.882	5.938	0	93.08
Cash	1,075	0.110	0.110	0	0.79

In addition, we conducted a multicollinearity test and heteroscedasticity test to demonstrate that linear regression is the appropriate method for this investigation. The results of the multicollinearity test presented in Tables 2 and 3 indicate that the value of the VIF is less than ten and that the value of 1/VIF is more significant than 0.1. Therefore, this model is free of multicollinearity indications.

The result of the heteroscedasticity test presented in Table 4 indicates that $P>|t|$ in ESG 2019, size and Tobin's Q are above 0.05, indicating no heteroscedasticity. In contrast, leverage and cash are below 0.05, indicating a heteroscedasticity issue. Meanwhile, the result of the heteroscedasticity test presented in Table 5 indicates that $P>|t|$ in ESG 2020, size and cash are above 0.05, indicating no heteroscedasticity. In contrast, leverage and Tobin's Q are below 0.05, indicating a heteroscedasticity issue. To address this issue, researchers regress with robust standard errors in Stata. In addition, this study also uses two measurements for calculating volatility, Garman Klass and Yang-Zhang, for the robustness test.

Table 3.

Multicollinearity Test 2020 Stock Prices for 2020 and 2019 ESG Score

Variable	VIF	1/VIF
ESG 2019	1.20	0.832
Cash	1.18	0.849
Leverage	1.15	0.867
Tobin's Q	1.13	0.883
Size	1.13	0.888
Mean VIF	1.16	

Table 4.

Multicollinearity Test 2021 Stock Prices and 2020 ESG Score

Variable	VIF	1/VIF
ESG 2020	1.16	0.863
Cash	1.14	0.876
Leverage	1.14	0.879
Tobin's Q	1.14	0.879
Size	1.13	0.887
Mean VIF	1.14	

Table 5.

Heteroscedasticity Test 2020 Stock Prices and 2019 ESG Score

Variable	P>|t|
ESG 2019	0.151
Size	0.237
Leverage	0.000
Tobin's Q	0.160
Cash	0.0015

Table 6.

Heteroscedasticity Test 2021 Stock Prices and 2020 ESG Score

Variable	P>|t|
ESG 2020	0.395
Size	0.194
Leverage	0.008
Tobin's Q	0.023
Cash	0.756

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ESG Performance on Stock Price Volatility

Based on the results of the regression of ESG performance on stock price volatility presented in Table 7, ESG performance has a negative and significant influence on stock price volatility measured by the Garman Klass method for 2020 and 2021. Meanwhile, ESG performance had a negative and insignificant influence on stock price volatility as measured by the Yang-Zhang method for the 2020 period but a negative and significant influence for the 2021 period.

Consistent with hypothesis 1 and previous research indicating that ESG performance has a negative and significant influence on stock price volatility (Zhou & Zhou, 2021). This result indicates that a firm's high ESG performance can help reduce stock price volatility. The greater a firm's ESG performance, the lower its volatility.

The results of regression with the Garman Klass model in 2020 indicate that size has a positive and significant impact on volatility. According to Wijaya et al. (2022), the influence of size on financial performance is evident. Therefore, it is preferable for large firms to enhance their corporate governance to reduce the firm's risk. Meanwhile, the results of regression with the Garman Klass model in 2021 and the Yang Yang-Zhang model in 2020 and 2021 indicate that size has a positive but insignificant impact on volatility. This may imply that the larger the scale of a firm, the greater its volatility. This result is consistent with previous studies by Sabbaghi (2022), which found that the firm's size does not significantly moderate the relationship between ESG and stock price volatility.

The leverage ratio indicates a firm's ability to fulfill its short- and long-term obligations in case of liquidation. The result of regression for leverage has a positive and statistically significant influence on stock price volatility. The results of this regression are consistent with research conducted by Chon & Kim (2021) that stated that when negative information about a firm's value enters a financial market, the firm's value declines, resulting in a high debt-to-equity ratio. This financial leverage channel increases the firm's equity risk, which ultimately manifests as high volatility.

Tobin's Q or q ratio, according to Brealey et al. (2018), is the ratio between the firm's assets and their market value (market value of outstanding stocks + debt) and the cost to replace those assets or book value. Higher Tobin's Q is viewed as profitable because it indicates excellent performance. However, there are potential risks associated with the firm's high value, which is overvalued. Habib & Hasan (2017) stated that equity overvaluation will increase the likelihood of a market collapse in the future. Thus, the result of Tobin's Q regression in Table 7 is consistent with prior research, indicating that Tobin's Q has a positive and statistically significant influence on volatility.

Both the Garman Klass and Yang-Zhang models produced negative and insignificant results for the cash regression in 2020. Cash on hand should mitigate the negative impact of COVID shock on corporate payouts, and COVID-19 is less severe for firms with greater cash on hand (Ntantamis & Zhou, 2022). Thus, this result aligns with previous studies that show that stock price volatility will decrease if the firm has more cash. However, regression results for 2021 indicate that cash has a positive and significant influence on the volatility of stock prices. In the agency theory, the quantity of cash on hand can be manipulated by management, thereby increasing the risk associated with having more cash (Chen, 2021). When a firm has more cash, its executives are more likely to invest in riskier initiatives that increase its risk. Chen (2021) discovered that cash positively influences the risk of a stock market crash. Thus, a firm's cash reserves, risk level, and stock price volatility are greater.

Table 7.

Regression Results of ESG Performance on Stock Price Volatility

	2020		2021	
	Garman Klass	**Yang Zhang**	**Garman Klass**	**Yang Zhang**
ESG	-0.0000483**	-0.0000179	-0.0001543***	-0.000112***
	(0.020)	(0.343)	(0.000)	(0.000)
Size	0.0004156*	0.0000713	0.0001576	0.000007
	(0.098)	(0.741)	(0.412)	(0.967)
Leverage	0.0034466**	0.0047946***	0.0048813**	0.0036219*
	(0.032)	(0.003)	(0.002)	(0.007)
Tobin's Q	0.0002139***	0.0001367***	0.0002534**	0.0001665**
	(0.000)	(0.000)	(0.003)	(0.019)
Cash	-0.0033958	-0.0019223	0.163736***	0.0118716***
	(0.224)	(0.459)	(0.000)	(0.000)
Constant term	0.0242416***	0.0271747***	0.0289193***	0.0269766***
	(0.000)	(0.000)	(0.000)	(0.000)
Total Sample	854	854	1,075	1,075
R-squared	0.0325	0.0219	0.1381	0.1061

Note: *, **, and *** represent significance at 0.1, 0.05, and 0.01, respectively.

The Influence of ESG Performance on the Volatility of Stock Price

The result in Table 8 indicated that ESG with high performance can reduce stock price volatility relative to ESG with low performance. This can be seen in Table 8, which shows that the volatility of firms with a high ESG score is between 0.0025544 and 0.0060762 times lower than firms with a low

ESG score. Using the Yang-Zhang method, firms with a high ESG score have volatility between 0.0012942 and 0.0046047 points lower than firms with a low ESG score. This result is consistent with prior research indicating that firms with superior ESG performance can reduce stock price volatility relative to firms with poor ESG performance (Zhou & Zhou, 2021).

Table 8.

Regression Results of ESG Performance on the Volatility of Stock Price

	2020		2021	
	Garman Klass	**Yang Zhang**	**Garman Klass**	**Yang Zhang**
ESGf	-0.0025544**	-0.0012942	-0.0060762***	0.0046047***
	(0.015)	(0.190)	(0.000)	(0.000)
Size	0.0002192	-0.0001162	0.0001703	0.0000375
	(0.401)	(0.620)	(0.503)	(0.860)
Leverage	0.0024034	0.0042295*	0.002965	0.0015491
	(0.163)	(0.055)	(0.187)	(0.432)
Tobin's Q	0.0001923***	0.0001095***	0.0004111**	0.0002455*
	(0.000)	(0.009)	(0.018)	(0.079)
Cash	-0.0020737	-0.0003996	0.0162926***	0.0096938***
	(0.607)	(0.919)	(0.000)	(0.002)
Constant term	0.0294823***	0.032402***	0.0260803***	0.0252432***
	(0.000)	(0.000)	(0.000)	(0.000)
Total Samples	428	428	538	538
R-squared	0.0407	0.0240	0.1874	0.1415

Note: *, **, and *** represent significance at 0.1, 0.05, and 0.01, respectively.

The Influence of ESG Performance on Firms Stability

The result in Table 9 indicates that after excluding other impacts of COVID-19, increased volatility with the Garman Klass method was 0.003835 lower in firms with high ESG scores compared to firms with low ESG scores. The Yang-Zhang method increases the volatility of firms with high ESG scores by 0.0033495 less than those with low ESG scores. Both of the result is significant. This phenomenon is also consistent with previous research by Zhou & Zhou (2021), which suggests that excellent ESG performance can help firms survive the pandemic, specifically COVID-19, and enable them to become more stable and recover from shocks more quickly. In addition, it is also in line with Liu et al. (2023) that ESG investment simultaneously stabilizes the financial market system.

Tabel 9.

Regression Result of The Influence of ESG Performance on Firms' Stability

	Garman Klass	**Garman Klass**	**Yang Zhang**	**Yang Zhang**
Post	-0.0024272***	-0.0023188***	-0.0041262***	-0.004052***
	(0.005)	(0.007)	(0.000)	(0.000)
ESGf	-0.0024272***	-0.0019016**	-0.0013107*	-0.0010504
	(0.007)	(0.042)	(0.096)	(0.209)
ESGf*Post	-0.003835***	-0.0039258***	-0.0033495***	-0.0033984***
	(0.002)	(0.001)	(0.002)	(0.001)
Size		0.000015		-0.0001565
		(0.933)		(0.274)
Leverage		*0.0022697		0.0025811*
		(0.101)		(0.083)
Tobin's Q		0.0002381***		0.0001529***
		(0.000)		(0.001)
Cash		0.0066213***		0.0025114
		(0.014)		(0.290)
Constant term	-0.036068***	0.0327739***	-0.0318932***	0.0335729***
	(0.000)	(0.000)	(0.000)	(0.000)
Total Samples	824	824	824	824
R-squared	0.1154	0.1463	0.1616	0.1771

Note: *, **, and *** represent significance at 0.1, 0.05, and 0.01, respectively.

Conclusion

The test results show that ESG performance impacts stock price volatility. This study also confirms the hypothesis that (1) there is a negative relationship between ESG performance and the volatility of stock price, (2) firms with a stronger ESG performance experience less volatility than those with a weaker ESG performance, and (3) higher ESG performance is more stable than lower ESG performance. To conclude, even when economic conditions are unfavorable, firms with strong ESG performance can reduce their volatility and ensure the stability of their business.

This result suggests that firms should play a proactive role in ESG and improve their ESG performance. Firms can also begin investing in ESG because it is profitable. They can consider investing in environmental initiatives, such as using renewable energy or achieving net zero carbon in their business, in social initiatives, such as ensuring equitable wages and the absence of discrimination, and in governance initiatives, such as implementing sound corporate governance. This result also suggests that investors should invest in a firm with good ESG performance.

This research has limitations, which include the scope of this study excluding developed countries and the research period in 2020 and 2021. Thus,

for further research, researchers can add more countries and extend their research period after COVID-19.

Author contribution

Declaration of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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References

Aydoğmuş, M., Gülay, G., & Ergun, K. (2022). Impact of ESG performance on firm value and profitability. *Borsa Istanbul Review*, *22*, S119–S127. https://doi.org/10.1016/j.bir.2022.11.006

Bisnis Indonesia. (2020, April 14). *BURSA AS: Indeks S&P 500 Melemah Jelang Rilis Laporan Keuangan Bank AS*. https://Miraeasset.Co.Id/Id/News/24058.

Brealey, R. A., Myers, S. C., Allen, F., & Mohanty, P. (2018). Principles of corporate finance, 12/e (Vol. 12). *CITY: McGraw-Hill Education*.

Broadstock, D. C., Chan, K., Cheng, L. T. W., & Wang, X. (2021). The role of ESG performance during financial crisis: Evidence from COVID-19 in China. *Finance Research Letters*, p. *38*, 101716. https://doi.org/10.1016/j.frl.2020.101716

Bursa Efek Indonesia. (2022). *Apa Itu ESG?* https://esg.idx.co.id/What-Is-Esg

Cardillo, G., Bendinelli, E., & Torluccio, G. (2023). COVID-19, ESG investing, and the resilience of more sustainable stocks: Evidence from European firms. *Business Strategy and the Environment*, *32*(1). https://doi.org/10.1002/bse.3163

Cerqueti, R., Ciciretti, R., Dalò, A., & Nicolosi, M. (2021). ESG investing: A chance to reduce systemic risk. *Journal of Financial Stability*, *54*, 100887. https://doi.org/10.1016/j.jfs.2021.100887

Chen, Z. (2021). *The Impact of Cash Holding on Stock Price Crash Risk*. https://doi.org/10.2991/assehr.k.211209.252

Chon, S., & Kim, J. (2021). Does the Financial Leverage Effect Depend on Volatility Regimes? *Finance Research Letters*, *39*, 101600. https://doi.org/10.1016/j.frl.2020.101600

Danielsson, J. (2011). *Financial Risk Forecasting: The Theory and Practice of Forecasting Market Risk, with Implementation in R and Matlab*. West Sussex: John Wiley & Sons.

Deng, X., Li, W., & Ren, X. (2023). More sustainable, more productive: Evidence from ESG ratings and total factor productivity among listed Chinese firms. *Finance Research Letters*, *51*, 103439. https://doi.org/10.1016/j.frl.2022.103439

Dinh, M. T. H. (2023). ESG, time horizons, risks, and stock returns. *Research in International Business and Finance*, *65*, 101981. https://doi.org/10.1016/j.ribaf.2023.101981

Feng, J., Goodell, J. W., & Shen, D. (2022). ESG rating and stock price crash risk: Evidence from China. *Finance Research Letters*, p. *46*, 102476. https://doi.org/10.1016/j.frl.2021.102476

Gunawan, I., Firdaus, M., Siregar, H., & Siregar, M. E. (2022). Volatility and Stability of ESG Equity in Indonesia toward Internal and External Shocks. *International Journal of Islamic Economics and Finance (IJIEF)*, *5*(2). https://doi.org/10.18196/ijief.v5i2.12693

Habib, A., & Hasan, M. M. (2017). Business strategy, overvalued equities, and stock price crash risk. *Research in International Business and Finance*, *39*, 389–405. https://doi.org/10.1016/j.ribaf.2016.09.011

Haldar, A., & Sethi, N. (2021). THE NEWS EFFECT OF COVID-19 ON GLOBAL FINANCIAL MARKET VOLATILITY. *Buletin Ekonomi Moneter Dan Perbankan*, *24*, 33–58. https://doi.org/10.21098/bemp.v24i0.1464

He, F., Ding, C., Yue, W., & Liu, G. (2023). ESG performance and corporate risk-taking: Evidence from China. *International Review of Financial Analysis*, *87*, 102550. https://doi.org/10.1016/j.irfa.2023.102550

Hoepner, A. G. F., Oikonomou, I., Sautner, Z., Starks, L. T., & Zhou, X. (2016). ESG Shareholder Engagement and Downside Risk. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2874252

Hsin, C.-W., & Peng, S.-C. (2023). Investor propensity to speculate and price delay in emerging markets. *International Review of Financial Analysis*, *86*, 102557. https://doi.org/10.1016/j.irfa.2023.102557

Inggrit Wijaya, L., Herlambang, A., & Evans, B. (2022). Corporate Social Responsibility and Leverage Level on High Profile Industries at Indonesian Stock Exchange of 2015-2019 Period. *Media Ekonomi Dan Manajemen*, *27*(1), 1. https://doi.org/10.24856/mem.v27i01.2285

Junaedi, D., & Salistia, F. (2020). DAMPAK PANDEMI COVID-19 TERHADAP PERTUMBUHAN EKONOMI NEGARA-NEGARA TERDAMPAK | Simposium Nasional Keuangan Negara. *Simposium Nasional Keuangan Negara*, *2*(1).

Li, H., Zhang, X., & Zhao, Y. (2022). ESG and Firm's Default Risk. *Finance Research Letters*, p. *47*, 102713. https://doi.org/10.1016/j.frl.2022.102713

Lim, C. M., & Sek, S. K. (2013). Comparing the Performances of GARCH-type Models in Capturing the Stock Market Volatility in Malaysia. *Procedia Economics and Finance*, *5*, 478–487. https://doi.org/10.1016/S2212-5671(13)00056-7

Liu, L., Nemoto, N., & Lu, C. (2023). The Effect of ESG performance on the stock market during the COVID-19 Pandemic — Evidence from Japan. *Economic Analysis and Policy*, *79*. https://doi.org/10.1016/j.eap.2023.06.038

Liu, M., Guo, T., Ping, W., & Luo, L. (2023). Sustainability and stability: Will ESG investment reduce the return and volatility spillover effects across the Chinese financial market? *Energy Economics*, *121*, 106674. https://doi.org/10.1016/j.eneco.2023.106674

Ntantamis, C., & Zhou, J. (2022). Corporate payout, cash holdings, and the COVID-19 crisis: Evidence from the G-7 countries. *Finance Research Letters*, *50*, 103275. https://doi.org/10.1016/j.frl.2022.103275

Olsen, B. C., Awuah-Offei, K., & Bumblauskas, D. (2021). Setting materiality thresholds for ESG disclosures: A case study of U. S. mine safety disclosures. *Resources Policy*, *70*, 101914. https://doi.org/10.1016/j.resourpol.2020.101914

Phan, D. H. B., & Narayan, P. K. (2020). Country Responses and the Reaction of the Stock Market to COVID-19—a Preliminary Exposition. *Emerging Markets Finance and Trade*, *56*(10), 2138–2150. https://doi.org/10.1080/1540496X.2020.1784719

Polman, P., & Winston, A. (2022, April 13). *Yes, Investing in ESG Pays Off*. https://Hbr.Org/2022/04/Yes-Investing-in-Esg-Pays-Off.

Rababah, A., Al-Haddad, L., Sial, M. S., Chunmei, Z., & Cherian, J. (2020). Analyzing the effects of <scp>COVID</scp> -19 pandemic on the financial performance of Chinese listed companies. *Journal of Public Affairs*. https://doi.org/10.1002/pa.2440

Rahman, H. U., Zahid, M., & Al-Faryan, M. A. S. (2023). ESG and firm performance: The rarely explored moderation of sustainability strategy and top management commitment. *Journal of Cleaner Production*, *404*, 136859. https://doi.org/10.1016/j.jclepro.2023.136859

Ramadhan, P., Rani, P., & Wahyuni, E. S. (2023). Disclosure of Carbon Emissions, COVID-19, Green Innovations, Financial Performance, and Firm Value. *Jurnal Akuntansi Dan Keuangan*, *25*(1), 1–16. https://doi.org/10.9744/jak.25.1.1-16

Sabbaghi, O. (2022). The impact of news on the volatility of ESG firms. *Global Finance Journal*, p. *51*, 100570. https://doi.org/10.1016/j.gfj.2020.100570

Sherwood, M. W., & Pollard, J. L. (2018). The risk-adjusted return potential of integrating ESG strategies into emerging market equities. *Journal of Sustainable Finance & Investment*, *8*(1), 26–44. https://doi.org/10.1080/20430795.2017.1331118

Sumiati, S., Wijayanti, R., Yuana, P., & Nikmah, C. (2022). Improving company value: the role of human capital, structural capital, capital employed, investment decisions, and manager's attitude to risk. *BISMA (Bisnis Dan Manajemen)*, *14*(2). https://doi.org/10.26740/bisma.v14n2.p110-123

Todorova, N. (2012). Volatility estimators are based on daily price ranges versus the realized range. *Applied Financial Economics*, *22*(3), 215–229. https://doi.org/10.1080/09603107.2011.610739

Wang, H., Shen, H., & Li, S. (2023). ESG performance and stock price fragility. *Finance Research Letters*, *56*, 104101. https://doi.org/10.1016/j.frl.2023.104101

World Health Organization. (2020a, February 11). *Novel Coronavirus (2019-nCoV): Situation report, 22*.

World Health Organization. (2020b, March 11). *WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020*.

Xu, X. (2023). Has ESG Performance Reduced Stock Price Volatility. *Journal of Innovation and Development*, *3*(1). https://doi.org/10.54097/jid.v3i1.8421

Yang, D., & Zhang, Q. (2000). Drift Independent Volatility Estimation Based on High, Low, Open, and Close Prices. *The Journal of Business*, *73*(3), 477–492. https://doi.org/10.1086/209650

Zhou, D., & Zhou, R. (2021). ESG Performance and Stock Price Volatility in Public Health Crisis: Evidence from COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*, *19*(1), 202. https://doi.org/10.3390/ijerph19010202